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# WASTE-TO-ENERGY DOCUMENTS

MAR 17 1980

## JOINT HEARINGS

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BEFORE THE

### SUBCOMMITTEE ON TRANSPORTATION AND COMMERCE

OF THE

### COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE

AND THE

### SUBCOMMITTEE ON ENERGY DEVELOPMENT AND APPLICATIONS

OF THE

### COMMITTEE ON SCIENCE AND TECHNOLOGY U.S. HOUSE OF REPRESENTATIVES

NINETY-SIXTH CONGRESS

FIRST SESSION

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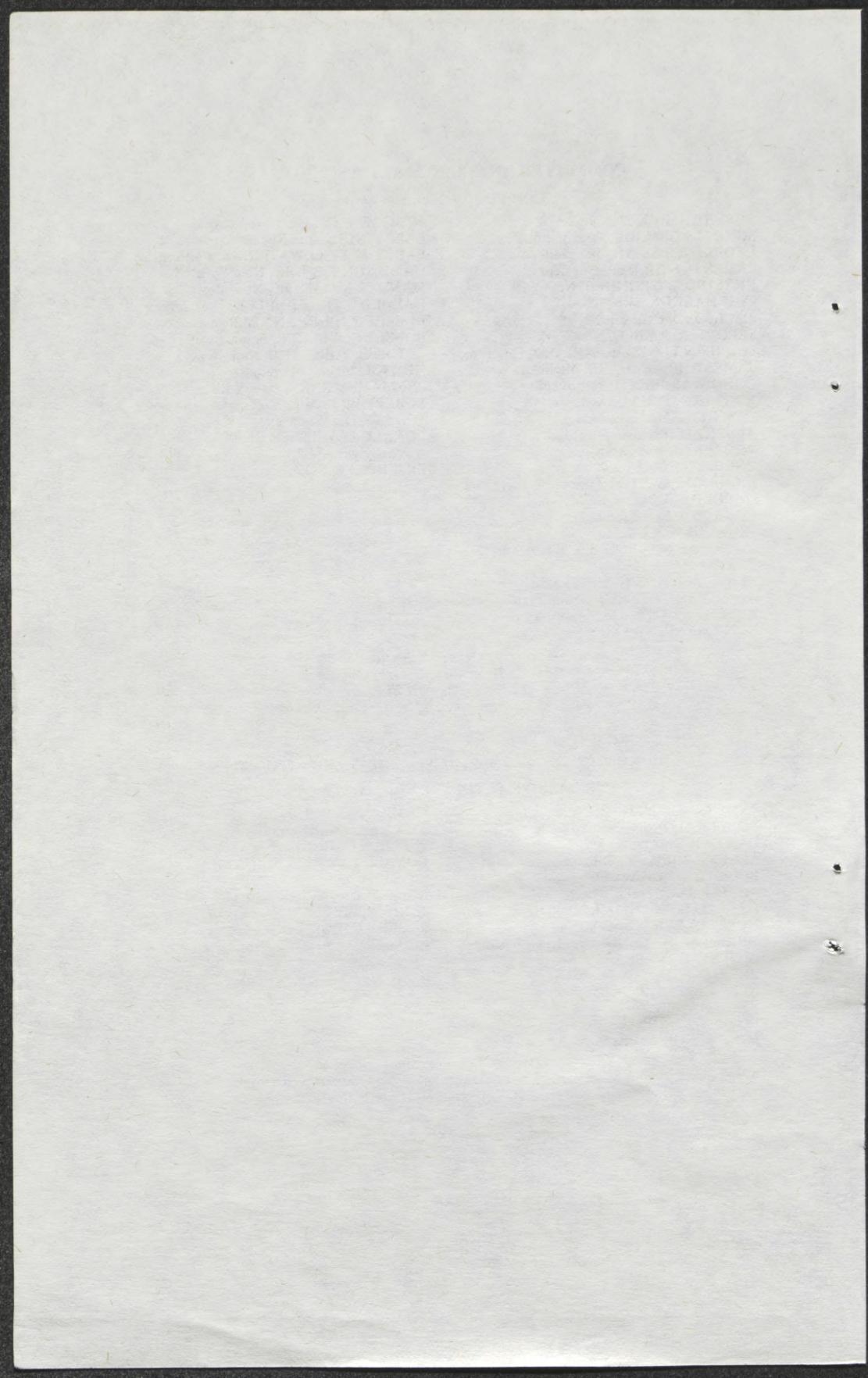
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 National Alcohol Fuels Commission, Theodore A. Schwartz, member.  
 National Center for Resource Recovery, Harvey Alter, Ph. D., director of research programs.  
 Paine, Webber, Jackson & Curtis, Robert H. Aldrich, senior vice president.  
 Port Authority of New York and New Jersey, Neal R. Montanus, director, Industrial Development Department.  
 Sioux Falls, S. Dak., Harold Winger, commissioner.  
 SPM Group, Englewood, Colo., Robert D. Schmidt, president.  
 Waste Management, Inc., Peter J. Ware, director of engineering and technical development.  
 Wheelabrator-Frye, Inc., William J. Boardman, director of regulatory affairs.

## WASTE TO ENERGY

TUESDAY, JULY 17, 1979

HOUSE OF REPRESENTATIVES, SUBCOMMITTEE ON TRANSPORTATION AND COMMERCE, COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, AND THE SUBCOMMITTEE ON ENERGY DEVELOPMENT AND APPLICATIONS, COMMITTEE ON SCIENCE AND TECHNOLOGY,

*Washington, D.C.*

The subcommittees met, pursuant to notice, at 9:30 a.m., in room 2318, Rayburn House Office Building, Hon. James J. Florio, chairman of the Subcommittee on Transportation and Commerce presiding (Hon. Richard L. Ottinger, chairman, Subcommittee on Energy Development and Applications).

Mr. FLORIO. The hearing will come to order.

At the outset, I would like to welcome all of you to what I regard as several days of very important hearings. I would also like to express my appreciation to the distinguished chairman and member of the Science and Technology Subcommittee on Energy Development and Applications, Mr. Ottinger, who is to my right.

Today's hearings symbolically signify the need for cooperation, not only between the various committees with similar jurisdictions, but also between the public and private sectors, and among all policymaking components in Government. It is obvious that the fuel prices have gone up in the last number of years. The President has very dramatically stated in the last few days that there is a need to develop alternative sources of fuel.

Likewise, we are concerned about the environmental problems associated with the disposal of solid waste, most vividly the question of landfills and the expense that is being associated with them.

In a sense, we are being faced with two questions. Can we dispose of solid waste in an environmentally sound way, and can we generate energy out of that disposal process. The purpose of these hearings is to determine whether or not it is feasible to deal with both problems in a coordinated way.

Municipal solid waste may certainly be considered as an underutilized, yet untapped, alternate source of fuel. The recovery of material from the waste stream as well as the recovery of energy from the disposal of nonrecoverable materials can yield substantial energy savings. It is the intent of the subcommittees gathered here today to review the views of the witnesses who have been kind enough to join us to discuss the status of technology as well as the economic and institutional constraints which seem to inhibit the development of commercial waste-to-energy facilities.

I would now ask Mr. Ottinger if there is a statement that he would like to make.

Mr. OTTINGER. Thank you very much.

I am pleased, indeed, to join with my colleague Jim Florio, and to have our two committees, the Interstate and Foreign Commerce Committee's Transportation and Commerce Subcommittee, and our Subcommittee on Energy Development and Applications of the Committee on Science and Technology, join together in what I agree with him are very important hearings.

I would like to acknowledge the great interest and assistance of our ranking minority member, Hamilton Fish, on this subject. He has been a moving force on the subcommittee and the full committee in promoting waste-to-energy applications.

What we would like to do in these hearings is to explore the state of the technology for conversion of waste. Many of our communities are under an order, particularly with respect to sewage sludge, to cease the dumping of sewage sludge in the ocean in 1981. We are very interested in the state of the technology of being able to convert sewage sludge into energy, and other useful applications.

In this waste-to-energy program, we have two problems which we attack at once, and hopefully constructively solve both. One is the energy shortage and the other is the problem that Mr. Florio has indicated, the disposing of solid waste.

The second important question is, why are we not doing it? Other countries in the world are. What is it that impedes our using existing technologies in cities, towns, and villages throughout this country to convert waste to energy? What kind of incentives are needed to overcome whatever barriers may presently exist?

I hope that these hearings are fruitful. This is a subject in which I know many of the members of both committees are very interested, indeed, and I think Congress and the country are very interested.

I thank the gentleman from New Jersey for participating with me in this endeavor.

Mr. FLORIO. Mr. Wydler.

Mr. WYDLER. Yes, I thank you, Mr. Chairman.

I have mainly an interest in this subject matter because of the fact that in my area on Long Island, in the town of Hempstead, there currently exists just such a plant as we generally talk about. It takes municipal garbage and converts it into something useful, in part to recover the metals and other items that can be removed from the garbage and reused, and to make energy, in the form of electricity, which is sold to the local utility company.

This plant has been constructed at a cost of \$80 million. It was operating until recently and has generated a lot of electricity. The practical aspects of it have been proven. It has been closed down for the last few weeks for some nontechnical reasons, namely, a problem with the odor from the plant, which environmental protection, Federal, State and local agencies are working on. So I am sure that it will take a long time to get that straightened out. The other problem is union troubles, which is something that is going to exist, I suppose, no matter who builds the plants. Those are also under consultation now, and maybe they will be straightened out shortly, and the plant will start to operate again.

The point is, of course, that this plant was built without a penny of public money, which is quite a remarkable feat, since, as I said, the final cost was well within the \$100 million range.

I would simply ask the committees to seriously consider, during its hearings, the thought that maybe we don't necessarily have to have the Federal Government build and finance a great number of these plants. As a practical matter, the private industry might well be ready, willing and able to do it, since these plants can be made profitable or at least private industry thinks that they can be made profitable. That might be the way to go.

I only point out to the committee members what I think is the way the President wants to take the country on synthetic fuels, which is a massive Government spending program in an area where I think we could get private industry to do the job, if we gave them a number of guarantees and incentives which might be a lot less costly to the Government in the long run. This might give us the alternative of not going ahead with such a program if, in fact, time proves that it is not the best way to go.

So I would hope that the committee would keep in mind the fact that this is a subject matter that lends itself to private enterprise, and that it is not necessary to have a solution that has the Government paying for all of these plants throughout the country.

Mr. Chairman, I would like to ask you, I have in my mind the fact that I think it would be helpful for this committee to hear a witness from Long Island. I have a gentleman in mind, the supervisor of the town of Hempstead, where this plant has been built, since he mainly was the person who put the proposal together in the first instance, had the plant built or allowed it to be built, and contracted to sell the garbage to the private concern. Now he has the problem of keeping it running. He deals with this on a first-hand basis and has some really important information to give to the members of the committee about actually building and running one of these plants.

I would like to have him here sometime before these hearings end, and testify before the committee. I think he would be a very helpful witness. I understand that there will be a hearing tomorrow, which I am sure he could not make, but that there will be another hearing at some later date. I would like to request that he be called as a witness at that time. He is presiding supervisor Alphonse Dematto of the town of Hempstead.

Mr. OTTINGER. Mr. Chairman, it is certainly agreeable to me, if it is agreeable to you. We plan to take our subcommittee to Hempstead in September to actually take a look at that operation.

Mr. WYDLER. That is good. But are you going to have that third day of hearing before that date, or when?

Mr. OTTINGER. I don't know. We have not scheduled it yet, but we are planning to have both the hearing and the visit to Hempstead in September.

Mr. WYDLER. Then, possibly, that can all be worked out at one time. Thank you.

Mr. FLORIO. I would like to ask my distinguished colleague and friend from New Jersey, Mr. Roe, if he has any comments?

Mr. ROE. Thank you, Mr. Chairman.

I want to applaud the work that you and Dick Ottinger are doing in holding these hearings. I think that it is an extraordinarily important step forward. We have a major problem in the northern part of New Jersey because of a U.S. Supreme Court decision which regrettably allows New York and Pennsylvania to dump waste materials in New Jersey.

We have an abundance of raw material that we are attempting to dispose of, as you know, and I have already introduced legislation to move in that direction in the northern part of our State.

It also seems to me that the point that Mr. Ottinger made about the 1981 sludge situation, getting out of the ocean, is creating an enormous problem in our own State, as you know. So I think that we have to seize this opportunity to really forge some sort of a national approach to this problem, and I think that it can be enormously helpful to particularly urban States in not only getting rid of our solid waste, but converting it into energy usable materials.

So I want to thank you for your leadership in this direction. I think that it is very important to our State and to the Nation.

Mr. FLORIO. Thank you.

Mr. Madigan, the ranking minority member of the Transportation and Commerce Subcommittee, is here, and we would appreciate comments from him.

Mr. MADIGAN. Thank you, Mr. Chairman. I will be very brief.

I simply want to commend both you and Mr. Ottinger for having the initiative to put these hearings together. It seems obvious to me that the things which we foresaw at the time that we developed the Resource Conservation and Recovery Act have not been substantially followed through on by the various departments and agencies of the Government given the responsibility to develop the problems that we had in mind.

I understand that there may very well be very good technical and economic reasons why those things have not gone forward, but I look forward to these hearings, as Mr. Ottinger has said, as an opportunity to determine exactly what the roadblocks are, and see what other incentives might be capable of being developed so that we can overcome those roadblocks.

I want to thank the chairman of the subcommittee especially for his interest in these problems, and yield back to him the balance of my time.

Mr. FLORIO. Thank you very much.

The gentleman from California, Mr. Dornan.

Mr. DORNAN. I really have no further comment, Mr. Chairman, other than what has been stated before. I look forward to the hearings. Thank you.

Mr. FLORIO. Mr. Roth, do you have any comments?

Mr. ROTH. No, Mr. Chairman.

Mr. FLORIO. Mr. Glickman, do you have any comments?

Mr. GLICKMAN. Mr. Chairman, I appreciate the opportunity to participate in the hearings. I think that the most important thing is that we do have EPA, the Department of Energy, and the Department of Commerce people here. I know with this one subject, at times it seems the three agencies can be going in at least three different directions. I think that it is very important that EPA and

the Department of Energy have signed a memorandum of understanding as to what the extent of their roles will be in the future.

I think that it is very important that we have all three here, so that they can coordinate their actions in the future.

I yield the balance of my time.

Mr. FLORIO. Thank you very much.

Mr. OTTINGER. Mr. Chairman, with your permission. Mr. Fish has been unable to be with us, and he has asked if I would read his statement.

First I would like to welcome Mr. Royer to the committee. He has just arrived on the scene, and we are looking forward to working with you on the very important issues facing the subcommittees. We appreciate your being with us.

I would like, at this point, to read Mr. Fish's opening statement. He regrets that he cannot be with us, but he has a conflicting committee meeting this morning. Mr. Fish's statement reads as follows:

"I am particularly pleased that we have scheduled hearings today on the subject of municipal waste to energy. The potential for converting municipal wastes into energy certainly warrants serious consideration by our subcommittee. By converting municipal wastes into energy we can also help solve the ever increasing waste disposal problems which continue to confront our cities.

"I have long been a supporter of the Federal municipal waste-to-energy program. I have watched its progress to the stage where I believe that we should now proceed with serious construction projects. However, I am afraid that the Department of Energy has continued to overlook the promise offered by this program, and to thwart future progress in this area.

"This is evident by the fact that the Department has not requested any funds for actual loan guarantees for fiscal year 1980. In order to remedy this situation, both Chairman Ottinger and myself offered an amendment providing an additional \$10 million for loan guarantees during markup on the DOE authorization bill."

My parenthetical insert is that that passed in the subcommittee and in the full committee.

"We hope that this action will help accelerate the Federal municipal waste-to-energy program and allow us to tap the potential energy contained within these wastes.

"Our Nation anxiously awaits to see what the Federal Government will do to help us solve our energy problems. Of the many energy programs now underway, this program seems to offer great potential for success. We, in the Congress, have a great responsibility to press forward as soon as possible with such promising programs and provide the funding that these programs need to insure their success.

"I believe that we can produce substantial amounts of energy from municipal wastes in the immediate future if we permit Federal funding and loan guarantees for the actual construction of facilities to convert municipal wastes to energy. Our energy shortage is a national problem and the solution should not be an expense solely on any one municipality.

"During the hearings I hope that we will receive useful testimony on the proper role of the Federal Government in this area, and what future direction it should take.

"I am particularly pleased and honored that Ms. Lucille Pattison is present with us and will be a witness today. She is a respected member of the congressional district I have the honor of representing. Mrs. Lucille Pattison has been politically active in the Hyde Park area since 1970. In 1973, she was elected to the county legislature and served 2 years as the majority leader, and 1 year as the minority leader. Mrs. Pattison serves as the first woman county executive in New York State history.

"I thank you, Mr. Chairman, for allowing me to make these remarks. I look forward to the witnesses and welcome their testimony."

Mr. FLORIO. Thank you very much.

We are going to ask the first witnesses to come forward. They represent the General Accounting Office, the Environmental Protection Agency, the Department of Energy, and the Department of Commerce.

Therefore, I would like Mr. J. Dexter Peach, Director of Energy and Minerals, General Accounting Office; Mr. Steffen Plehn, Deputy Assistant Administrator for Solid Waste of the Environmental Protection Agency; Mr. John Millhone, Director of Buildings and Community Systems, Department of Energy; and Mr. Sidney R. Galler, Deputy Assistant Secretary of Commerce for Environmental Affairs, Department of Commerce, to come forward. We would ask the witnesses to introduce themselves, then proceed as they see fit. Their statements will be made a part of the record in their entirety. We would appreciate their proceeding in a summary fashion.

Gentlemen, we welcome you to the committee, and we would ask if Mr. J. Dexter Peach would proceed.

**STATEMENTS OF J. DEXTER PEACH, DIRECTOR, ENERGY AND MINERALS DIVISION, GENERAL ACCOUNTING OFFICE; STEFFEN W. PLEHN, DEPUTY ASSISTANT ADMINISTRATOR FOR SOLID WASTE, ENVIRONMENTAL PROTECTION AGENCY, ACCOMPANIED BY STEPHEN LEVY, CHIEF, RESOURCE RECOVERY BRANCH, OFFICE OF SOLID WASTE, EPA; JOHN P. MILLHONE, DIRECTOR, OFFICE OF BUILDINGS AND COMMUNITY SYSTEMS, DEPARTMENT OF ENERGY, ACCOMPANIED BY DON WALTER, CHIEF, URBAN WASTE AND MUNICIPAL SYSTEM BRANCH, DOE; AND SIDNEY R. GALLER, DEPUTY ASSISTANT SECRETARY OF COMMERCE FOR ENVIRONMENTAL AFFAIRS, DEPARTMENT OF COMMERCE**

Mr. PEACH. Mr. Chairman, as you indicated, I have a complete statement, which is in effect a summary of a report that we prepared and released in February of 1979, entitled "Conversion of Urban Waste to Energy: Developing and Introducing Alternate Fuels from Municipal Solid Waste." I would like to have the entire statement inserted in the record and I would like to try to summarize and highlight what I think are some of the important points.

Mr. FLORIO. Without objection, the entire statement will be printed in the record [see p. 10], and we gratefully appreciate your willingness to summarize.

Mr. PEACH. Let me talk basically about three things. First, I will very simply summarize some things of which I am sure the committees already have some awareness, and that is that the conversion of urban waste to energy can provide multiple benefits. Urban waste is an abundant substance that is growing in volume. The Environmental Protection Agency estimates indicated 175 million tons will be generated annually by 1980, and grow by 1990 to 225 million tons.

The conversion of this waste to energy has a sound scientific and practical basis. About 75 percent of urban waste is combustible. It is sort of an inexhaustible energy resource with a volume that is growing. It is in continuous supply, low in sulfur, and it can be burned so that it produces less sulfur dioxide than pulverized coal.

It also offers other advantages such as the opportunity to recover various ferrous metals, aluminum and glass, and of course it can help reduce our solid waste disposal problems.

We have identified in our study 131 urban waste-to-energy projects in the United States, 20 that are operational, 10 under construction, 30 in the planning phase, and 71 in preliminary study stages. If these 131 projects were all fully operational by 1985, they could process about 36 million tons of urban waste, or 18 percent of the waste produced.

The energy recoverable by these projects, including the recycling of recovered metals and the extraction of methane from existing landfills, could provide the Nation with annual energy savings equivalent to about 48 million barrels of oil now worth about \$980 million.

By 1995, an expansion of these projects could realistically be expected to provide annual energy savings equivalent to some 158 million barrels of oil with a current value of about \$3.2 billion. They could help reduce our growing waste disposal load in an economic and environmentally acceptable way.

Let me move on to a second area, and that deals with the question of how well Federal agencies have been meeting their responsibilities, an area where we found considerable need for improvement at the time of our review.

Existing legislation provides the basis for the Federal role in development and commercialization of municipal solid waste energy systems, and responsibility for administering the legislation has been assigned to EPA, the Department of Energy, and the Department of Commerce. We reviewed the program elements at each of these agencies, and found a Federal urban waste-to-energy program which appeared fragmented, uncoordinated, inadequately funded, uncertain in its priorities, and lacking in a detailed, overall strategy.

More specifically, we found that DOE and EPA plan their activities largely independent of each other, in spite of the similar and overlapping authorities and their May 1976 agreement to coordinate planning and facilitate information exchange.

The Commerce Department's efforts to stimulate broader commercialization of proven resource recovery technologies, develop

specifications, and identify markets, had been stalled by lack of funds.

EPA had given regulation of hazardous waste its top solid waste management priority, and not committed staff and financial resources required to carry out the overall resource recovery provisions of its mandate. EPA and Commerce budget requests for meeting their responsibilities under that act have frequently been cut, and in some cases have been disallowed by OMB.

DOE funded its urban waste technology program at a level inconsistent with the high priority assigned to this technology in the national plan for energy research development and demonstration, and it lacked a specific strategy for the development and implementation of urban waste conversion processes.

Loan guarantee programs authorized by existing legislation had not been funded. At present there are no Federal economic incentives designed specifically to encourage the use of urban waste-to-energy systems on a broad scale.

The State and local governments working with private industry provide the prime impetus for the 131 urban waste-to-energy projects in the United States. Many of these governments and other organizations look to the Federal Government for technical and financial assistance, advice, and encouragement.

In this regard, we believe an improved Federal assistance program is necessary to accelerate the use of urban waste-to-energy systems in the near- and mid-term.

Now to the third area that I wanted to discuss briefly. We believe that increased use by 1985 is possible if the Federal program providing needed assistance is improved. Through providing needed information, assistance and incentives, it is possible that many waste-to-energy systems now in the planning or study phase could be accelerated and could be implemented, and become operational by 1985, to provide the foundation for what can be a valuable source of alternate fuels for our Nation.

We believe that needed program improvements include:

A cohesive and a specific overall strategy for all involved agencies, which takes into account the skills and expertise dispersed throughout them.

A more useful flow of information and an expansion of a practical outreach to State and local governments and to public and private researchers to provide a forum for exchange and dissemination of technical and economic data.

An expansion of studies and research on methods of processing and recovering materials and energy, and in the development of markets and new uses for recycled materials.

In addition, the program should provide technical and financial assistance to communities evaluating or acquiring urban waste-to-energy systems, with appropriate emphasis on encouraging timely implementation of technologies which have been proven in commercial applications.

It should also provide incentives to insure the marketability of energy forms produced, and materials recovered, and to encourage investment in urban waste-to-energy systems; require a determination of which subsidies and economic incentives best foster the use of urban waste-to-energy systems; and require advising the Con-

gress as to which are needed for encouraging the use of these systems in the near- and mid-term.

I will not repeat in detail the recommendations that we made. In essence, we recommended developing a specific kind of plan as to what we want to do in this area, and how we hope to get there. This kind of planning, we found, is absent in a lot of activities in the energy area, in terms of really laying out specific goals and objectives; timetables for how we want to move to meet those objectives and attain those goals; periodic reassessment of our progress, and adjustment, if need be, to make sure that we move toward those goals and objectives.

Our recommendations were designed to have EPA, the Department of Energy, and the Department of Commerce work and present that type of plan, including those type of elements to the Congress.

In general, from a reaction standpoint, in commenting on our report, the Department of Energy and the Department of Commerce agreed with our recommendations, but believed either Energy or Commerce, and not EPA, should have the lead in developing a recommended interagency plan.

In our view, we felt that Congress had already given EPA the responsibility in that area under earlier legislation, and that EPA should retain that leadership role, but if it did not act responsibly after a period of time in the development of such a recommended interagency plan, then a leadership change should be considered by the Congress.

We did not get formal written comments from the Environmental Protection Agency on the report. However, after it was issued, we received some comments from the EPA Deputy Assistant Administrator for Solid Waste that indicated that EPA had implemented new programs which directly addressed some of the activities which our report labels as lacking emphasis.

It is still not clear to us, at this point, what these new programs entail. They were developed after the completion of the review, and we have not evaluated them in detail. I think that these hearings provides a good opportunity to do that.

I was also pleased to learn within the last week, as I did through Trade Press and other sources of information, about the Department of Energy and the Environmental Protection Agency entering into a memorandum of understanding as to how they will work together.

I believe that that is a good first step. I think we will have to see where things progress from that point.

Mr. Chairman, that completes my statement.

[Testimony resumes on p. 24.]

[Mr. Peach's prepared statement follows:]

UNITED STATES GENERAL ACCOUNTING OFFICE  
WASHINGTON, D. C. 20548FOR RELEASE ON DELIVERY  
Expected at 9:30 a.m.  
Tuesday, July 17, 1979STATEMENT OF  
J. DEXTER PEACH  
DIRECTOR, ENERGY AND MINERALS DIVISION  
BEFORE THE  
SUBCOMMITTEE ON TRANSPORTATION AND COMMERCE  
OF THE  
HOUSE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE  
AND THE  
SUBCOMMITTEE ON ENERGY DEVELOPMENT AND APPLICATIONS  
OF THE  
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY  
ON  
CONVERSION OF URBAN WASTE TO ENERGY

Mr. Chairman and Members of the Subcommittees:

We welcome the opportunity to be here today to discuss the conversion of urban waste to energy as a means of helping to alleviate our Nation's energy supply and solid waste disposal problems. My testimony is based on our February 28, 1979, report to the Congress which evaluated Federal efforts to develop and introduce alternate fuels from municipal solid waste. 1/ Our report describes the various waste-to-energy conversion processes, the efforts of private and public agencies to implement them, and the benefits they could provide in the near- and mid-term. It also discusses what we

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1/"Conversion of Urban Waste To Energy: Developing and Introducing Alternate Fuels From Municipal Solid Waste," EMD-79-7, Feb. 28, 1979.

perceive to be major barriers to their use and the actions needed to overcome them.

My testimony focuses on three areas:

- how urban waste-to-energy systems relate to the energy supply and solid waste disposal problems facing our Nation;
- the degree of success or failure of Government programs aimed at encouraging development and use of these systems; and
- improvements needed at the Federal level if we as a Nation are to realize the environmental, economic and energy-related benefits of waste-to-energy conversion.

CONVERSION OF URBAN WASTE TO ENERGY CAN PROVIDE MULTIPLE BENEFITS

Urban waste is abundant and growing in volume. The average person generates 3.5 pounds a day, and as a Nation we generate about 135 million tons a year. The Environmental Protection Agency (EPA) estimates that 175 million tons will be generated annually by 1980, 201 million by 1985, and 225 million by 1990. It is collected at central sites and much of it is combustible. Its conversion to fuel could reduce the waste bulk and do much to eliminate environmental, social, and economic problems now associated with municipal solid waste disposal.

The conversion of these wastes to energy has a sound scientific and practical basis.

--Typically about 75 percent of the waste is combustible matter which can be converted into gaseous, liquid and solid energy forms.

--It is a virtually inexhaustible resource and the volume generated is growing.

--It is in continuous supply and is concentrated in cities which require large amounts of energy.

--A ton of municipal solid waste contains about 9 million British thermal units (Btus) of heat energy and could provide as much energy as 65 gallons of fuel oil or about 9,000 cubic feet of natural gas.

--It can be fired as a supplemental or primary fuel in commercially available steam boilers.

--It is low in sulfur and can be burned so that it produces less sulfur dioxide than pulverized coal.

Furthermore waste-to-energy conversion offers other advantages:

--Saleable materials such as ferrous metals, aluminum, and glass can be recovered and by-products such as carbon, char, ash, and glassy aggregate, which can be used in the manufacture of cement and paving materials or for fertilizer, are produced.

--Landfill requirements can be reduced by as much as 95 percent (if materials are recovered) at a time when suitable landfill area is scarce and this method of disposal is being restricted or prohibited.

--Energy recovery can be more economical and more environmentally preferable than conventional incineration systems which have no heat recovery capabilities.

In spite of the benefits, however, use of urban waste-to-energy systems in the United States is not widespread due largely to institutional or economic barriers. In contrast to Western Europe, where conversion of waste to energy is a well established technique and where over 180 plants are operational, the United States has about 20 plants operating. In the past, abundant land, material, and energy resources have made such systems uneconomical in the United States. The economics are now changing, however. Conventional methods of waste disposal--incineration, landfill, or ocean dumping--are being disallowed or becoming more costly due partly to strict enforcement of environmental regulations and the lack of suitable landfill space near urban areas. Also, the rising cost of conventional fossil fuels has improved the competitiveness of alternate fuels.

The Nation is beginning to respond to the new situation and opportunities, but we feel the response could be accelerated. Projections show that only small amounts of the urban waste generated will be converted to energy. EPA estimates that currently about 1 million tons per year of municipal solid waste, less than 1 percent of the waste produced, will be processed for energy. By 1985, EPA estimates that 112 million tons annually of solid waste will be available for conversion to energy. Agency projections indicate, however, that based on present trends and policies, only 10 to 20 million tons of these wastes could be processed for energy and material recovery. We believe the amount converted by 1985 could be substantially increased.

We identified 131 urban waste-to-energy projects in the United States, 20 operational, 10 under construction, 30 in the planning phase, and 71 in preliminary study stages. If these 131 projects were all fully operational by 1985, they could process about 36 million tons of urban waste--18 percent of the waste produced. The energy recoverable by these projects, including the recycling of recovered metals and the extraction of methane from existing landfills, could provide the Nation with annual energy savings equivalent to about 48 million barrels of oil now worth almost \$980 million. By 1995, an expansion of these projects

could realistically be expected to provide annual energy savings equivalent to some 158 million barrels of oil with a current value of about \$3.2 billion. These projects could help reduce our growing waste disposal load in an economical and environmentally acceptable way.

FEDERAL AGENCIES NOT MEETING  
THEIR RESPONSIBILITIES

Existing legislation provides the basis for the Federal role in the development and commercialization of municipal solid waste energy systems, and responsibility for administering the legislation has been assigned to EPA and the Departments of Energy (DOE) and Commerce. We reviewed program elements at each of these agencies and found a Federal Urban Waste-to-Energy Program which appeared fragmented, uncoordinated, inadequately funded, uncertain in its priorities, and lacking in detailed overall strategy. More specifically, we found that:

- DOE and EPA planned their activities largely independently of each other in spite of their similar and overlapping authorities and their May 1976 agreement to coordinate planning and facilitate information exchange.
- Commerce Department efforts to stimulate broader commercialization of proven resource recovery

- technologies, develop specifications, and identify markets for recovered materials had been stalled by lack of funds.
- EPA had given regulation of hazardous wastes its top solid waste management priority and had not committed the staff and financial resources required to carry out the overall resource recovery provisions of its mandate.
  - EPA and Commerce budget requests for meeting their responsibilities under the Resource Conservation and Recovery Act of 1976 had frequently been cut and in some cases disallowed by Office of Management and Budget.
  - DOE funded its urban waste technology program at a level inconsistent with the high priority assigned this technology in its national plan for energy research, development and demonstration, and it lacked a specific strategy for the development and implementation of urban waste conversion processes.
  - Loan guarantee programs authorized by the Energy Conservation and Production Act of 1976 and the Department of Energy Act of 1978 had not been funded. At present, there are no Federal economic incentives designed specifically to encourage the use of urban waste-to-energy systems on a broad scale.

State and local governments, working with private industry, provide the prime impetus for the 131 urban waste-to-energy projects in the United States. Many of these governments and other organizations look to the Federal government for technical or financial assistance, advice, and encouragement. We believe an improved Federal assistance program is necessary to accelerate the use of urban waste-to-energy systems in the near- and mid-term.

INCREASED USE BY 1985 IS POSSIBLE  
IF THE FEDERAL PROGRAM FOR  
PROVIDING NEEDED ASSISTANCE  
IS IMPROVED

If the Federal Urban Waste-to-Energy Program were improved to provide needed information, assistance, and incentives, it is possible that many waste-to-energy systems now in a planning or study phase could be accelerated and could be implemented and become operational by 1985. These projects can provide the foundation for what can be a valuable source of alternate fuels for our National energy system.

We believe needed program improvements include:

- A cohesive and specific overall strategy for all involved agencies which takes into account the skills and expertise dispersed through these agencies.
- A more useful flow of information and an expansion of practical outreach service to State and local governments and to public and private researchers to provide

a forum for the exchange and dissemination of technical and economic data and to help identify and resolve institutional problems and concerns.

--An expansion of studies and research on methods of processing and recovering materials and energy and on the development of markets and new uses for recyclable materials. This will help resolve technical, economic, and environmental uncertainties regarding the conversion processes, the energy forms produced, and materials recovered.

In addition, the program should provide technical and financial assistance to communities evaluating or acquiring urban waste-to-energy systems, with appropriate emphasis on encouraging timely implementation of technologies which have been proven in commercial applications. It should also provide incentives to ensure the marketability of energy forms produced and materials recovered, and to encourage investment in urban waste-to-energy systems. This will require the timely determination of which subsidies and economic incentives best foster the use of urban waste-to-energy systems and require advising the Congress as to which are needed for encouraging the use of these systems in the near- and mid-term.

RECOMMENDATIONS

We recommended that the Administrator of EPA, in consultation with the Secretaries of Energy and Commerce, develop and submit to the Congress by September 30, 1979, a detailed 10-year plan describing the specific strategy for the Federal Urban Waste-to-Energy Program. The plan should be coordinated with other Federal agencies, State and local governments, private industry, and public interest groups, and be updated and submitted annually. This interagency plan should:

- Specify goals and objectives with appropriate emphasis on commercialization and research, development, and demonstration activities which must take place by 1985 if the Nation is to realize the full potential of urban waste-to-energy systems in the 1985 to 2000 time frame.
- Define the specific roles and responsibilities of DOE, EPA, Commerce, and any other Federal agencies involved in this effort, giving full consideration to any organizational realignments or transfers of responsibilities which will minimize overlapping of functions and lead to improved effectiveness of program operations.
- Provide that all relevant interagency agreements are finalized in a timely fashion.

--Establish time frames and resource requirements for accomplishing the plan's purpose, and identify alternative financing options and the specific type and timing of Federal assistance by each agency needed to facilitate completion of projects in advance planning and preliminary study stages.

In addition, the plan should provide for:

--Incentives which best foster the use of urban waste-to-energy systems and their products, including technical and limited financial assistance aimed specifically at encouraging the timely completion of all 131 solid waste energy projects.

--An improved information and education program to furnish States and local governments with a maximum flow of information and practical assistance regarding such matters as system planning, acquisition, and implementation; Federal financial guarantees; sale and use of plant output; and needed compliance with relevant environmental standards.

To facilitate oversight and coordination, the plan should include milestones to measure progress in meeting goals and objectives, and also include appendixes expressing the separate views of the Departments of Energy and Commerce.

The Departments of Energy and Commerce generally agreed with our recommendations but believed that either Energy or Commerce, not the Environmental Protection Agency, should have the lead in developing our recommended interagency plan. Because the Congress has already given EPA responsibility for planning, developing, and coordinating Federal solid waste management programs and the recovery of resources, including energy, from wastes, we believe that the leadership role properly belongs with EPA. However, should the Agency not act responsibly in developing the recommended interagency plan, then a leadership change should be considered by the Congress.

EPA did not provide formal written comments. However, after our report was issued, the EPA Deputy Assistant Administrator for Solid Waste did comment on the report and indicated that EPA has implemented new programs which directly address activities which our report labels as lacking emphasis. It remains unclear to us what these new programs entail. Since these programs were apparently begun after completion of our review, we obviously have not evaluated their relevance to correcting the shortcomings discussed in our report. These hearings provide a good opportunity for EPA to shed more light on this matter.

In summary, we believe municipal solid waste is a promising domestic energy source. Urban waste-to-energy systems

can provide a valuable supplement to the Nation's energy supply and help to resolve material resource and solid waste disposal problems. They could

- produce energy from a new and available source equivalent to 48 million barrels of oil annually by 1985, and some 158 million barrels by 1995;
- recover non-renewable materials such as iron and aluminum, while conserving much of the energy used to process virgin materials;
- process urban waste in an economical and environmentally acceptable way.

Technologies for converting this resource to energy and recovering valuable materials are available. Some have been commercially proven and are used extensively for energy conservation in Western Europe. However, if technologically and economically viable waste-to-energy systems are to be used on an accelerated schedule in the near- and mid-term, a more active role by the Federal Government is required.

The interagency plan we recommended provides for incentives which best foster the use of urban waste energy systems and their products, including technical and limited financial assistance. We believe particular emphasis should be given to those projects employing commercially available technologies. These projects would then serve as examples for other projects

yet to be developed and minimize or eliminate the need for substantive, long-term Federal involvement. We also believe the specific role that loan guarantees should have in support of municipal solid waste projects and the amount of financial risk that might require Federal guarantees should be determined as part of the interagency planning effort.

Mr. Chairman, this concludes my statement. We will be happy to answer any questions the Subcommittees might have.

Mr. FLORIO. We thank you very much.  
It is appropriate that we now call on Mr. Steffen Plehn of EPA.

#### STATEMENT OF STEFFEN W. PLEHN

Mr. PLEHN. Mr. Chairman, Mr. Ottinger, I am very pleased to be here today. I have a statement, and I will also not read that. I will try to summarize some of the key points.

Mr. FLORIO. Without objection, your statement will be printed in the record [see p. 29] in its entirety.

Mr. PLEHN. I think that this is a very useful hearing, and I think that it is very symbolic, in turn, that the four of us are sitting here at the table talking to you together.

As a first point, I would like to say that we need to keep in mind that energy recovery from waste can take two forms:

First, energy can be recovered from the direct combustion of waste, along or in combination with another fuel such as coal. Garbage is not the best fuel in the world. It has about half the Btu's of coal, but it is a useful energy source.

Second, the recovery of materials such as ferrous metals, aluminum, paper, and glass is also a form of energy recovery.

For example, a ton of aluminum takes 30 barrels of oil to process, and a ton of recovered aluminum requires only 1 barrel of oil to process. Similarly, a ton of newsprint from virgin pulp requires almost 4 barrels of oil, whereas a ton from recovered newsprint requires about 1½ barrels.

Fortunately, there is no inherent conflict between source separation and waste recovery and the production of energy directly from waste. As I will discuss, EPA's program emphasizes both.

EPA has been concerned with the recovery of resources from waste for about 10 years, and our program in the late 1960's and early 1970's centered heavily on financial support for the further development of technologies in this area. We ran a series of demonstration projects around the country, which were the precursors of the Hampstead plant that was discussed, and some of the others.

I think that that program was a very successful one in terms of increasing the knowledge base, and the development of the technologies in this area. We believe at this point—I think that this is the point that Mr. Peach made—that these technologies are now at a point where a community can proceed with confidence to develop a facility on the basis that the risks involved in the technology are manageable.

Therefore, consistent with the mandate that we received in 1976 under the Resource Conservation and Recovery Act, the focus of our program has shifted to one of providing financial and technical assistance to communities to implement resource recovery systems. It is our judgment, based on our experience in this field, that this is probably the most significant of the obstacles to implementation in this country.

I might just hold this chart up, which I am not sure you are going to be able to see, but I will leave it with you, if you like, and you might look at it afterward.

This is drawn from something which is almost completed. This is in the final draft. This is called "A Resource Recovery Management Model." What this is directed to is the city manager, or the

mayor of a community, who wishes to implement a resource recovery system. We have developed this with the cooperation of people that have been experienced in doing this, and it attempts to lay out every step that has to be taken and the order in which they have to be taken, in order for a project to be successful.

This top chart is the overall flow diagram of all of the steps that a community has to take from the time of initial feasibility studies, through feasibility planning, through procurement planning, and through procurement, to get up to the point that the facility goes into construction and operation.

This chart is the summary chart. Over here is a blip that says: "Analyze the waste stream." This chart down here shows the steps that the community needs to go through to properly analyze the waste stream, and there is a chart like that for each one of the summary charts up here.

We have also provided a sheet which indicates who ought to do the job, what the objectives of the job are, how long it is likely to take, what literature is available, et cetera.

The point I want to make here is that this is a kind of a planning and procurement task which is foreign to communities. You are not, here, buying off-the-shelf items which a community can purchase and then put into operation. You are talking about developing a sophisticated business relationship between a community which has the raw material, which is called garbage, and a private enterprise which is willing, under terms, to put in capital and develop facilities to process that garbage to produce a product.

It is at this problem that EPA is trying to direct its efforts. How to help communities get through this process effectively and efficiently, and without problems. To do that, we have a five-part program.

The centerpiece of our program is a program of grants to local communities which the President recommended in his urban message in March of 1978. We received appropriations of \$15 million for that in fiscal year 1979. The President requested an additional \$14 million for that program in the fiscal year 1980 budget.

Under it, after a careful, competitive, solicitation process, we have selected 68 communities, of which 66 now appear to be moving ahead to receive grants to support this planning through the feasibility stage, the procurement planning, and the procurement stages.

We have carefully structured that program in terms of phasing. We are going to insure that communities successfully complete each phase before they move to the next phase. In selecting the communities, we sought primarily to determine those communities where the preconditions for successful resource recovery were best, namely, where the landfill possibilities were very difficult, because it is our experience that unless a community really is up against the wall in landfilling, they will not have the energy and the commitment to follow through with this detailed planning process, and also where there was a commitment of the people involved to seeing this project through.

Those funds will permit a community to hire one or two full-time people, and to hire the consulting assistance that they need to

move through this process. In addition to that, we have a number of other forms of assistance to provide to them.

Through the technical assistance panels program, under the Resource Conservation and Recovery Act, we can provide teams of consultants who are expert in this field, that can come in and advise these communities at appropriate points. Over the last year and a half, we have assisted 160 communities around the country with different forms of advice and assistance on resource recovery issues.

We also, under the subtitle D of the Resource Conservation and Recovery Act, are providing support to the State governments for them to develop the capability to assist their communities in this process.

As you are aware, States like the State of Connecticut and recently the Government of Puerto Rico have developed resource recovery authorities. These entities have bonding authority for the financing of these facilities. They also can provide technical and planning assistance to the communities in developing these facilities.

Other States, such as New York, have not gone the authority route, but have the capability in their State department of environmental conservation. We believe that that is extremely important, and are providing support for that through the subtitle D program.

We also have a number of efforts underway to develop information and disseminate that information and assistance. We have an evaluation program which evaluates operational facilities, both in Europe and in this country, in order to determine their technical reliability, their economic costs, their environmental performance. We disseminate that information to the industrial community, and the consuming community.

We also have what has been a very well received program of resource recovery seminars, which we give five to six times each year around the country. We have had 2,000 attendees. They have been very enthusiastic. This is a 2-day program in which you really come to grips with the nuts and bolts of this problem, find out what the opportunities are, and find out what the problems are.

Finally, one other point that I would like to make about this planning process. When a community goes out with a request for proposal, if it is responded to seriously by one of the industries that is in the resource recovery business, they are talking about spending somewhere between \$100,000 and \$500,000 in responding to that community's request.

A point that I would like to make is that we think that this planning, in addition to helping the community get their act in order, will insure that the RFP's that finally go out to those industries that can provide these systems will be well drawn, the necessary data will be there. The community will really know what it is doing, and the industry as a result can have a high degree of confidence that it has a good chance of proceeding with a project that will be successful.

Finally, I would like to comment briefly on the report of the GAO, and its criticisms of the degree of cooperation between the various Federal agencies that have been involved.

I think that the basic thrust of the report is sound. I think that it is clear that the coordination between the Federal agencies can and must be improved. I think that the concept of an integrated planning effort to bring together the activities of the various agencies is a very sensible one. In connection with that, we have had with the Department of Commerce, as you know, an interagency agreement which has been in effect for about a year. We recently entered into a memorandum of understanding with the Department of Energy, which for the first time defines distinct but complementary roles for our two agencies.

We believe, and I know the Department of Energy believes, that this really provides now a very firm conceptual basis for the development of an integrated Government plan.

Mr. OTTINGER. May I interrupt at this point, Mr. Chairman?

Could you just spell that out for us, in all of its details, where the pieces fit as you see it?

Mr. PLEHN. The basic concept of our agreement with the Department of Energy is that the Environmental Protection Agency should have the lead responsibility for all interactions with State and local governments on the planning and procurement of resource recovery systems. The Department of Energy should have the lead for all financial support for demonstrations leading toward the further development of technology, or for the general subsidization through the loan guarantee program of resource recovery facilities.

We have further worked out a procedure whereby the Department of Energy will communicate to us those technologies in which they are particularly interested in demonstrating or supporting. We will communicate that to those communities which we have selected in our urban grant program for the planning support, so that those communities are well aware of what it is that the Department of Energy is interested in funding.

At the point that a community decides that it wants to move forward with the technology that the Department of Energy is interested in demonstrating, and the Department of Energy determines that it is interested in that community as a site for that demonstration, the management of the project would shift to the Department of Energy.

Mr. FLORIO. Mr. Plehn, I have received a copy of the memorandum of understanding. It is relatively succinct and easily understood. It might be in the interest of at least the two agencies to make copies of this memorandum available to the members of the committee.

Mr. PLEHN. I will be very glad to do that, Mr. Chairman.

Just as a final point, with respect to the need for the development of this interagency plan, the Environmental Protection Agency is setting up a meeting, which is going to occur within the next month between Mr. Jorling and his counterparts at the Department of Commerce and the Department of Energy to begin to work on that plan.

Our objective is to try to develop a plan for submittal to the Congress in March of 1980, with the updating of that plan every year thereafter, consistent with the recommendations of the General Accounting Office. So we will be proceeding with that.

I ought to say that I think a lot of useful, if not very formal, communication and coordination has taken place to date. My staff, and the Department of Energy staff, and the Department of Commerce staff are in communication every day. It is not as though we don't know what we are doing, or we are not working closely together. However, there clearly is a need for a more integrated and formal coordination of our efforts.

Mr. OTTINGER. Mr. Chairman, I think that it would be useful if we could have the memoranda of understanding, both between EPA and the Department of Energy, and EPA and the Department of Commerce, for the record.

Mr. FLORIO. If the agencies would make available to the committee copies of those, they will be, without objection, entered into the record [see p. 41].

Mr. PLEHN. Just the final thing that I think would be of interest to your committee. This is the most recent publication of the National Center for Resource Recovery, which is a privately funded group which does excellent work in this area, and they have what I think would be for you a very interesting article, called "Overcoming Barriers to Resource Recovery," which was developed as an outgrowth of the 2-day conference which the MITRE Corp. hosted here in Washington last year.

To my mind, I think that it provides a very clear and useful overview of some of the obstacles that have laid in the way of the rapid implementation of resource recovery in this country.

Mr. WYDLER. In view of the witness's recommendation of this article that we have in front of us, I ask unanimous consent that it be included in the hearing record.

Mr. FLORIO. It will be so ordered [see p. 54].

Mr. PLEHN. That concludes my statement, Mr. Chairman, I will be very glad to answer any questions.

[Testimony resumes on p. 61.]

[Mr. Plehn's prepared statement and additional material requested follows:]

STATEMENT OF  
STEFFEN W. PLEHN  
DEPUTY ASSISTANT ADMINISTRATOR FOR SOLID WASTE  
ENVIRONMENTAL PROTECTION AGENCY  
BEFORE THE  
SUBCOMMITTEE ON TRANSPORTATION AND COMMERCE  
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE  
AND THE  
SUBCOMMITTEE ON ENERGY DEVELOPMENT AND APPLICATIONS  
COMMITTEE ON SCIENCE AND TECHNOLOGY  
HOUSE OF REPRESENTATIVES  
July 17, 1979

Mr. Chairman, I am Steffen Plehn, Deputy Assistant Administrator for Solid Waste of the U. S. Environmental Protection Agency. I thank you for this opportunity to talk with you today about the recovery of energy from municipal solid waste. I would like to tell you how EPA perceives this effort and what EPA's role is in moving the United States toward the maximum potential recovery of energy from waste.

Let me say at the outset that energy recovery from waste can take two forms. First, energy can be recovered for the direct combination of waste, alone or in combination with another fuel such as coal. A ton of waste in the United States contains about 4500 BTU per pound, about half that of coal. Second, the recovery of materials such as ferrous metals, aluminum, paper, and glass is also a form of energy recovery. For example, a ton of aluminum from virgin ore requires the equivalent of over 30 barrels of oil to process. A ton from recovered aluminum requires about 1 barrel.

Similarly, a ton of newsprint from virgin pulp requires the equivalent of almost 4 barrels of oil, whereas a ton from recovered newsprint requires about 1 1/2 barrels. Fortunately, there is no inherent conflict between source separation and waste recovery and the production of energy directly from waste. As I will discuss, EPA's programs emphasize both.

For over ten years EPA, and its predecessor organization in HEW, has been concerned with assisting local communities in dealing with their solid waste management problems; from storage to collection to incineration and disposal on the land to reduction of the waste to be disposed. It has been our experience that, invariably, waste-to-energy projects are developed as a community's solution to its solid waste management problem.

In response to the increasing demands for technological means to recover energy and materials and reduce the amount of waste that must be disposed on the land, EPA in the early 1970's supported a series of efforts to develop technology base. Our research, development, demonstration and evaluation efforts and with those of other Federal agencies and private industry resulted in the creation of a technological base that can satisfy the resource recovery needs of the immediate future. By no means have we learned all one would like to know about all available technologies. That process is still continuing. We now feel, however, that there is a strong enough technological base available for communities

to implement resource recovery without assuming unnecessary or unreasonable risks. This, of course, presumes that these systems are carefully planned and implemented and that the experiences and data gathered from other earlier efforts are utilized.

With that in mind, EPA has been shifting its emphasis from technology development to that of encouraging and supporting the implementation of projects. We have developed a number of very effective tools which are having a positive impact on the rate of implementation. Before reviewing them for you, however, I would like to first outline some of the major reasons why we feel so strongly about supporting a program to accelerate this nation's resource recovery movement.

First, the market for energy from waste is strengthening. The increasing value of the energy products and the demand for noninterruptable, renewable energy sources has created an excellent market potential for the energy produced in a resource recovery system.

Second, low cost alternatives to resource recovery are disappearing. The increased costs of operating sanitary landfills in compliance with environmental regulations; the increasing transportation and energy costs associated with delivering wastes to remote landfill sites, and the uncertainty of long term costs associated with controlling

leachate, gas migration and other environmental problems from landfills long after they are filled and abandoned have all tremendously narrowed the economic gap between landfilling and resource recovery.

Third, public opposition to the siting of sanitary landfills is at an all-time high. The fear that these sites might "come back to haunt them" some time in the future, such as is currently happening with many industrial and municipal waste landfills, makes the job of siting a landfill all the more difficult. Resource recovery systems, on the other hand, require smaller sites and are usually located in industrial areas.

And finally, the technology is ready. We have learned enough about waste-to-energy technologies to enable communities to build systems that entail acceptable levels of risks.

Despite the widespread, popular support that resource recovery enjoys in this country, I am sorry to say, Mr. Chairman, that the United States lags far behind other industrialized nations in the extent to which it recovers energy from municipal solid wastes. In 1978, only 10 percent of our waste was recovered and less than two percent of our waste was recovered directly as energy. Yet, in a number of Western European countries recovery rates of 25 to 50 percent have been achieved. If we, like some European countries, recovered energy from 50 percent of our waste, it would be

equivalent to a little over half of the oil we imported from Iran in 1978. I should like to note, however, that in the past, we have not experienced the same constraints on fossil fuel supplies or such a limited availability of land for waste disposal as those other countries have.

As those same constraints are becoming more critical in this country, we look upon those European countries as an example of what is possible for us to achieve. EPA's efforts over the next few years will be directed towards helping to raise the U. S. percentages for both energy and materials recovery. We believe that by 1990, the U. S. can reasonably expect to recover at least 15 percent of the waste stream through energy recovery and another 10 percent through materials recovery. Hopefully we will do even better than that.

Our approach to the problem is to provide communities the tools necessary to remove the obstacles which have impeded this nation's resource recovery efforts. Our experiences over the years have clearly identified the institutional barriers as probably the major obstacle to more widespread implementation of resource recovery systems.

Planning for an energy recovery plant is very complex. It requires management of a series of technical, marketing, financial, legal and organizational factors that are new to local governments. And many communities are not able to

66 communities selected for support. The implementation of these projects will save almost 6 million barrels of oil each year. This will raise energy recovery from solid waste in the U. S. from the current 2 percent to almost 9 percent of the waste stream. These communities were chosen from over 200 applicants. Funds under this program can be used to support project feasibility analysis, development of a procurement strategy, and the solicitation and selection of contractors to design and construct facilities. Funds cannot be used for actual design, land acquisition, equipment, or construction. We have taken this position because we have found that technically sound, well conceived projects can be readily financed through traditional capital markets in the private sector.

Another program with which EPA is supporting State, local, and even Federal agency efforts to implement resource recovery is the Technical Assistance Panels Program. This Program, which is managed through the ten EPA Regional Offices, provides staff and consultant expertise to help these agencies in solving their resource recovery problems. In 1978, over 100 communities throughout the United States received this type of assistance. And so far this year, we have assisted almost sixty more.

We are also encouraging the States to take a more active role in the development of resource recovery projects. Planning

budget out of their operating funds the several hundred thousand dollars that are necessary to address these factors properly.

The end result is that the community is thus not able to do a very good job of planning for resource recovery implementation. And absent a careful thinking-out of their requirements, a community is likely to encounter problems. If a sufficient supply of waste is not assured, the project is doomed to be uneconomical. If the request for proposal is not well thought through, industry can't respond well nor will the financial community be interested in risking their investment dollars in a poorly thought-out project. In addition, the energy community - the utility company and consumer - will be unsure of the product they are expected to buy.

Everyone in the system is totally dependent on the quality of the planning effort. If any part of that effort is poorly executed, the project is unlikely to succeed.

In order to assist communities to overcome these implementation problems, the President, as part of his Urban Policy Program in March 1978, initiated a program to provide funds to urban areas to do the necessary comprehensive planning effort to develop resource recovery projects. It is intended to be a three year program, and we are currently completing the awarding of financial assistance to the first

at the State level is another important element of EPA's overall resource recovery program focus. Under RCRA, States are provided funding to develop comprehensive State plans dealing with all areas of solid waste management including resource recovery. Planning requirements established by EPA include specific actions regarding resource recovery, including removal of State laws which make contracting for resource recovery services difficult. In addition, we have drafted a guide explaining how the States can go about providing technical assistance, financial assistance, information dissemination, and other services to help aid their local communities in implementing resource recovery. Some States have even gone so far as to establish Resource Recovery Development Authorities with bonding power to finance waste-to-energy projects.

In addition to providing direct assistance, EPA also conducts an extensive program of information development and dissemination. We support numerous evaluations and studies of European and domestic projects to generate factual, detailed data for use by decision makers and officials responsible for implementing those decisions.

Probably two of the most effective tools with which EPA is able to convey resource recovery information are through the Resource Recovery Implementation Seminar Program and a newly developed "Resource Recovery Management Model."

During the past two years over 2,000 Federal, State, local, and private decision makers have received a two-day resource recovery overview from our implementation seminar program. This program, which has been very favorably received, has encouraged certain communities to proceed with resource recovery projects; we also know that, appropriately, it has discouraged some communities that are not yet ready for resource recovery.

Our Resource Recovery Management Model will be invaluable to communities proceeding with waste-to-energy systems. The model, developed with the advice of recognized experts who have been involved in resource recovery implementation efforts here in the United States, clearly delineates each step necessary to bring a project from an idea to a reality. This one tool will be instrumental in expediting the implementation process in this country.

In all of the efforts, EPA seeks to place equal emphasis on source separation as on direct energy recovery. In our Urban Policy grant program, for example, we will be funding several source separation projects and require other communities to consider explicitly how to incorporate source separation in their projects.

Before concluding my remarks, I'd like to briefly reflect on the relationship of EPA's Resource Recovery Program, as I've just described it, to the programs of the Department of Energy and Commerce. We have recently concluded a comprehensive Memorandum of Understanding with

the Department of Energy that establishes EPA as the lead agency in working with communities in project planning and development, and DOE as the lead agency for demonstrations of new technologies and for financial assistance in facility construction. In this pursuit, DOE will develop a list of candidate technologies for demonstration. Appropriate communities being assisted by EPA will be identified and selected for hosting those demonstrations.

I think DOE shares our feeling that the most pressing need in the technology development area is to improve currently available technologies, instead of developing dramatically new concepts. We must identify and eliminate the problems that are reducing the technical, economic, and environmental effectiveness of the "conventional" alternatives for energy recovery from municipal solid waste.

An Interagency Agreement between EPA and the Department of Commerce, defining our respective resource recovery responsibilities, has been in effect since May 30, 1978. The Department of Commerce has the lead in developing and expanding markets for recovered materials. This role is a significant adjunct to our efforts to accelerate the rate of implementation of resource recovery systems. The materials recovery components of most existing energy recovery systems are not economically viable because the recovered products are difficult, if not impossible, to market. Creating a

greater demand for recovered materials will improve the economic viability of many types of energy recovery systems.

Our efforts to insure coordination of our activities with those of the Department of Energy and the Department of Commerce do not end with the signing of the Memorandum of Understanding and the Interagency Agreement. EPA has assumed the lead role in establishing an Interagency Committee to develop a joint five year plan and to act as a focal point for coordination of Federal activities in this area. A five year action plan will be completed by March 1, 1980.

Mr. Chairman, I thank you for having given me this opportunity to testify at this hearing and I will now attempt to answer any question you would care to direct toward me.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

JUL 31 1979

OFFICE OF WATER AND  
HAZARDOUS MATERIALS

Honorable James J. Florio  
Chairman  
Subcommittee on Transportation  
and Commerce  
Committee on Interstate and  
Foreign Commerce  
House of Representatives  
Washington, D. C. 20515

Dear Mr. Chairman:

As you requested during the joint hearing on July 17, 1979, on the subject of energy conversion from waste, for the record I am forwarding to you a copy of the Memorandum of Understanding between the Environmental Protection Agency and the Department of Energy, and a copy of the Interagency Agreement between the Environmental Protection Agency and the Department of Commerce.

During the hearing, we spoke of the economic and technical factors which deter utility companies from burning fuel derived from waste. Questions were raised concerning mechanisms which might be developed to encourage the utilities to cooperate with such resource recovery efforts, and shortly after returning from the hearing we identified one possible mechanism that we will explore.

Under Subtitle "D" of RCRA, EPA provides funds to States for the development of comprehensive, State-wide plans for solid waste management, including resource recovery. Since the utility companies are generally licensed by the States, we believe that this question of cooperation is one which should be considered by the States in the development of their plans.

On August 28, 1978, we published proposed Guidelines for developing State plans, and within the next ten days, we expect to issue them in final form. Although the "utility cooperation" aspect is not specifically incorporated in the Guidelines, we will take other steps in our continuing contacts with the States to encourage them to do so.

Please advise us if we can be of further assistance in the conduct of your studies on this very timely and crucial subject concerning the conversion of waste to energy.

Sincerely,

Steffen W. Plehn  
Deputy Assistant Administrator  
for Solid Waste

Enclosures

MEMORANDUM OF UNDERSTANDING  
BETWEEN THE  
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
AND THE  
UNITED STATES DEPARTMENT OF ENERGY  
ON ENERGY RECOVERY FROM MUNICIPAL  
SOLID WASTE

A. Introduction

This document is an agreement between the Environmental Protection Agency (EPA) and the United States Department of Energy (DOE) on the subject of planning, demonstrations, and financial assistance for commercialization relating to the recovery of energy and materials from solid waste. This Memorandum of Understanding (MOU) clarifies and augments an earlier Interagency Agreement between EPA and the Energy Research and Development Administration which was concluded on May 7, 1976; parts of that May 7, 1976 Agreement dealing with research and development activities may be addressed in a separate MOU to be developed by EPA's Office of Research and Development and DOE.

B. Scope of this Agreement

This MOU deals specifically with resource recovery from municipal wastes. Municipal wastes are defined here to include trash and garbage from commercial and residential sources and sewage sludge. The activities covered under this agreement include project planning, development, design, and construction as defined below.

Project Planning and Development

Feasibility analysis -

Preliminary - The broad analysis of waste quantities and composition, markets, technologies, sites, project economics, etc., leading to a determination of the basic feasibility of resource recovery in a given situation.

In-depth - Detailed evaluation of waste, technologies, markets, and sites to focus in on feasible alternatives, including more detailed economic analysis and conceptual design.

Procurement planning - The process of determining preferred approaches to securing a constant supply of waste to a plant, selecting ownership and operation options, developing a risk posture, and selecting a financing approach.

Procurement - The process of preparing and issuing a request for proposals, reviewing proposals, and negotiating final contract terms; or, as an alternative procurement approach, the process of selecting a specific technology and a firm to design it, and issuing and evaluating construction bids requests or the process of implementing another procurement approach.

Project Finance, Design, Construction, Start-up, and Operation

Facility design - The final engineering design of a facility.

Financing - The actual securing of funds through bonds or other selected financing mechanisms, including Federal or State subsidies.

Construction - The construction of a facility.

Start-up - Those functions necessary to bring a facility to steady state full scale operation.

Evaluation - Assessment of the construction start-up and full scale steady state operations of the plant.

C. Basis for this Agreement

1. Through the Resource Conservation and Recovery Act of 1976 (RCRA), EPA is charged with protection of health and the environment and conservation of material and energy resources.
2. Through the Federal Non-Nuclear Research and Development Act of 1974; as amended, and the

Energy Act of 1978 -- Civilian Application, DOE is charged with assisting in the development and commercialization of new energy sources, including solid waste.

3. Therefore, EPA and DOE share a common goal of recovery of energy and materials from solid waste.
4. The objectives of EPA and DOE to achieve this common goal are closely interrelated and mutually dependent. The objectives of both programs will be advanced by the rapid implementation of resource recovery systems.
5. The commonality of goals, and mutual interdependence of objectives, the respective mandates, capabilities, and experience of the two agencies lead to complementary approaches to achieving those objectives.
  - o EPA has substantial financial resources directed specifically toward local solid waste and resource recovery planning and project development. EPA also has regional offices staffed with experienced personnel to manage these planning activities. In addition, the EPA Technical Assistance Panels Program mandated by RCRA is available to support these efforts.
  - o DOE has substantial authorities and resources for providing support and incentives for production of alternate fuels and demonstration of new technologies. DOE loan guarantee, cooperative agreement and price support authorities provide mechanisms for supporting demonstrations. The experience of DOE in technology development complements these authorities. DOE also has regional offices, National Energy Laboratories staffed with experienced personnel to advise in development. DOE has significant responsibilities in supporting programs of State energy offices in energy management under PL 94-163, PL 94-385 and the National Energy Act.
  - o Both EPA and DOE also have substantial R&D capabilities and functions which are not directly a part of this MOU.

6. Each agency desires to complement, rather than duplicate, the programs of the other, so that their combined efforts will be effective, efficient, and well coordinated.

D. Operating Principles

Based on the above factors, EPA and DOE have defined distinct, but complementary, roles regarding planning and demonstrations as indicated below.

1. EPA has lead responsibility for project planning and development. The principal EPA programs associated with this responsibility include: financial assistance to State governments for resource recovery planning and State program development; financial assistance to local governments for project planning and development under the President's Urban Policy; technical assistance to State and local governments through Technical Assistance Panels mandated by RCRA; and seminars and publications to disseminate information gathered through evaluations of commercial resource recovery systems, surveys of resource recovery implementations, and other activities.
2. The Department of Energy has lead responsibility for facility design, construction, start-up, and operation. Evaluation will be accomplished jointly as agreed upon. Major DOE authorities for risk acceptance in support of demonstrations associated with this responsibility include grants, contracts, cooperative agreements, loan guarantees, and price supports. In addition DOE may choose to apply their authorities for loan guarantees and price supports to "underutilized" technologies. The DOE authorities are applicable to support private or publicly-owned waste-to-energy production facilities. As part of this activity, DOE will define innovative and underutilized technology candidates. DOE also has responsibility for implementing certain incentives related to energy conservation involving waste recycling. These include investment tax credits for recycling equipment and industry recycling targets.
3. To ensure that their assistance activities will accelerate widespread implementation of resource

recovery, EPA and DOE are committed to tailor programs to effectively address clearly defined problems, and design these programs to minimize potential delays in activity that can result from competition for Federal assistance.

E. Specific Operational Relationships

Specific mechanisms have been defined for integrating the two programs.

1. EPA will carry out periodic competitive solicitations under the Urban Policy Program to identify candidates for financial assistance for project planning and development to recover energy and materials from solid waste. DOE will assist EPA in the review and competitive selection process.
2. DOE will develop a list of candidate technologies for demonstration and a list of underutilized technologies. These lists will be developed with assistance from EPA's Office of Solid Waste, Office of Research and Development and others. These lists will be updated and announced publicly at least annually. A number of mechanisms will be developed so that DOE's interests can be clearly communicated, including written materials, briefings, etc.
3. EPA will include this information in any future solicitation announcements for planning projects, and will provide it to all those selected under the current and future announcements.
4. DOE will use EPA's programs for identifying appropriate communities for its demonstration projects. Where a suitable community is not identified to demonstrate one of DOE's defined candidate technologies, then DOE may solicit separately for a community interested in demonstrating that specific technology. This solicitation will be accomplished only after advanced information to EPA. Opportunity will be provided to EPA to announce the solicitation jointly.
5. EPA's planning role includes assisting municipalities and their consultants in analyzing alternative technologies (conventional and innovative) which may be appropriate for municipalities to use. Part of this role includes making municipalities aware of DOE's interest in financing innovative energy

recovery technologies. DOE will work with EPA in providing such guidance.

6. It is anticipated that the planning process will lead many communities to choose commercially available technologies not included in the DOE candidate demonstration list. In these cases EPA will follow the planning process through all phases. DOE will be offered the opportunity to participate in the development of work statements and to assign a project co-monitor on a case by case basis, although the contractors' single point of contact will be within EPA.
7. Other communities will be interested in selecting a technology included on DOE's candidate demonstration list. In these cases DOE will assist EPA in the planning and development process as follows:
  - DOE will begin its assistance in the management of the planning and development process at the time a community has selected one of the candidate demonstration technologies for further consideration, i.e. following feasibility analysis.
  - If there are special planning requirements for communities considering demonstration technologies which DOE feels are not addressed in EPA's initial planning process, they will be incorporated into that process at the time a community elects, after initial screening, to give further consideration to candidate demonstration technologies. This would normally occur after the feasibility analysis is completed.
  - Depending on the extent of any such additional planning activities, DOE may be asked to fund them directly.
8. At that point in the planning process when a community makes a final selection of a demonstration technology and is selected by DOE for financial assistance, DOE will take the lead in assisting that community with further steps of project implementation, including design, financing, and construction of the project. EPA will co-monitor these projects on a case by case basis.

9. If a community chooses a codisposal technology which would be eligible for support through EPA grants authorized under the Clean Water Act, and DOE is also interested in supporting such a system as a demonstration, responsibilities will be resolved on a case by case basis.

**F. Management and Coordination Procedures**

1. The agencies agree to establish a Steering Group cochaired by an EPA's Deputy Assistant Administrator for Solid Waste Programs and DOE's Director of the Office of Buildings and Community Systems. The Steering Group will meet quarterly to discuss the status of their respective programs and the application of this Memorandum of Understanding.
2. A staff level Working Group, with annual rotating chairpersonship, will be established for coordination of information on planning, project development, and demonstration. This Working Group will serve as a focal point for exchange of information and for the day to day implementation of this MOU.
3. The agencies will develop a joint five-year "Recovery of Energy and Materials from Urban Waste" plan. This plan will outline the current status and agency plans and programs. This plan will be updated each year and the agencies will meet not later than September 1 to discuss their activities in this area in the next fiscal year.
4. The agencies agree to formally review this Memorandum of Understanding at least every two years to determine its continued applicability and to propose any necessary changes.

*Thomas Galery*  
 Assistant Administrator  
 for Water and Waste Management

*Ann C. Waldh*  
 Assistant Secretary  
 Conservation and Solar  
 Applications

Date: 5/31/79

Date: 5-10-79

INTERAGENCY AGREEMENT  
BETWEEN THE  
DEPARTMENT OF COMMERCE  
AND THE  
ENVIRONMENTAL PROTECTION AGENCY  
ON THE  
IMPLEMENTATION OF THE RESOURCE CONSERVATION AND RECOVERY ACT

I. PREAMBLE

This interagency agreement between the Department of Commerce (DoC) and the Environmental Protection Agency (EPA) delineates the agencies' respective responsibilities under the Solid Waste Disposal Act (42 U.S.C. 3251 et seq.), as amended by the Resource Conservation and Recovery Act of 1976 (P.L. 94-580, 42 U.S.C. 6901 et seq.) (hereinafter cited as the Act).

Generally, the Administrator of EPA is charged with the responsibility for carrying out the Act. However, Subtitle E (42 U.S.C. 6951-6954) assigns certain duties to the Secretary of Commerce.

EPA has developed a substantial solid waste and resource recovery program, which includes the focal point of Federal expertise, strong technical skills, and established institutional arrangements. DoC has developed technical and economic skills necessary to the implementation of the Act and has substantial business and consumer programs and relationships which would facilitate the commercialization of resource recovery as envisioned therein.

In order to avoid duplication of effort, and in order to facilitate the carrying out of each agency's respective responsibilities under the Act, both agencies have entered into this agreement of interagency cooperation. The purpose of this agreement is to establish a basis for both parties to

cooperate closely in a mutual exchange of information, and to avoid duplication of effort by clarifying respective roles in areas of mutual interest.

In order to ensure effective cooperation, this agreement (1) identifies or provides for the identification of responsibilities and projects in which the agencies have a mutual interest and discusses respective roles; (2) specifies or provides for the specification of mutually supportive actions to execute such projects; consistent with the priorities dictated by each agency's missions; and (3) ensures that projects of potential mutual interest are not unilaterally initiated by either agency, but instead proceed only after adequate consultation.

## II. AGREEMENT

A. EPA has the lead Federal agency responsibility for administering the Act.

B. EPA's general responsibilities include:

1. Providing technical and financial assistance to State and local governments for development and implementation of solid waste management plans;
2. Providing training grants in solid waste occupations;
3. Prohibiting future open dumping on land and requiring upgrading or closing of existing open dumps;
4. Regulating the treatment, storage, transportation, and disposal of hazardous wastes;
5. Promulgation of guidelines for solid waste management practices and systems;

6. Conducting a research and development program for improved solid waste management and resource conservation techniques;
7. Demonstrating improved solid waste management, resource recovery, and resource conservation systems; and
8. Establishing a cooperative effort among Federal, State, and local governments and private enterprises.

C. EPA's specific responsibilities include:

1. Establishing Resource Conservation and Recovery Panels to provide implementation assistance to State and local governments upon request (Section 2003);
2. Developing guidelines for Federal procurement of products containing recycled materials (Section 6002);
3. Chairing the Resource Conservation Committee - A Cabinet-level committee to study and recommend to Congress resource conservation incentives and disincentives (Section 8002(j));
4. Implementing a broad-based public information program relating to all phases of resource recovery and conservation including technical, economic, and environmental feasibility to various recovery technologies (Section 8003); and
5. Implementing a comprehensive Research Development and Demonstration Program including demonstration and evaluation of resource recovery systems,

as well as numerous studies of technologies, markets and implementation (Subtitle H).

D. DoC has the duty to encourage greater commercialization of resource recovery technology and reuse of recovered materials by publishing guidelines for the development of specifications for recovered materials, by identifying and stimulating the development of markets for recovered materials, by identifying economic and technical barriers to the use of recovered materials, by encouraging new uses for recovered materials; by promoting technology through published evaluations of commercially feasible systems, by developing a data base to assist persons in choosing commercially feasible resource recovery systems; and by providing forums for the exchange of technical and economic data relating to resource recovery facilities (Subtitle E). DoC will exercise these responsibilities so as to implement the broad purposes of the Act and so as to be consistent with EPA's lead agency administration of the Act.

E. EPA will maintain its established role in solid waste management and resource recovery. DoC will not duplicate EPA's capabilities but rather will complement and extend those capabilities in the areas corresponding to DoC's responsibilities under the Act.

F. DoC, through its National Bureau of Standards (NBS), will establish guidelines for the development of specifications for classification of materials recovered from waste destined for disposal. NBS will work closely with EPA in this effort and will utilize the Resource Conservation and Recovery Panels as one mechanism of communicating this information to the public sector.

G. EPA and DoC will jointly be responsible for determining the need for specifications relating to recovered materials that may be used to create energy from waste such as refuse-derived fuel, gas and oil. In making such determination, the views of the Department of Energy (DoE) will be solicited and considered as required under Section 8001 of the Act. Should such specifications be required, EPA, in concert with DoE, will request the assistance of NBS in their development.

H. NBS, on a cost-reimbursable basis and subject to the availability of resources, will develop testing procedures and/or provide testing for products made from recovered materials, as may be required of EPA under Section 6002(e). The need for such testing or testing procedures will be mutually determined by NBS and EPA.

I. DoC will identify locations of existing and potential markets for materials recovered from the waste stream. DoC will utilize the baseline data already collected by EPA, but will maintain an up-to-date comprehensive listing of such locations.

J. DoC, in close coordination with EPA, will identify technical and economic barriers to the use of recovered materials utilizing existing EPA data and expertise. Both agencies may conduct work in this area, but will closely coordinate individual projects to avoid duplication.

K. EPA along with DoE will identify market locations and constraints to the use of energy- or fuel-substitute products, including solid refuse-derived fuel, gas and oil. This information will be made available to DoC for use in encouraging commercialization of proven technologies.

L. DoC will encourage the development of new uses for recovered materials by encouraging commercialization, i.e., acceptance in the user community, of new products from recovered materials. EPA will conduct research, development, and demonstration activities necessary to prove the technical and economic feasibility of producing such products.

M. EPA will continue to develop and implement resource recovery systems. Related activities will include research and development, demonstrations, evaluation of commercial facilities, dissemination of information, and technical assistance in implementation. DoC will utilize the data and information developed by EPA to assist in the feasibility evaluation and commercialization of recovery systems when they become proven technology. Along these lines, DoC will provide information to companies and industries to inform them of commercial business opportunities and to advise them of the commercial feasibility of such facilities. EPA will continue to provide guidance to State and local governments concerning facility feasibility.

N. EPA will include appropriate DoC personnel as a part of the resources available to the Resource Conservation and Recovery Panels mandated in Section 2003.

O. Both agencies will promptly and continually exchange data and analysis of mutual interest. EPA, on a high priority basis, will describe and make available its data base on resource conservation and recovery, projects underway, and projects being planned to DoC on those matters which, while responding to EPA's responsibility under the Act, have commonality with or relate to DoC responsibilities.

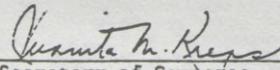
P. DoC, through its Bureau of the Census, will cooperate with EPA, as set forth in other agreements, in the requirement of Section 4005(b) to inventory all disposal facilities or sites in the United States which are "open dumps" within the meaning of the Act.

Q. The agencies will establish an interagency working group to facilitate the effective implementation of the terms of this agreement. The working group will meet upon the call of either agency and may establish specific information dissemination mechanisms on an ad hoc basis.

R. The points of contact for this agreement for coordination and information are:

- 1) for EPA, the Deputy Assistant Administrator for Solid Waste (755-9170); and
- 2) for DoC, the Deputy Assistant Secretary for Environmental Affairs (377-4335).

S. This agreement becomes effective when signed by both parties and may be modified, amended, or cancelled upon the written consent of both parties.

  
 \_\_\_\_\_  
 Secretary of Commerce

/s/ Douglas M. Costle  
 \_\_\_\_\_  
 Administrator, Environmental  
 Protection Agency

Date MAR 03 1978

Date MAY 30 1978

# Overcoming Barriers to Resource Recovery

The following article on the barriers to implementing resource recovery was prepared specially for the NCRB Bulletin by Susan J. Kinney of The MITRE Corp., Metrek Div., Bedford, Mass.

*In response to widespread recognition of the need to step up the pace of resource recovery implementation and to resolve the major issues that have caused delays in present implementation efforts, The MITRE Corporation sponsored a symposium in October 1978 entitled "Actions to Increase Resource Recovery Implementation." One hundred and fifty participants, representing all levels of expertise and involvement in the field of resource recovery, gathered to identify barriers to implementation and to discuss methods by which they could be minimized. The following discussion reflects the ideas that were generated at the meeting, and is based on the experiences and opinions of MITRE's resource recovery staff.*

## Answers to Solid Waste Disposal Problems

Disposal of solid waste has become one of the most pressing problems faced today by states, cities and counties. In many areas, traditional landfill and incineration operations are proving to be environmentally unsound and often inadequate to handle ever-increasing amounts of solid waste. State and local officials must undertake the difficult and time-consuming task of finding an alternative method of solid waste disposal that will provide a long-term answer to disposal needs in a manner that is both environmentally and economically acceptable.

Resource recovery is, in many areas, the best long-term disposal method presently available. First, it is a partial solution to a major environmental disgrace—extensive pollution of surface and ground water by inadequate land disposal of solid wastes, the pollution of air by uncontrolled or ineffectively controlled incineration, and the needless waste of significant land resources. Second, it is conceivable that waste-derived energy or fuel products could supply two to three percent of the nation's energy requirements. Although it cannot be considered a major new energy source, resource recovery can provide for specific energy needs.

## Why Has Resource Recovery Implementation Been Slow Paced?

Despite the advantages of resource recovery over traditional disposal methods, implementation efforts have been slow paced. One reason for this is that resource recovery can be more costly than traditional disposal methods, particularly in the initial years of operation. Experience has shown that communities generally are not willing to spend more money to get rid of their wastes simply for the environmental benefits of resource recovery. Even where costs are essentially equal, however, resource recovery is usually chosen only after all other disposal alternatives are deemed unavailable. In other words, lack of a feasible alternative appears to be the key motivating force behind the selection of resource recovery.

Most obstacles to implementation can be traced back to the fact that resource recovery involves the utilization of new, often insufficiently proven, technologies and new institutional arrangements between government and industry. Most

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**Resource recovery is, in many areas, the best long-term disposal method presently available.**

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**A resource recovery project is essentially a business venture with the accompanying business risks and financial requirements that are an integral part of any business enterprise.**

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public sector problems (e.g., public transportation and wastewater treatment) have traditionally been resolved by the establishment of public operating entities to operate the required systems or facilities. These systems and facilities are usually "off-the-shelf" purchases, and therefore their procurement is a straightforward matter using well-established procedures; communities know what they need to buy, they have bought the product before, and their normal procurement methods facilitate the purchase.

In contrast, there has been little experience in planning for and purchasing resource recovery facilities. Furthermore, the approach to resource recovery procurement differs from established approaches to public sector problems. In handling solid waste management problems, the public sector has moved toward the use of the private sector not only to design and construct, but also to operate resource recovery facilities. A resource recovery project is essentially a business venture with the accompanying business risks and financial requirements that are an integral part of any business enterprise. Resource recovery involves the acquisition of a raw material (solid waste) and its conversion into products in the form of energy and materials. The parties involved in a resource recovery project must agree to long-term contracts for solid waste input and for the purchase of energy products as security for project financing. Because of the newness of resource recovery technology, it is not yet an "off-the-shelf" purchase, and therefore established procurement and financing approaches are often not suitable for or conducive to its purchase. MITRE is now working with the U.S. Environmental Protection Agency (EPA) to develop a resource recovery management model. The first version of the model

contains more than 400 significant activities necessary to plan and procure a resource recovery system. Perhaps the sheer complexity and magnitude of this process itself is one of the significant barriers impeding implementation.

#### **Numerous Uncertainties and Risks**

Experience has indeed shown that the resource recovery planning and procurement process is complex and unfamiliar to most of the participants. In addition, the numerous uncertainties and risks associated with resource recovery cause what is already a complex process to be even more difficult and time-consuming. Commitment on the part of public officials is required in order to overcome the risks and uncertainties that can stand in the way of implementation.

State and local governments must carry out a thorough investigation of their solid waste management problems and the feasibility of resource recovery. If resource recovery appears to be their best option, they still must decide whether an economically and politically defensible decision to proceed with resource recovery implementation can be made, given the probable uncertainties in:

- The amount of waste available to the facility, at present and in the future;
- Markets for energy and materials and the projected income available from the sale of these products;
- The availability of landfill, environmental standards pertaining to landfill, and projected costs of landfill operations;
- The technical reliability of resource recovery processes; and
- The legality of the implementation plan and strategy.

In order to minimize the problems and issues that can arise because of these uncertainties, it is advisable that local officials complete a thorough front-end planning effort prior to system procurement. Resource recovery system planning is often a lengthy and expensive process, but the investment is worthwhile, as it will ensure the later success of implementation efforts.

#### **Waste Stream Control**

Controlling the waste stream is one of the most difficult and important problems to overcome in planning a resource recovery facility. A minimum tonnage of solid waste must be contractually committed for delivery to a facility in order to guarantee throughput and disposal fee revenue, as well as energy and materials products revenue. It is absolutely necessary to demonstrate a guarantee of these revenues in order to secure project financing.

Furthermore, the issue of waste stream control must be resolved in the early stages of system planning because the anticipated waste influx influences design considerations. It must be decided whether the facility will be designed only for those wastes for which long-term commitments exist or if allowances will be made for additional wastes, which would seek entry after alternative disposal sites close or become economically unattractive. For

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#### **Controlling the waste stream is one of the most difficult and important problems to overcome in planning a resource recovery facility.**

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example, industrial wastes often do not lie within a community's collection responsibility and therefore cannot be guaranteed by a community. These wastes are usually handled under short-term contract with private haulers who prefer to haul to the least expensive disposal facility. Planners can choose to

## Overcoming Barriers

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### **A difficult problem to overcome in facility planning is securing a commitment for the long-term purchase of refuse-derived energy or fuel products at an equitable price.**

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ignore industrial waste and force private haulers to seek increasingly scarce landfill space, or they can plan to accommodate the industrial waste and negotiate who will bear the risk of such waste not being brought to the facility.

Many existing and planned resource recovery facilities are large-scale systems which require regional service areas to achieve the necessary solid waste input. In order to acquire control of the waste stream in a region, individual long-term commitments must be received from many communities. This has proven to be a monumental task, particularly in states where there are no established authorities with waste disposal powers and where community participation in a resource recovery project is voluntary. Communities are apprehensive about entering long-term contracts for waste disposal with resource recovery projects because of the perceived risks involved. They wonder "How are we going to be sure that this plant is filled up with waste? Will others sign up and meet their commitments? What happens if I sign up first? Is there something in the contract that I have overlooked and will be sorry for later? If I do sign a long-term contract for this project, what assurance do I have that another technology will not cause it to become just another white elephant?" These concerns must be recognized and addressed by project leaders in order to encourage voluntary community participation.

States or cities can take action to control the waste stream through legislation, user charge systems, or the establishment of a franchise system. States can enact legislation to give cities the authority to control the waste or to give cities legal ownership of the waste. Experience has shown, however, that states are hesitant to use mandatory measures for waste control, even where

the authority to do so has been established.

A user charge system is a method by which participating communities (households) and businesses are directly charged an amount which reflects the approximate cost to dispose of the waste volume collected from each source. With this system there is a zero tipping fee at the facility. Participants voluntarily give the local jurisdiction responsibility for disposal of their wastes, and thus control over the waste stream is obtained.

The establishment of a franchise system for solid waste disposal is another method through which the disposal of waste can be controlled. With this system, resource recovery facility operators are assigned a specific service area or waste shed. At present, an informal franchise system for collection is in use in some Michigan communities. Leadership for the institution of franchise systems would probably have to come from the federal level.

There is a question of equity associated with attempts to control the waste stream. Resource recovery facilities are competing with established disposal facilities for waste, usually with government backing. Private haulers and landfill operators, who are established in the waste disposal business, strongly object to having their waste supply diverted to a new resource recovery facility. This issue is present regardless of whether the waste is being controlled by ordinance (as in Akron, Ohio), through state legislation, or by seeking voluntary participation through waste supply contracts.

State and local governments are in need of information about the waste control issue and guidance in resolving the problem in their area. They should be able to anticipate the problems that they will face in obtaining control of the waste stream, such as legislation that

forbids communities to enter long-term disposal contracts. Therefore, a study should be undertaken of state legislation affecting waste control and alternative approaches that have been used to resolve the problem. Compilation of a set of model state laws and reasonable standard approaches to the problem based on what is learned from successful experiences would be useful.

### **Energy Markets**

In the experience of most resource recovery projects, another difficult problem to overcome in facility planning is securing a commitment for the long-term purchase of refuse-derived energy or fuel products at an equitable price. Investor-owned electric utilities are promising long-term markets for electricity, steam, or refuse-derived fuel (RDF); unfortunately, they are reluctant to become involved in resource recovery projects.

The primary responsibility of an electric utility is to provide reliable electric service to its customers at the lowest possible cost, while providing an adequate rate of return to its shareholders. The lack of full-scale demonstration of resource recovery projects and the resultant uncertainties and risks that are associated with the industry are therefore major disincentives to utility participation, because they can have a negative impact on the reliability and cost of electric service. Furthermore, an electric utility is required to pass any increase or decrease in fuel cost on to its ratepayers. For this reason it lacks any economic incentive to become involved in the use of an essentially minor new energy source. An electric utility would receive no economic compensation for its assumption of risk.

Regarding the purchase of electricity or steam, the utility's reluctance stems mainly from this lack of incentive to buy. The utility is relatively indifferent to this new energy source for two reasons: first, the amount of available refuse-derived steam or electricity is often insignificant in relation to a

utility's total energy requirement; and, second, cost pass-through requirements prevent utilities from making a profit on the purchase. In the case of RDF, the lack of incentive is compounded by the technical risks associated with the use of this product. Utilities are concerned about the unpredictable and potentially damaging effects on their boilers of firing RDF.

Experience has shown that electric utilities will require the following assurances before making a commitment to purchase energy or fuel from a resource recovery facility:

- The reliability of service will not be impaired;
- The net cost to the ratepayer will not be increased;
- Capital investment risks will be minimized; and
- Environmental standards will still be met.

Furthermore, utilities are in need of a reliable data base on technical issues so that they can confidently assess the extent of the risks that are associated with the use of refuse-derived fuels. They also need clarification of economic and contractual issues, so that when entering projects they have full awareness of the risks they have contractually assumed.

Public utility and public service commissions should be made aware of the status and needs of the resource re-

covery projects if any cost savings could be distributed between their ratepayers and their shareholders, therefore, a method for providing incentive would be to release utilities that purchase refuse-derived energy from cost pass-through requirements for that energy.

### **Noncomplying Alternatives to Resource Recovery**

The problem of competition from existing landfills and incinerators that are not in compliance with environmental regulations is yet another obstacle to resource recovery implementation. It is important for communities that are looking for a solution to a solid waste disposal problem to realize that, regardless of the method chosen, the true cost of solid waste disposal will be borne by the community. For this reason, there should be no inequities or hidden subsidies which make a currently operating facility appear attractive when it is not. Many disposal facilities that are now relatively low-priced, compared to resource recovery, are not in compliance with environmental standards or landfill regulations. Although disposal costs at these facilities are attractively low, the community will also eventually pay for cleanup of the environment.

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### **Public utility and public service commissions should be made aware of the status and needs of the resource recovery programs in their states.**

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covery programs in their states. The importance to these programs of utility participation and support should be stressed. Public utility and public service commissions should be encouraged to actively promote the concept of cooperation between resource recovery and public utilities, and should consider the enactment of regulatory change which would facilitate this cooperation. For instance, utilities might be more inclined to participate in resource

It is widely recognized that if disposal facilities are properly designed, constructed, and operated, the cost will be higher than at substandard facilities. The evenhanded enforcement of environmental standards at all waste disposal facilities is, therefore, a widely endorsed method for helping to close the gap between the costs of resource recovery and landfills. More state pressure is needed, however, in order to bring existing facilities into compliance.

## Overcoming Barriers

The uncertainty associated with the availability of landfill makes it difficult for both communities and resource recovery planners to anticipate the future need for resource recovery, and communities will often shy away from resource recovery as long as they believe that their landfill might be available for several more years. It is essential that undesirable disposal alternatives are eliminated so that sound planning for long-term waste disposal can be performed, whether or not the chosen disposal method will be resource recovery.

### Technological Uncertainties

At present there are few resource recovery technologies which have been satisfactorily proven or demonstrated, and every project now being undertaken has some degree of risk associated with its system performance. Furthermore, environmental standards that may be promulgated in the future may make resource recovery systems being implemented today technologically or economically obsolete. The high level of risk related to technology is a major deterrent to the implementation of even the most promising systems.

In order to increase the rate of demonstration of resource recovery technologies, federal financial assistance for support of innovative and soundly planned projects has been authorized and is presently being evaluated. This assistance would be available in three main forms; loan guarantees, loans, and price supports. With a loan guarantee, the full faith and credit of the United States would be placed behind a portion of the debt incurred in construction of a resource recovery facility. The financial consequences of project risks would thereby be shifted from project participants and bondholders to the federal government. A loan guarantee would be used to support the financing of a project that is worthy of demonstration, but that would not otherwise be built because of a high level of risk. Alternatively, federal loans would provide direct fi-

ancial support of a project which would otherwise not be built because of the inability of the participating parties to obtain a loan at reasonable or at any cost. Price supports would be used to reduce the economic uncertainty of a project that stems from weak or unstable energy or material markets. With this mechanism, federal money would be used to support the price of recovered energy or materials, thereby reducing the burden on the tipping fee as the source of project revenue.

Federal financial assistance to support the demonstration of promising technologies must be accompanied by continued research and development efforts for both large and small scale technologies. With the continued improvement and demonstration of resource recovery technology, the level of project risk will be significantly reduced and resource recovery will become a disposal option that is chosen with confidence.

### Implementation Plan

In addition to the issues that are related to the technical and economic feasibility of resource recovery, there is a group of problems that are related to the legality of the implementation plan. Difficulties are often met in negotiating contracts and allocating risks, procuring the resource recovery system, and developing a financing package.

### Risk Allocation

The long-term contracts that are required in resource recovery projects lead to a very careful definition of risks and how they will be assumed. The assignment of some risks is reasonably obvious, such as the guarantee of system performance, but it is difficult to assign the risks related to the energy market, project financing, and waste input. A lack of precedent and inconsistency in state laws and practices has complicated the task of risk allocation. Existing surveys of resource recovery con-

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**The preferred method today for procuring resource recovery is the full-service approach with competitive negotiation.**

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tracts apparently do not adequately convey how or why final positions on risk allocation were reached.

Communities are anxious to learn the risk posture assumed in earlier projects as well as the basis for allocation in each case. This knowledge would help communities decide which risks they could appropriately assume and would provide examples for the way in which risk allocation is translated into a written contract. Thus, the contract negotiation experience of earlier resource recovery projects should be documented, and based on this earlier experience, model contracts should be developed to serve as a framework in future projects.

### Procurement Approach

Selection of a procurement method is an important determinant of how risks are allocated. At present, the preferred method for procuring resource recovery is the full-service approach with competitive negotiation. With this approach, a full-service contractor is selected through the evaluation of competitive industry proposals and negotiation of a contract with a single firm for facility design, construction, and operation. The full-service approach tends to carry with it the highest system cost, but has the lowest risk related to operation. Since a single firm is used for design, construction and operation, there is a single point of responsibility and, thus, it is easy to fix responsibility if a problem occurs. The two important characteristics of the competitive negotiation process are that it removes lowest bid as the major criterion for selection and it allows the procuring agency to discuss the proposals with bidders before a selection is made. It therefore provides an opportunity for full consideration of the important technical, financial, marketing, environmental, and management interrelationships of a proposal.

The main problem with utilizing this preferred procurement approach is that many states have laws which prohibit its use. An inventory of state procurement

### Potential resource recovery contractors need reliable and complete information in order to prepare responsive proposals.

processes and pertinent legislation should be undertaken for states that have or will be procuring resource recovery. Potential obstacles to resource recovery procurement (such as restrictions on competitive negotiation, long-term contracting, or the use of revenue bond financing) should be identified so that timely efforts to initiate changes in legislation or to modify the procurement approaches can be made. The development of model procurement codes for various procurement approaches would provide a framework to be followed and would assist communities in foreseeing potential problem areas in their procurement efforts.

### IRS Regulations

The development of a financing package for a resource recovery project is complicated by International Revenue Service (IRS) regulations and rulings. The financing of resource recovery through general obligation bonds (which are backed by the full faith and credit of participating communities) is no longer recommended for most projects because of the large capital requirements associated with these facilities. Tax-exempt revenue bonds as part of relatively complex financing packages are now more common, as these financing packages require individual rulings by the IRS—rulings which often take as long as six months.

The extent to which the use of tax exempt revenue bonds has been allowed in the financing of resource recovery facilities and the utilization of investment tax credits and depreciation allowances has varied from project to project. Project financing is often tailored around obtaining these tax benefits since their

presence can make several dollars per ton difference in the tipping fees. The uncertainty in the outcome of IRS rulings results in delay and legal costs to resource recovery projects. The IRS, therefore, should clarify guidelines for the use of financing mechanisms and should develop consistency in ruling procedures. The standardization of IRS rulings will make it possible to determine the tax status of project financing with more certainty and with less delay.

### Front-End Planning

As previously stated, in order to address the uncertainties associated with resource recovery and thereby maximize the probability of successful project implementation, an extensive and costly front-end planning effort must be undertaken. The first step of the front-end planning stage consists of the delineation of system objectives and the identification of technology and design options. The appropriate choice of resource recovery technology and system design stems from a clear statement of what objectives the system is expected to meet coupled with the feasible range of options dictated by the local situation (markets, available waste quantity, etc.). The objectives must be clearly defined and the options accurately identified before a judgement can be made on which technology/design option most closely matches the objectives. The final selection of technology and design must take into account the relative importance or weight that local participants attach to net disposal cost per ton, environmental impacts, acceptable level of reliance on landfill, demonstrated history of system performance, degree of innovation, extent of recovery, and other factors.

Thorough front-end planning not only ensures sound decision-making, it also facilitates preparation of the Request for Proposals (RFP), a document that has a direct impact on the ultimate success of a project. Potential resource recovery contractors need reliable and complete information in order to pre-

## Overcoming Barriers

pare responsive and well thought-out proposals. The project parameters, objectives, and assumptions that are identified in the RFP serve as the basis for technical and management decisions by responding firms. Most resource recovery firms will spend the time and money to prepare a proposal only in response to a thorough and well-planned RFP, because such an RFP is an indication that a project has a good chance of success. Over the past few years, the credibility of the resource recovery industry has suffered because of flurries of planning activity at the local level without timely follow-through and implementation. This problem can often be traced back to inadequate RFP preparation and front-end planning.

The main problem with front-end planning is that local jurisdictions often do not have the money to hire consultants to assist in dealing with important financial, legal and technical issues. The high up-front costs of system planning can prevent communities from initiating planning and procurement efforts. The Environmental Protection Agency and the Department of Energy have recognized this need and have established responsive programs through which financial and technical assistance are made available. Nonetheless, there is a need for expansion and modification of

these programs to make assistance more widely available and more specific to the needs of individual projects.

### Difficulties Can Be Overcome

It is clear that there are many easily identifiable obstacles to resource recovery implementation that delay what is an inherently complex implementation process. Nonetheless, resource recovery remains a widely pursued solid waste disposal option, and the extensive activity in the field is an indication of the abiding interest in this technology. Ongoing experiences in resource recovery implementation are leading to the improvement and standardization of planning and procurement methods, and technologies are continually being developed and perfected. We have learned quickly from past efforts, and have gained important insight into the problems that are encountered in implementation. It is essential that we continue to disseminate the knowledge gained in first-hand project experience in order to facilitate future efforts. Armed with this knowledge and the cooperation and dedication of leaders in the field of resource recovery, the difficulties in resource recovery implementation should rapidly be overcome. ●

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**Despite identifiable obstacles, resource recovery remains a widely pursued solid waste disposal option.**

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Mr. FLORIO. Thank you very much.  
I would now like to call on Mr. John Millhone, Director of Buildings and Community Systems, Department of Energy.

#### STATEMENT OF JOHN P. MILLHONE

Mr. MILLHONE. Mr. Chairman, I also have a written statement that I will ask be entered in the record, and I will summarize my comments.

Mr. FLORIO. Without objection, the entire statement will be entered in the record [see p. 63].

Mr. MILLHONE. I am pleased to be here. I think that the committees' inquiry and the representation at the witness table show the positive direction that needs to be taken in this area.

I will cover basically three topics. First, I would like to mention the memorandum of understanding because I think that this represents the progress that we have made in the area that the GAO has identified as needing progress. I think the roles of the two agencies are well described there, in that the DOE will support the design, construction, and operations of systems. That is spelled out in the MOU.

I think that it is necessary, then, to follow that with the statement that at this time the administration has not provided any funding for the construction and operation of systems. So at this time, although we have that assignment under the MOU, the activities of the Department are in the development of designs for demonstrations or innovative systems, and more basic research and development types of work.

In a related area, we are also working on an MOU with EPA, which gets into the area of the treatment of wastewater. This is also an area where there is some overlap of responsibility, and some energy potential, as well as some environmental considerations. We anticipate no trouble in working out that memorandum of understanding, and can provide a copy of that when it is available, as well. [See p. 66.]

The second thing I would like to cover would be just a description of what we have done thus far in this area, in a very summary fashion.

In fiscal year 1978, DOE supported some 20 cities in developing potential demonstrations of new technologies in the urban waste area. In addition, seven other projects could lead to demonstrations of new technologies. For example, we supported the Stanford University project in cooperation with EPA, to develop an atmospheric fluidized bed to produce steam, using background data and equipment from EPA experiments.

We are also supporting in Middlesex County, N.J., in the efforts to develop a resource recovery plant, and in New York in developing its initial plant. Two other projects we are pleased about, are attempting to recycle incinerators by adding waste heat boilers to existing incinerators.

DOE issued competitive procurements during fiscal year 1978, and has continued to support these programs in fiscal year 1979. These are aimed at the recovery of energy from sewage sludge; exploring the energy advantage of combining municipal waste and

wastewater treatment and, the recovery and use of methane from landfills.

The latter is particularly significant since it converts wastes buried over the last 10 years into an energy source capable of producing about one-tenth of a quad of energy per year, while decreasing the explosion hazards of landfills. This effort is being continued in fiscal year 1980 to look at the design parameters of such recovery activities.

We are, then, in 1980, continuing our Pompano Beach project which, as you know, recovers methane from municipal solid waste. The plant is completed and has been producing methane since August 1978. There have been no problems with the digestion process to date, although we have had a number of problems with the reprocessing plant. These have been solved, and the plant is now operating at design rate.

This effort will continue in 1980 in order to test digester mixing and to achieve a high rate of production from that landfill. At the same bioconversion area, we have a smaller effort to produce ethanol from waste by enzymatic hydrolysis.

The last project I would like to keynote is our small scale systems development effort. By 1984, the Nation will be producing about 200 million tons per day of trash. This represents large, underutilized resource containing 2 quads of energy and, if all the inorganics are to be recycled, the conversion of an additional quadrillion Btu's. We are talking here, as many other witnesses have said, about significant energy resources and savings.

Of this potential of 3 quads, only about 56 percent is recoverable by the size systems that are currently being studied. By developing small scale systems, this potential can be expanded up to an estimated 90 percent. As the total energy farm is developed elsewhere in DOE, the industry area, even that potential could be increased.

In accordance with the mandate of Congress, DOE issued a draft rule on July 11, 1979, for the support of municipal waste demonstration plants by means of loan guarantees, and in August we will also publish an advanced notice of proposed rulemaking on price supports to support demonstrations.

Finally, in fiscal year 1980, our principal efforts will be to continue the different development programs at Pompano Beach, and the secondary methane from landfills, which I have described. We expect to complete our studies of potential demonstrations, and make recommendations to the administration with regard to their funding.

The loan guarantee and price support programs will be made final, although there is no intent in the administration to implement them at this time. Most importantly, we will continue our small scale development systems work. It is in this area that we intend to initiate the development of new concepts.

I will be pleased to answer any questions any of the members might have.

[Testimony resumes on p. 72.]

[Mr. Millhone's prepared statement and a draft memorandum of understanding, subsequently received for the record, follow:]

STATEMENT OF JOHN P. MILLHONE, DIRECTOR, OFFICE OF BUILDINGS  
AND COMMUNITY SYSTEMS, DEPARTMENT OF ENERGY

Ladies and Gentlemen of the House Subcommittees on Transportation and Interstate Commerce and Energy Development and Applications. Thank you for the opportunity to speak before this joint hearing on urban solid waste.

I am pleased to describe for you the results of our 1979 efforts, and the projects we intend to pursue with the President's proposed \$10 million budget for research and development in FY 80.

First I must digress. The most important event of 1979 was the signing of a Memorandum of Understanding (MOU) with the U.S. Environmental Protection Agency (EPA). Essentially, that MOU provides that EPA will support feasibility studies and procurement planning. DOE's efforts will draw upon EPA's feasibility studies to the maximum, unless we should decide to support the demonstration of a technology not otherwise considered.

In Fiscal Year 1978, DOE supported twenty cities in developing potential demonstrations of new technologies. In addition, seven other projects could lead to the demonstration of new technologies. For example, we are supporting Stanford University, in cooperation with EPA, to develop an atmospheric fluidized bed to produce steam, using background data and equipment from EPA experiments. We are also supporting Middlesex County in New Jersey in its efforts to develop a resource recovery system, and New York City in developing its initial plant. Two other projects we are excited about attempt to recycle incinerators by adding waste heat boilers to existing incinerators.

Part of our program conserves energy in the treatment of wastewater. We are developing an MOU with EPA in this area and expect no problems. In development work we have continued our efforts toward a treatment system that shows promise of achieving secondary level treatment with low energy cost while producing minimal sludge and some methane.

As a bridge back to our energy efforts; DOE issued three competitive procurements during FY 1978 and continued their support in FY 1979. These three Requests for Proposals (RFP's) aimed at:

1. the recovery of energy from sewage sludge,
2. exploring the energy advantage of combining municipal waste and wastewater treatment and,
3. the recovery and use of methane from landfills.

The latter is particularly significant since it converts wastes buried over the last ten years into an energy source capable of producing about one-tenth of a quad of energy per year while decreasing the explosion hazards of landfills. This effort is being continued in FY 1980 to look at the design parameters of recovery.

We are continuing our Pompano Beach project which, as you know, recovers methane from municipal solid waste. The plant is completed and has been producing methane since August, 1978. There have been no problems with the digestion process to date, although we have had a number of problems with the preprocessing plant. These have been solved and the plant is now operating at design rate. This effort

will continue in Fiscal Year 1980 in order to test digester mixing and to achieve high rate production. In this same bioconversion area we have a smaller effort to produce ethanol from waste by enzymatic hydrolysis.

The last project I would like to keynote is our small scale systems development effort. By 1984, the nation will be producing 200 million tons per day of trash. This represents an underutilized resource containing two quads of energy and, if all the inorganics in it were recycled, the conservation of an additional quadrillion Btus. Of this potential three quads only fifty-six percent is recoverable. By developing small scale systems, this potential can be expanded up to an estimated ninety percent. As the total energy farm is developed elsewhere in DOE, even that potential will increase.

In accordance with the mandate of Congress, DOE issued a draft rule on July 11, 1979 for the support of municipal waste demonstration plants by means of loan guarantees and in August we will also publish an advanced notice of proposed rule-making on price supports to support demonstrations.

In Fiscal Year 1980 our principal efforts will be to continue the development programs at Pompano Beach and the recovery of methane from landfills. We expect to complete our studies of potential demonstrations and make recommendations to the Administration. The loan guarantee and price support rules will be finalized. However, there is no intent in the Administration to implement them at this time. Most importantly, we will continue our small scale systems work. It is in this area that we intend to initiate the development of new concepts.

**DRAFT**

Memorandum of Understanding Between the EPA Office of  
Water Program Operations and the DOE Office of  
Conservation and Solar Applications Concerning  
Technical Assistance for the EPA  
Construction Grants Program

The U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) agree that energy conservation should become a major factor in the construction and operation of municipal wastewater treatment facilities. In those situations where EPA requires technical assistance in addressing energy aspects of municipal wastewater treatment technologies and individual facilities, DOE may initiate efforts to provide the needed technical assistance. When DOE desires to establish projects to test energy related equipment and processes involved in municipal wastewater treatment, EPA will assist in locating appropriate sites and municipalities interested in cooperating with DOE and EPA in equipment and process evaluations.

This memorandum established a mechanism for the DOE Office of Conservation and Solar Applications and the EPA Office of Water Program Operations to provide each other with technical assistance as required and to undertake joint projects of mutual interest in the area of energy conservation and resource recovery as they relate to municipal wastewater treatment facilities and technologies.

GENERAL

EPA Activity

The provisions of the Clean Water Act (PL 95-217), placed an even greater emphasis upon energy conservation and resource recovery than was originally ~~evident~~ <sup>contained</sup> in the Federal Water Pollution Control Act Amendments <sup>of 1972</sup>

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(PL 92-500). Section 201(g)(5) requires EPA construction grant recipients to analyze "innovative and alternative" treatment processes and technologies for use in wastewater treatment works. Section 201(i) specifically requires EPA to encourage processes that reduce energy needs.

Section 202(a)(2)-(3) provides special incentives to municipalities receiving construction grant funds to utilize innovative and alternative treatment processes and techniques. Alternative wastewater treatment processes and techniques are those which have been proven and used in actual practice; innovative processes and techniques are developed methods which have not been fully proven under the circumstances of their contemplated use. The incentives include funding of allowable construction costs for treatment works or significant portions of treatment works that utilize innovative and alternative treatment processes and techniques at a rate 10 percent greater than for conventional technologies, 100 percent federal grants for replacement or modification of innovative and alternative treatment works under certain conditions, and a 15 percent cost preference for the cost-effectiveness analysis of treatment works that utilize innovative or alternative processes or techniques. A funding reserve is established to pay for the increased part of the grants for treatment works that include innovative or alternative processes or techniques. Also, States are authorized to give higher priority to treatment works utilizing innovative or alternative technologies.

The Clean Water Act and its legislative history make it clear that the provisions pertaining to innovative and alternative technologies are to include energy conservation and recovery considerations. There are

and a draft manual (Innovative and Alternative Technology Assessment Manual EPA 430/9-78-001, dated 1978) that provides

numerous references to cost and energy reduction in the legislative history of the Act which indicate reliance on these factors for the evaluation of innovative and alternative technologies.

EPA has issued new construction grant regulations (September 27, 1978) and is preparing detailed guidance, <sup>and</sup> information on a wide range of presently used <sup>and emerging</sup> processes and techniques to assist in the evaluation of innovative and alternative technologies. Additionally, the Agency has recently published a detailed study on energy conservation and the operational energy requirements for municipal wastewater treatment plants (Energy Conservation in Municipal Wastewater Treatment, EPA 430/9-77-011; March 1978), <sup>EPA and are also</sup> and ~~jointly with~~ DOE <sup>is</sup> developing a more comprehensive energy study to address the energy aspects of different construction materials and techniques as well as energy conservation, recovery and possible production from different wastewater and sludge management processes.

<sup>The September 21, 1978</sup>  
~~Construction Grant Regulations and guidelines were issued on~~  
~~September 28, 1978,~~ to provide criteria for identifying and evaluating innovative and alternative wastewater treatment processes and techniques under the authority of Section 304(d)(3) of the Clean Water Act. These criteria allow alternative technologies to include energy recovery facilities including co-disposal measures for sludge and refuse which produce energy, anaerobic digestion facilities (provided that more than 90 percent of the methane gas is recovered and used as fuel), and equipment which provides for the use of digester gas within the treatment works. Self-sustaining incineration may also be included provided that the energy recovered and productively used is greater than the energy

consumed to dewater the sludge to an autogenous state. <sup>PP</sup>Criteria are also provided to define innovative wastewater treatment processes and techniques that are developed methods which have not been fully proven under the circumstances of their contemplated use and which represent a significant advancement over the state-of-the-art in terms of meeting various national goals, including increased energy conservation or recovery. The criteria for innovative technologies require that the net primary energy requirements for the operation of the treatment works are at least 20 percent less than the net energy requirements of the least net energy alternative which does not incorporate innovative wastewater treatment processes and techniques (i.e., the net energy requirements are no more than 80 percent of those for the least net energy non-innovative alternative).

#### DOE Activity

The Department of Energy Act of 1978 (PL 95-238) and earlier legislation has authorized DOE to undertake research and demonstration activities as well as establish federal loan guarantee programs aimed at encouraging decreased energy requirements for waste management through energy conserving technologies and turning urban wastes into fuels.

Section 19 of this law authorizes \$300 million in federal loan guarantees for demonstration projects for converting urban wastes into fuels while Section 20 authorizes an additional \$20 million for other types of subsidies to encourage commercialization of waste derived energy or energy intensive products. DOE currently has an active R&D program aimed at energy recovery from sludge and at combining urban solid waste

and sludge for energy recovery or conservation, as well as ongoing work on various energy conserving wastewater treatment processes. In addition, there are several joint EPA/DOE activities including the development of an energy conservation design manual on wastewater treatment and investigations into low energy use wastewater treatment technologies.

#### COOPERATIVE AGREEMENT

Since the ~~the passing~~<sup>passage</sup> of the Federal Water Pollution Control Act Amendments in 1972 ( PL 92-500), EPA ~~has granted~~<sup>+</sup> more than \$19 billion ~~under~~<sup>has been appropriated for</sup> the Construction Grants Program to assist municipalities in the construction of wastewater treatment facilities. Conventional treatment systems have been constructed in most situations since the technical and economic risks of alternative and innovative systems were not fully quantifiable and understood by EPA, state officials, consultants and the municipalities. However, the recent amendments provided in the Clean Water Act are expected to stimulate a greater use of those alternative and innovative treatment processes and techniques that greatly reduce energy use in wastewater treatment and that recover energy from sewage sludge. DOE will assist EPA in stimulating greater use of these alternative and innovative technologies in several ways, including:

- o providing technical assistance in evaluating energy aspects of municipal wastewater treatment technologies
- o providing technical assistance in addressing energy aspects of individual EPA Construction Grants Projects
- o undertaking pilot scale demonstrations, wastewater treatment processes and techniques aimed at energy conservation or energy production and recovery
- o assisting in energy-oriented evaluations of alternative and innovative wastewater treatment processes and techniques funded under the EPA Construction Grants Program.

EPA will assist DOE in their efforts to promote conservation of energy use and energy production/recovery in wastewater treatment technologies used by the municipalities and in identifying appropriate sites and municipalities interested in cooperating with DOE in the evaluation of new energy conserving and energy production/recovery wastewater treatment technologies.

U.S. Department of Energy  
*Assistant Secretary, Office of  
Conservation and Solar Applications*

U.S. Environmental Protection Agency  
Deputy Assistant Administrator for  
Water Program Operations

RBastian:pfm:3/12/79

Mr. FLORIO. Thank you very much.  
Mr. Galler?

#### STATEMENT OF SIDNEY R. GALLER

Mr. GALLER. Thank you, Mr. Chairman, and Mr. Ottinger.

I appreciate very much the opportunity to appear before you and to present the Department of Commerce's views on the subject of waste to energy. With your indulgence, I would like to very quickly introduce the Commerce team, who are here with me in the audience.

Immediately to my left, in the front row, Dr. Harvey Yakowitz, who is the Chief of the Office of Recycled Materials of the National Bureau of Standards, and is working on a temporary basis to help us develop the Commerce Department program. Next to him is Dr. Lee Subluskey, who is the Project Coordinator in the Office of Environmental Affairs. Next to him is Mr. James Owens, who is the Director of the Office of Basic Industries in the Industry and Trade Administration, followed by Dr. Robert Kaplan, who is on loan from the Bureau of Mines and is helping us to develop a program for the recapture of industrial residuals. Last but not least, Mr. Joseph Berke from the National Bureau of Standards, who is serving as our liaison with NBS in this program.

We believe that the waste-to-energy issue, and the larger solid waste management issue, must be addressed on a locality-to-locality basis. The critical question which must be answered is: "What is the most economically optimum method to address both the waste-to-energy issue and the larger solid waste management issue for a very specific locality?"

In order to answer this question, several important factors need to be known: These include:

The composition and quantity of the waste as a function of time;  
Specifications for materials used to convert waste to energy, thus allowing for increased marketability;

Markets for energy from waste, for example, electricity from a turbine or some form of refuse derived fuel or steam, or a combination of these;

Market barriers to energy from waste, for example, possibility of increased boiler corrosion;

Energy sources, requirements and plans within the area;

Transportation costs and energy differentials;

Trade-offs between recovering and reusing materials and burning;

Present total—fully accounted—cost of disposal;

Marginal costs of finding and opening a new disposal site; and

Current and projected costs of maintaining or expanding an existing site.

Data concerning all of these factors are needed before an optimum waste-to-energy program can be developed for a given locale. For example, if the only market for waste to energy is electricity, there may be little economic basis for choosing a technology which produces refuse derived fuel—RDF—but total energy savings from reclaiming materials may nevertheless accrue. The main point, however, it is that demand-pull of the market will dictate the appropriate technology.

An impartial analysis of all options is needed to enable interested parties to rationally select a course of action. As an example, consider the case where no obvious market for an energy product from waste can be located. In this instance, it would be necessary to evaluate the total energy savings to be obtained if certain components of a waste stream are reclaimed. For example, if aluminum cans are reclaimed, a 95-percent energy savings would accrue from making new cans from old rather than from virgin processes. At the same time, bauxite imports could be reduced. If a market can be found nearby, post-consumer waste glass can be reclaimed and remelted to make new glass. This could save about 15 percent of the natural gas energy needed to make new glass containers from virgin material. In this example, the lack of a market prohibits utilization of the organic fraction comprising 80 percent of domestic waste as an energy source. However, a potential course of action might include source separation and reuse of newsprint thus reducing use of energy intensive processes to create newsprint from virgin materials. This course of action might also be combined with the preparation of cellulosic insulation from the remaining fraction. Appropriate use of such insulation would result in energy conservation.

The Department of Commerce's role is largely defined in subtitle E of the Solid Waste Disposal Act. Subtitle E directs the Secretary of Commerce to locate and to stimulate markets for recovered resources, to provide guidelines for specifications for recovered resources, to promote and to encourage commercialization of proven resource recovery technologies and to obtain and exchange economic and technical data relating to resource recovery.

Additional portions of the act assign other duties with respect to the recovery of materials, and energy from waste to EPA, while other acts, for example, the Department of Energy Organization Act, Public Law 95-91, assign still other duties dealing with waste-to-energy to the Department of Energy, as we have heard.

The Department of Commerce has, indeed, entered into an interagency agreement with EPA concerning spheres of responsibility under the act. That agreement will be furnished to the committees [see p. 48].

A research agreement with the Department of Energy is in force. Thus, the three major operating agencies have acted to minimize the possibility of programmatic redundancies with respect to energy from waste. Shortly, an interagency coordinating committee is expected to be established in order to provide overall programmatic guidance for resource recovery activities.

At this time, the Department is examining means to conserve energy and materials in the industrial sector. Possibilities here are to recycle certain materials or to alter production lines so as to conserve energy and reduce waste. To this end, the Department and EPA have sponsored joint conferences in Chicago, Boston, Dallas, and San Francisco, aimed at educating—and I use that word loosely, perhaps “sensitizing” would be a better word—industrial leaders to the possibilities for energy conservation, pollution reduction, and increased profits from the use of pollution controls and in-process energy recapture.

The use of reclaimed materials and energy by the Federal sector as mandated by subtitle F of the Solid Waste Disposal Act could serve as a major factor in market development for secondary materials and energy from waste.

At this time the National Bureau of Standards of the Department of Commerce is devoting considerable effort to the characterization of waste-to-energy products. Raw refuse, which is the feedstock for waterwall incinerators, as well as the several types of RDF, are undergoing study.

The object is to devise a means to sample the product statistically, and then to state as accurately as necessary its heat content, ash forming properties, moisture, propensity to pollute, propensity to corrode under certain firing conditions, and its physical characteristics. For example, is spontaneous combustion a possibility?

Let me just point out that, in addition, the National Bureau of Standards has underway projects aimed at obtaining optimum specifications for the use of waste glass in glass containers, and for the characterization of fly ash from coal powerplants.

If fly ash is declared to be a hazardous waste under the provisions of subtitle C of the Solid Waste Disposal Act, the cost of its disposal is likely to increase very significantly. Hence, the cost of power generated from coal is likely to increase as well. At the same time, we at Commerce recognize that fly ash can be used in civil engineering in various ways. This use of fly ash reduces waste and saves energy as well. NBS hopes to increase its activities in this area. Let me say that this is a kind of demonstration model for our developing program plans for the recapture and reuse of other industrial residuals.

In the area of market studies, the Industry and Trade Administration, primarily through Mr. James Owens, has begun preliminary reviews of certain recycled materials.

This concludes my prepared statement. I will be pleased to try to answer any questions.

Thank you.

[The interagency agreement referred to follows:]



UNITED STATES  
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION  
WASHINGTON, D.C. 20545

GENERAL TERMS AND CONDITIONS  
OF THE  
INTERAGENCY AGREEMENT  
BETWEEN  
NATIONAL BUREAU OF STANDARDS  
AND  
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

AGREEMENT NO. EA-77-A-01-6010

PURPOSE

The purpose of this Interagency Agreement is to complement the Memorandum of Understanding between the U.S. Energy Research and Development Administration (ERDA) and the National Bureau of Standards (NBS) dated September 16, 1975.

AUTHORITY

This Interagency Agreement is entered into under the authority of Public Law 93-438, and other applicable law.

SCOPE

This agreement provides for the performance of various research projects by the National Bureau of Standards for the U.S. Energy Research and Development Administration.

In order to provide support to various research projects, each having different periods of performance, the agreement shall be implemented in a task order format.

Each research project to be supported by ERDA shall be separately transmitted to NBS and individually identified by a specific task order number.

Each task order or modification to a task order shall be authorized by the ERDA Contracting Officer.

I. Definitions

For purposes of this agreement, "Administration" means the United States Energy Research and Development Administration or any duly authorized representative thereof, and "Agency" means National Bureau of Standards or any duly authorized representative thereof.

A task order(s) shall be issued for each research project.

II. Costs Chargeable to Administration Funds

The Agency may charge the Administration, except as otherwise provided in Provisions VIII and IX hereof, the actually incurred costs necessary or incident to the performance of the work for each task order. Actual costs include directly related expenses and appropriate charges for indirect and administrative expenses of the Agency but not of the Department of Commerce until Fiscal Year 1978.

The National Bureau of Standards shall not accrue costs on account hereof in excess of the funding limitation stipulated for each research project unless the Administration shall first agree to advance additional funds.

III. Financing--Consolidated Working Fund Advance

Upon presentation by the Agency of a Standard Form 1081 voucher, the Administration will make available, in advance, one-fourth the amount specified in this agreement on a quarterly basis, subject to adjustment at completion of the work.

Each Standard Form 1081 submitted shall state the amount of the advance that is applicable to each task order.

1. Any funds expected to remain beyond the original period of performance for a research project which is incomplete, or for which there is an increased scope of work, will remain available to the Agency if the Task Order is amended by the Administration to extend the period of performance for the research project beyond the original completion date. Requests for such time extensions should be made to the Administration by the Agency at least thirty (30) days prior to the end of the performance period.
2. Any funds remaining for a continuing research project remain available for the entire performance period of the project.
3. Any task order negotiated under Congressionally mandated programs such as the Energy Related Inventions program will automatically be extended contingent upon the availability of funds.
4. Any funds remaining after the completion of a research project shall be reimbursed to the Administration.

IV. Notice of Costs Approaching Total Estimated Costs

When the obligations and costs incurred by the Agency for carrying out the work requested by the Administration for a specific research project shall equal the amount the Administration has advanced therefor, the Agency shall not be expected or required to incur further obligations or costs for that research project unless the Administration shall first agree to advance additional funds, nor shall the Administration be obligated to reimburse the Agency for obligations or costs beyond those amounts.

V. Financial Reports

The Agency shall furnish the Administration with a consolidated financial report as soon as practicable (but in no event more than 30 calendar days) after the close of each NBS monthly accounting period identifying accrued costs to date for each task order.

VI. Accounting Records

The Agency shall accumulate and account for obligations and costs incurred in connection with the work being performed under this agreement.

VII. Termination

The Administration may terminate this agreement upon 120 days written notice of such termination addressed to the Agency. In the event of such termination the Agency shall be reimbursed, to the extent permitted, for obligations actually incurred to the effective date of termination, and for commitments extending beyond the effective date of termination which the Agency, in the exercise of due diligence, is unable to cancel. Payments under this agreement, including payments under this article, shall not exceed the ceiling amount specified for each task order.

VIII. Capital Equipment

- (a) "Capital Equipment" means each item of equipment which is expected to have an extended period of service, generally a year or more, and has sufficient monetary value, generally of \$500 or more, to justify continuing accounting records for the item.
- (b) Unless expressly authorized by the Contracting Officer in advance, the Agency shall not be reimbursed or use funds made available under this agreement for the procurement or fabrication of capital equipment.

- (c) If capital equipment is purchased or otherwise acquired pursuant to an authorization under paragraph (b) above, except as may be otherwise agreed by the Administration and the Agency--
- (1) the title thereto shall vest in the Administration;
  - (2) the Agency shall be responsible for the maintenance and safeguarding thereof;
  - (3) the Agency shall maintain a record in such a manner as to insure adequate control and accounting satisfactory to the Administration, of capital equipment procured or fabricated.

IX. Real Property and Facilities

- (a) Unless expressly authorized by the Contracting Officer in advance, the Agency shall not be reimbursed or use funds made available under this agreement for the acquisition or condemnation of any real property or any facility or for plant or facility acquisition, construction or expansion.
- (b) If the Agency acquires or condemns any real property or any facility or acquires, constructs, or expands any plant or facility pursuant to an authorization under (a) above, except as may be otherwise agreed by the Administration and the Agency--
- (1) the title thereto shall vest in the Administration;
  - (2) the Agency shall be responsible for the maintenance and safeguarding thereof;
  - (3) the Agency shall maintain a record thereof in such a manner as to insure adequate control and accounting satisfactory to the Administration.

X. Patents

The following provisions apply to all projects hereinafter identified, except "Energy Inventions Evaluation Program."

- (a) Whenever any invention or discovery is made or conceived by an employee, a consultant, or a contractor of the Agency in the course of or under the terms of this agreement, the

Agency shall furnish the Administration with complete information thereon; and the Administration shall have the sole power to determine whether or not, and where a patent application shall be filed, and to determine the disposition of the title to the rights under any application or patent that may result. The judgment of the Administration on these matters shall be accepted as final; and the Agency, for itself and for its employees, consultants, or contractors shall agree that the inventor or inventors will execute all documents and do all things necessary or proper to carry out the judgment of the Administration, including aiding the Administration (at Government expense by proper arrangements) and in the prosecution of applications for the patents and in the defense of the Government's right in any country.

- (b) No claim for pecuniary award or compensation under the provisions of the Atomic Energy Act of 1954, as amended, shall be asserted by the Agency, its employees, consultants or contractors with respect to any invention or discovery made or conceived in the course of, or under the terms of this agreement.
- (c) It is recognized that during the course of the work under this agreement, the Agency or its employees, consultants or contractors may from time to time desire to publish, within the limits of security requirements, information regarding scientific or technical developments made or conceived in the course of or under this agreement. In order that public disclosure of such information will not adversely affect the patent interests of the Administration or Agency, patent approval for release and publication shall be secured from the Administration prior to any such release or publication.
- (d) With respect to any inventions, discoveries or improvements in which ERDA determines that it does not desire to file or retain all rights, ERDA agrees to inform the Agency as to all inventions, discoveries or improvements reported to ERDA hereunder and the allocation of rights to such inventions will be made jointly by ERDA and the Agency. Both ERDA and the Agency agree to not waive rights to any inventions without prior written approval of the other.

## XI. Security

- (a) Contracting Agency's duty to safeguard Restricted Data, Formerly Restricted Data, and other classified information. The Agency shall, in accordance with the Energy Research and Development Administration's security regulations and requirements, be responsible for safeguarding Restricted Data, Formerly Restricted Data, and other classified information and protecting against sabotage, espionage, loss and theft, the classified documents and material in the Agency's possession in connection with the performance of work under this agreement. Except as otherwise expressly provided in this agreement, the Agency shall, upon completion or termination of this agreement, transmit to the Administration any classified matter in the possession of the Agency or any person under the Agency's control in connection with performance of this agreement. If retention by the Agency of any classified matter is required after the completion or termination of the agreement and such retention is approved by the Contracting Officer the Agency will complete a certification of possession to be furnished to the Energy Research and Development Administration specifying the classified matter to be retained. The certification shall identify the items and types or categories of matter retained, the conditions governing the retention of the matter and the period of retention, if known.

If the retention is approved by the Contracting Officer, the security provisions of the agreement will continue to be applicable to the matter retained.

- (b) Regulations. The Agency agrees to conform to all security regulations and requirements of the Administration.
- (c) Definition of Restricted Data. The term "Restricted Data," as used in this clause, means all data concerning--(1) design, manufacture, or utilization of atomic weapons; (2) the production of special nuclear material; or (3) the use of special nuclear material in the production of energy, but shall not include data declassified or removed from the Restricted Data category pursuant to section 142 of the Atomic Energy Act of 1954.

- (d) Definition of Formerly Restricted Data. The term "Formerly Restricted Data," as used in this clause, means all data from the Restricted Data category under section 142 d. of the Atomic Energy Act of 1954, as amended.
- (e) Security clearance of personnel. The Agency shall not permit any individual to have access to Restricted Data, Formerly Restricted Data, or other classified information, except in accordance with the Atomic Energy Act of 1954, as amended, and the Administration's regulations or requirements applicable to the particular type or category of classified information to which access is required.
- (f) Criminal liability. It is understood that disclosure of Restricted Data, Formerly Restricted Data, or other classified information relating to the work or services ordered hereunder to any person not entitled to receive it, or failure to safeguard any Restricted Data, Formerly Restricted Data, or other classified matter that may come to the Agency or any person under the Agency's control in connection with work under this agreement, may subject the Agency, its agents, employees, or subcontractors to criminal liability under the laws of the United States. (See the Atomic Energy Act of 1954, as amended, 43 U.S.C. 2011 et seq.; 18 U.S.C. 793 and 794; and Executive Order No. 11652, as amended.)
- (g) Subcontracts and purchase orders. Except as otherwise authorized in writing by the Contracting Officer, the Agency shall insert provisions similar to the foregoing in all subcontracts and purchase orders over \$10,000.

## XII. Technical Progress Reports and Publication

The Agency will make such reports to the Administration on the progress of the work under this agreement as may be mutually agreed upon.

All work totally supported by ERDA to be released as technical reports will be published as NBS reports. At the option of the funding group--(1) sufficient copies for ERDA standard distribution will be budgeted for at the project definition stage; (2) or reproducible copy will be sent to ERDA; (3) or up to 102 copies will be furnished by NBS. If NBS-furnished copies are selected,

27 copies will be sent by NBS to the ERDA Technical Information Center (TIC), P.O. Box 62, Oak Ridge, Tennessee 37830. Distribution and availability of these reports will be accomplished by ERDA, primarily through the National Technical Information Service.

Work partially supported by ERDA will be published as an NBS "formal" publication or NBS report. The publication mode will be selected by NBS. Up to 25 copies will be furnished the funding group and two (2) copies will be sent to TIC.

NBS scientists and engineers may publish the results of their ERDA-supported research in appropriate scientific or technical journals after Provision X. Patents has been complied with.

Up to ten (10) reprints of work totally or partially supported by ERDA (and reported on in nongovernmental journals or books) shall be furnished to the funding group. Two (2) reprints will be sent to TIC by NBS.

The NBS Manual for Scientific and Technical Communications, specifically Chapter 5, is the guide used for publications prepared under this agreement.

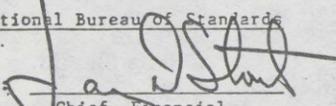
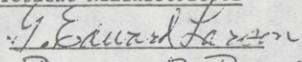
Information resulting from ERDA-sponsored research of benefit to the general public will be provided to ERDA for release, or approval for NBS to release, or for joint release. Release of such material by ERDA will indicate the source of the research and any release approved for issuance by NBS will be first coordinated with the Office of Public Affairs, ERDA. These procedures are intended to assure a prompt public release of reports reflecting the best scientific judgment of NBS, its advisors, and consultants.

#### XIII. Freedom of Information Act

For purposes of the Freedom of Information Act (5 U.S.C. 552), all reports and other documents which are generated in the fulfillment of the commitments of NBS under this Agreement are understood to be the records of both parties to this Agreement. Each party shall respond to requests for information in accordance with its own established FOIA procedures and policies, provided however, that neither party shall respond to any request under the FOIA without, to the extent practicable, first consulting with the other party.

XIV. Classification

In the performance of the work under this contract, the Agency shall assign classifications to all documents, material and equipment originated or generated by the Agency in accordance with classification guidance furnished to the Agency by the Administration. Every subcontract and purchase order issued hereunder involving the origination or generation of classified documents, material or equipment, shall include a provision to the effect that in the performance of such subcontract or purchase order the subcontractor or supplier shall assign classifications to all such documents, material and equipment in accordance with classification guidance furnished to such subcontractor or supplier by the Agency.

XV. AcceptanceNational Bureau of StandardsU.S. Energy Research and  
Development AdministrationBy: By: Chief, Financial  
Title: Management DivisionTitle: Deputy A.D. Proc. (p.m.)Date: 5/18/77Date: 5/19/77

Mr. FLORIO. Thank you very much.

In light of the wide participation, we will adhere to the 5-minute rule for each member on the round of questioning. We will recognize the members in the order in which they arrived.

I might just ask one question at the outset. Many of the witnesses commented on the need for developing markets, if we are going to have economic feasibility injected into the whole process. It seems to me that I remember utilities being the consumer of some 26 percent of fossil fuel in this country.

What, if anything, can or should be done to insure that utilities, in the generation of electricity, be required to give some consideration to the use of refuse derived fuel. This action would, in a sense, create a captive market which would enhance economic feasibility in the development of these types of projects.

Is anything being done in this area? Can any of you make suggestions as to whether or not this is a feasible approach? If nothing is being done, what should be done?

May I ask whoever feels capable, or competent to respond to the question?

Mr. PLEHN. I think that you have hit on a difficult problem. I guess, in part, the answer is that the response of utilities has been mixed. In some parts of the country, with reference to some of the proposed facilities, the utilities have been extremely cooperative, extremely interested and supportive of the development of resource recovery systems. In other areas of the country, that has not been the case. I think it can be ascribed to at least two factors.

One is that, given the way the utility rate structures are established, there is really no economic incentive for a utility to seek out refuse derived fuel for its use. If it were to achieve a savings as a result of the use of that fuel, that savings would be reflected in a reduction in the rate base and there would be no direct material advantage to the utility.

Mr. FLORIO. You are making reference to the automatic pass-through, where the utilities, whatever they are charged for fuel, pass it through to their customers.

Mr. PLEHN. That is correct.

A second point is that the utilities have had some concerns that the combustion of refuse with coal could create problems in their boilers, either in terms of scaling or corrosion, or other things. I think, in part, that problem should be met as we accumulate experience with the burning of refuse. However, I am also advised by technical people that every boiler behaves in its own way and, therefore, experience is difficult to generalize.

I think that what one faces is a situation in which the utilities say: "There is some operational risk here," and of course utilities tend to be very, very conservative in assuming risk, and there is no real incentive of a financial sort for them to move into this.

As I said, some utilities have been very responsive. They have done it because they have recognized the importance of the problem, and the opportunity for the Nation. I, off the top of my head, would not be able to make suggestion of legislative changes that might move to solve that problem, although we will give that some thought and communicate it to the committee in writing, if we can develop some ideas along that line.

Mr. GALLER. If I could add to this.

The question is a very important one, Mr. Chairman, and I think that it is demonstrative of the lack of a holistic approach to the entire challenge of resource recovery, including the recovery of energy from waste.

Now there are two ways of looking at the issue. Utilities and other industrial users can, and some of them do, use RDF, but primarily for public relations. If RDF is really going to be a serious competitor as an energy fuel, it has to hold its own in the marketplace. This means that those who are in the business of developing plans for producing the RDF have to be certain that they take into account the user specifications to insure that RDF will do what the user needs for it to do. By the same token, that includes communities as well as utilities, as well as industrial plants.

So it is not just a matter of providing a ready supply of RDF, but it is a matter of taking into account the specifications, taking into account the financial arrangements, taking into account the stability of long-term supplies. These all have to be factored in.

Mr. MILLHONE. I really have very little to add. We are doing a little research on the combustion characteristics of municipal refuse, and that should provide some information that would be useful in determining the feasibility and the cost of such plants. But it is primarily a market problem, as the earlier witnesses have indicated.

Mr. FLORIO. Thank you.

Mr. PEACH. Mr. Chairman, the only thing I would add is that it is among those kinds of questions which need to be studied as you look at the interagency plan that will be developed on where we want to go in recovering resources from municipal solid waste. Various kinds of options should be looked at and consideration given as to whether there is anything that should be done in this area through regulatory or legislative change.

Mr. FLORIO. It just seems to me that inasmuch as utilities are, for the most part, regulated on a State-by-State basis, it is incumbent upon the State regulatory agencies to require the utilities to prepare comparative studies. I suspect that there is no economic incentive on the part of the utilities to move into this area.

They are not going to do anything by themselves, but the utilities commission in the State can call upon the utility to provide comparative studies as to the impact upon the consumer if, with certain minimal investment, refuse derived fuel could, reduce or at least stabilize escalating fuel costs. Though the utility does not regard that benefit as a requirement for moving into this area, the public agency, in this case the public utility commission, or whatever it is called, has a responsibility to at least explore the feasibility and the desirability of the utility giving that option consideration, and perhaps switching over to it.

Mr. Roe?

Mr. ROE. Thank you, Mr. Chairman.

I was just curious about two points. One, what is your rationale for the administration not being willing to provide enough funds to really implement the program? Obviously, it is an enormous problem, and it ought to be given some attention. Do you have any feeling on that, or do you wish not to discuss that situation?

[No response.]

Mr ROE. We are obviously finished with that question. The next question is, one of the problems we are running into, for example, in any one of the environmental fields, is there are 50 cooks and no Indians. By the time we get done cross-fertilizing, amongst agencies, although it is perfectly normal to have differences of opinion, are we going to get anything done?

Would we be wise in trying to promulgate legislation that would put all the authority and all of the programming into one department? Can you see that concentration, or is that another question that you do not want to answer? Do you think that would be deleterious to your efforts?

Mr. GALLER. Mr. Roe, I will beg the question of whether there is a need for some legislative amendment or shift. But I would like to point out, and perhaps emphasize the point that you are bringing up.

With all due regard and respect for our colleagues at the table here, I am a little less sanguine about the ability of an interagency coordinating committee to do more than coordinate the programs that evolve in order to fulfill the missions of those respective agencies.

We, in Commerce, are in a kind of peculiar situation in that we have no predilection for any technology, nor do we favor any particular recovery process or material over another. But from where we sit, we see: (a) disaggregated industry, (b) disaggregated markets, and (c) the lack of a central point of focus at the Federal level that is at a policy and strategy forming basis.

This statement is not designed as a criticism, nor is it designed to take issue with my colleagues with regard to the validity of the programs that they are evolving. But the statement is only to recognize that we have to go to a higher level than merely coordinating programs. That is a personal view. It has not gone through the Commerce approval process.

Mr. PEACH. Mr. Roe, I would like to take a shot at both of the questions.

Just to go back to the funding question, I guess I would say that our study did highlight the fact that the funding probably at best had been sort of minimal for this program and that it had been given a pretty low priority, at least certainly in EPA, which, in our view should ostensibly be the lead agency in this area. There has been a history of budget cuts as the budget passed through the process in the Office of Management and Budget, even below that amount which the agency was requesting.

So I think that there has been a pattern and a history of very little funding in this area, given some of the things that we probably would need to do to try to move this technology along.

With regard to the question of pulling all this together in one agency and whether that would serve any better purpose, our view was that EPA definitely should be viewed as the lead agency for the development of the kind of interagency plan we recommend, which would be quite specific in laying out the responsibilities of the various agencies as they move forward to try to accomplish program objectives in this area. However, if this process cannot work in this kind of a fashion, then I think probably the Congress

is going to have to look at it from the standpoint of some legislative remedy.

Mr. ROE. What I am trying to get at is that we are all over the lot.

The States along the coast are now under mandate that by 1981, they will not be able to dump sewage sludge into the ocean. In dealing with the EPA particularly, and I don't mean to be unkind to the EPA, but it is an absolute nightmare because 1981 is just around the corner. But now the States are coming back and saying:

We don't have any land areas where we can dump this material because we have all kinds of carry-over trace metals, and things of that nature. We really don't know what to do because we are going to pollute our water supply.

I am wondering if above and beyond the purpose that the chairman and Mr. Ottinger have established these hearings on, is the basis to try to draw these things together and give them the priority they need. Otherwise we have many towns and sewage districts in my State that are now going for declaratory judgments in the courts as to what they are supposed to do after 1981.

One of the people from EPA said, "You just have to do it. If you don't do it we are just going to close you down." That to me is just about as ludicrous as anything can be. You are going to close down two cities? We have to do something with the sludge. We cannot dump it in the ocean. Then, we will package it and mail it to somebody.

All I am trying to get at, without being facetious, is: (1) there is not any priority, really, of any substance to the program at all; (2) there is no funding involved; and (3) there is no lead agency, therefore, to give it priority. Is that reasonably on the record?

Mr. MILLHON. I would like to respond also. You have raised some questions that were not part of my prepared testimony, so I think I need to add a qualifier that this has not been cleared through the appropriate channels within the Department of Energy.

I think that the committee might well be aware of the fact that the Department, in its budget request for 1980, requested some \$37 million for the program, which we felt would be a sufficient amount to accomplish the kind of direction and thrust that is needed, that included \$10 million for the loan guarantee program, and \$17 million for construction grants, using fairly flexible different financing systems.

I think the point was well made before that rather than a number of dollars for a demonstration, it is necessary to look in a more flexible fashion to the kinds of loan guarantee or other support that fit the particular market potential of a community. So the \$17 million would have been a fairly flexibly designed funding package that fit the resources and the market characteristics of the community that was interested in developing some form of innovative solid waste treatment system.

This was the Department's position, and obviously there are others who also look at these dollar figures and priorities, and I think the Department was perhaps not as on time in developing some of its loan guarantee regulations and other things, so that there were some legitimate questions about our ability to develop and implement some of these programs.

In response to your question, the Department sees this as a potential that needs to receive additional direction and support, although I am speaking as an individual who is familiar with these figures rather than as a spokesman for the administration.

As far as the second question, and that is the question of whether it would be better to have a superurban waste agency, or responsibility in one particular area, there has been, I think, considerable progress made in defining roles already. There would be some value in seeing whether the MOU's that have been developed, and the definitions of task that have occurred, will work as those who have been involved feel they will, before changing the relationships and causing some additional uncertainty.

Mr. ROE. Thank you, Mr. Chairman.

Mr. FLORIO. I believe that Mr. Ritter was the next to arrive.

Mr. RITTER. I would like to commend the distinguished chairman of the Transportation and Commerce Subcommittee.

I would like to make a comment on what I perceive to be a lack of direction at the Federal level in this municipal waste disposal area. It seems to me that we have had these programs for some time. The key missing factor has been the economics and not, necessarily the fact that one agency is not doing so well, or that another agency could do it better.

The economics are just now coming into focus, and perhaps giving us some positive opportunities. In many congressional districts around the country, in the last few months, we are seeing a flurry of activity to get together the municipalities with supplies of solid waste, with certain industries which need to generate steam, or with utilities that will take the fuel.

I think that we are at a time when the opportunities are probably greater economically than ever before. I have severe reservations with some of these less than adequate Federal initiatives that we have experienced. We could perhaps do more harm than good in dislocating the flow of the market, and the basic need for these fuels that utilities have, or that an industry has.

I think that we have to be very careful in the development of rules and regulations, grants and contracts, for we might end up stymying a natural evolution toward putting these programs into effect.

That being said, I wonder about the appropriateness of the Environmental Protection Agency having the lead role here. I understand the environmental considerations of waste. But the key feature to these plants actually working is the economics of supply of fuel to a utility, or to an industry in the area.

The main product of EPA is not cost effectiveness of fuels, the selling of fuels, or the producing of fuels. The main mission of EPA is to protect the environment. I see the difference in emphasis there as, perhaps, sidetracking from the major mission, which is to get these materials either into fuels, into the whole concept of recycling, which makes this process in total economically attractive.

It is a materials game. It is a materials production game. It is a materials economics game, aside from the fuels. That is a second level. So it seems to me that where there is a waste and environmental component I wonder whether the water and air pollution

people and the EPA, are really going to give any kind of priority to this energy production thrust, and to this materials recycling thrust. I don't think that we have seen it to date. I think you have to admit that it has not been there. I really worry about the future.

Mr. PLEHN. Mr. Ritter, I would like to respond to that.

It is a very good question because it lets me state a couple of points where my analysis of the situation is a little different from yours.

First, in order for resource recovery to work, three things have to be in place. First, there has to be technology to do the job, and we have seen, I think, in the last 6 to 8 years significant advancement in the technology for doing the job. We now have the waterwall system, the RDF system, we have the modular incinerators which are very flexible and can be used in all kinds of small scale operations.

We have the co-disposal technology in which you are dealing with Mr. Roe's problem of sludge and garbage simultaneously, and meeting two social objectives. So those technologies are essentially there, but perhaps not to the degree that we would like.

That is the first point. The second thing you need, and you are absolutely right on this, the economics have got to be sound.

Mr. RITTER. Incidentally, I put the technology together with the economics.

Mr. PLEHN. You are absolutely right that the economic situation has been improving since 1973, unfortunately, as a result of OPEC actions. The economic situation has very significantly improved by the increases in the price of oil in the last few months. I think that the economics are really falling into place for these systems.

That leaves a third set of obstacles, which is the institutional problem. I think the basic point is that a community gets into the resource recovery because it has a garbage problem that it has to solve. If it has got a lower cost option of landfilling, it tends to want to go that way because it is simpler, and it is known, and one does not have to deal with these very complex problems, which are legal, technical, and of all sorts, to get your act together to get into resource recovery.

I think, as I said in my statement, those institutional problems which are the most difficult ones for communities to solve. You are talking about a new kind of behavior. You are talking about controlling the waste stream. Industry cannot control the waste stream. Industry cannot get a hold of sufficient garbage to produce the energy without the community doing it for them.

Mr. RITTER. I understand completely, about the institutional factors, and I agree with you as to their importance. But if you give a county manager or executive that book, I think the best that he could do with it would be to use it for fuel in his fireplace, for it is an imposition of complexities at the outset that the bureaucracy is communicating to people who are ready to move ahead. I worry about books that are that thick. If this is the way to do it, I think that I will go home and play golf.

Mr. PLEHN. All I can say to that is that this book was developed on the experience of countless communities which have been successful, or more importantly not successful, in bringing about a

marriage between the technology for solving garbage problems, and the industrial usage of the fuel.

This book was developed based on that experience, to help people make that marriage successful.

I am with you. If the community can get there without this book, that is just fine. I am all for that. But I am saying that the experience has shown that this kind of guidance through this difficult, process will be of real help.

Mr. GALLER. Mr. Chairman, Mr. Ritter, I would agree with my colleague, Steff Plehn. I would perhaps not go along with his list of priorities. I think from my point of view the highest priority is the economics, and next the institutional barriers. The technology will evolve if there is an economic incentive for it to evolve.

Mr. RITTER. Isn't the EPA the agency that is going to get through those institutional barriers?

If as Mr. Roe said, they said, we are going to shut you down, I agree at that point that everybody should be mailing their waste to EPA.

Mr. ROE. Would the gentleman yield at this point, I would like to ask one question, which might be helpful.

Mr. RITTER. Yes, certainly.

Mr. ROE. What time frame, if somebody starts at the beginning of the maze, with all things being absolutely perfect, would it take the person to go through that maze before they would get to the point of approval of the project?

Mr. PLEHN. Based on experience in this country, for the communities that are just starting to the time that they are ready to make their decision as to whether they want to go with an architectural engineering approach, a turnkey approach, or a full service approach, is 183 weeks. That is 3 years.

Mr. ROE. Once they make that decision, how long does it take them to get on line for production?

Mr. PLEHN. It takes a couple of years to build and shakedown the plant. It is a 5-year process.

Mr. ROE. That is just to get to the point of getting anything done. The cost of construction alone increases every year.

Mr. PLEHN. What I am communicating here is not EPA's idea of what the world ought to be, but what the world has been in the development of these plants.

Mr. GALLER. May I complete my response to Mr. Ritter's comment?

There exists a pattern, a paradigm of what Mr. Ritter and Mr. Roe are discussing. What we have really lacked in this area has been an integrated delivery system that the communities could use in a timely fashion, and so respond in a timely fashion.

If you take a look at the county agent, the agricultural county agent, we find there is a time-tested, proven, successful way of delivering Federal guidance and information to localities and to individuals, and more importantly to provide those localities and those individuals with an integrated pipeline for communicating their needs and their problems back to the Federal level.

I make this only as an observation. I am not suggesting that we need exactly that kind of a pattern, but in my view what we have

lacked has been an integrated delivery system from the Federal level to the communities that need to benefit from our advice.

Mr. PLEHN. If I may make one more point, Mr. Ritter, bearing on the economics.

The energy value from a ton of waste, and I may not get these precisely.

Mr. RITTER. I understand the differentiation.

Mr. PLEHN. The energy value from a ton of waste is about \$6 to \$8 a ton. The energy comes from the organic components of the waste, which is about 89 percent, and what else is left is a very little bit of aluminum, 1 to 1½ percent, 6 to 8 percent of ferrous metals, and some glass. So you are talking about the 89 percent that is organic.

To build and operate one of these plants costs \$14 to \$18 a ton. So you are talking about the energy revenue plus what we call the tipping fee in order to make the thing work. Now, a \$10 or a \$12 tipping fee is, on the average, a high tipping fee in this country, but it is what is being paid in those communities where these plants are operating. That is what they are paying. In Hempstead the charge to the town went down \$2 a ton as a result of the creation of this plant. That is what they are paying in Bridgeport. That is what they are paying in Boston, and that is what they are paying in Florida. That is what they are paying in the Middle West. That is why these plants are happening there.

There are several things that are at work. The energy market is strengthening, so that that energy value will get higher. The landfill costs are increasing, in part because they are being more effectively regulated from an environmental point of view so that the environment is not subsidizing the land disposal and, in part, because the people's resistance to the siting of new landfills is getting more and more intense, which is forcing communities to go to further and further out, pay more and more for the land, and pay a lot in money and energy to truck the waste out there.

So these economics are coming together, but what I am saying is, if the community is not facing the \$6 or \$8, or \$10 per ton for the disposal of its waste, it is just not going to get into this. That is why we have not gotten into this in this country, and why the Europeans have gotten into it.

The Europeans are ahead of us because there they have less land, therefore, they came into the favorable economic zone sooner than we did. But that is going to change. These 66 communities that we are talking about, if they all succeed in putting on plants, rather than just 2 percent of the country's waste being turned into energy, it will be close to 10 percent.

For those of you who are from the Northwest, we are supporting three projects with the port authority, two in New Jersey and one in New York City, one in Hackensack, and one in Camden, and another one in New York City. Just to talk about the New York metropolitan area, there are 20 million tons of garbage in New York City.

Mr. RITTER. Let me summarize by saying that at this threshold of opportunity in taking solid waste and converting it to fuel and other useful materials, I am very, very hopeful that the role of the Federal Government will be to stimulate, and to provide, as Mr.

Galler said, a county agency approach to help these things along because we are beginning to talk about large volumes, and not just a demonstration here and there.

I think that getting the act together between EPA, DOE and the Department of Commerce, as the volume begins to come on line, not serving as an obstacle but as a stimulus, is an exceedingly important thing, and I commend the gentlemen for holding these hearings, and bringing some of these problems out into the open.

Mr. PEACH. Mr. Chairman, there is one point that I would just like to add, and refer it to Mr. Ritter. From our review and look at the situation, we have in our report a section which summarizes the barriers that we were able to identify. I think that they do deal with this question of the role of the Government, and how it can fit in this area.

One, very simply, is the question of information dissemination, and a better and improved method of disseminating out the data to people so they will know more about what is happening, because we found that there were places where they were not aware of opportunities.

Another deals with assistance for evaluation, because you do have to evaluate these things on a site specific basis, and provide that early assistance for evaluation, and then consider any incentives that can be offered just to encourage the investment and help it happen.

Mr. RITTER. Again, in summary, the experience of the people back home with EPA, with DOE, as well as with other Federal agencies, is that it is painful, difficult, and usually involves much delay. I think that we have got to be very much aware of that as we go forward.

Mr. FLORIO. Continuing under the 5-minute rule, we will call on Mr. Fish.

Mr. FISH. Mr. Plehn, if I understood you correctly, EPA has the lead role as far as relations with localities in planning and support for municipal waste to energy. If I quote you correctly, you said that the Department of Energy is responsible for financial support of demonstrations, including loan guarantees. Is that a fair summary of what you said?

Mr. PLEHN. Yes, sir, that is correct.

Mr. FISH. Now, we will receive testimony shortly about a county in New York that undertook a study of waste disposal systems on its own in 1973. It contracted for preliminary engineering studies in April of 1976, and had for 2 years, a substantial grant from the state legislature for construction. The Department of Energy notified the country over a year ago that its proposal had been accepted for negotiation of work scope and funding, and within a week the design concept cost study is due.

I ask you, what do you do in a situation like that, in which the community has been dealing exclusively with the Department of Energy as the only Federal agency.

Does it stay in that mode, or does it switch over to you at this point?

Mr. PLEHN. The funding for that community came before agreement was reached. The Department of Energy allocated \$2 million

to 20 communities around the country for similar kinds of planning and procurement efforts to the one that we have described.

As an outgrowth of the agreement, we will either pick or not pick up those communities for later stages of funding as is judged appropriate. If it is determined that it makes better sense for that to stay with the Department of energy, they will do that. If it makes better sense, as it has in a couple of cases, for them to come in under our program for funding, we will do that.

Mr. FISH. Is it dependent in part upon the technology that is contemplated?

Mr. PLEHN. It would depend in part on that, and it would depend on the stage at which they are in the process.

Mr. FISH. But what if they are ready to go to construction?

Mr. PLEHN. If they are ready to go to construction, and if the Department of Energy was interested in providing demonstration or other forms of support to that community, it would stay with the Department of Energy.

Mr. FISH. What if the Department of Energy is not interested in implementing loan guarantees, which seems to be the case.

Mr. PLEHN. I am going to turn that question to the Department of Energy.

Our program does not provide any support for the actual design or the construction of facilities.

Mr. FISH. It does not?

Mr. PLEHN. It does not.

Mr. FISH. Then, Mr. Millhone, in your testimony you said that in response to a mandate of the Congress, the DOE issued a draft rule on July 11 for the support of municipal waste demonstration plants relating to loan guarantees, and further that loan guarantees and price support rules will be finalized. However, you say, "There is no intent in the administration to implement them at this time."

That statement, together with what I am told, is that there are only two people currently working at the DOE headquarters on this program. I must conclude that there is a reluctance on the part of the Department of Energy to press forward with this program.

Could I ask you first, what is the reason for this reluctance?

Mr. MILLHONE. I believe that you are referring to the Dutchess County project.

Mr. FISH. I was, but in the larger context of personnel taking a strong position against implementation of loan guarantees.

Mr. MILLHONE. It was the administration's direction to the Department of Energy that the funding should not be provided on the loan guarantee program until the potential of that program was evaluated, and until the regulations for the program were out. That decision was made earlier.

Now we have published the loan guarantee regulations. I think that when the decision was made, one of the considerations was the fact that the regulations themselves had not been published.

The Department of Energy, as I indicated in an answer to an earlier question, has felt that there is a significant potential, not only for energy recovery but for other environmental considerations, in this area, and has supported higher levels of funding

than eventually was approved as part of the administration's budget.

I think the explanation for those changes was some consideration of all the funding requirements of all budget requests from various departments, and also concern about the absence of regulations at that time.

Mr. FISH. Mr. Millhone, I have heard for 2 years what you just said that we will postpone a decision on loan guarantees until we see the rules. I heard this last year, and I heard it 2 years ago.

You state in your testimony, however, that regardless of the fact that loan guarantee and price support rules will be finalized soon, you still say, "However, there is no intent in the administration to implement them at this time." So I don't see any change in policy.

We have just been told by the representative of the Environmental Protection Agency that they have no program that involves construction cost grants. So where does the community go? Is there no assistance, then, from the Federal Government?

Mr. MILLHONE. For a community that would be seeking funds either under the loan guarantee or some other funding program that has been described, or authorized by Congress, there is no current source of funds.

Mr. FISH. Do you have any recommendations by which this subcommittee could speed up this program, or for any additional incentives that are needed to accelerate it?

Mr. MILLHONE. The testimony that I have given is the testimony which states the Department of Energy's position on this issue at this time. I cannot amplify that in any way as a Department spokesman.

Mr. FISH. In the authorization legislation for DOE for the forthcoming fiscal year, title IV of the DOE authorization bill does provide money for construction. The appropriations bill has earmarked \$6 million for both feasibility studies and construction, which I think is a change from prior years' legislation. What will be DOE's response to that, if it becomes law?

Mr. MILLHONE. That is for a demonstration of innovative concepts, so it would not provide a significant level of funding to advanced technologies that have already been tried and tested. It would be only for the more innovative, limited number of demonstrations.

Mr. FISH. Do you regard the pyrolysis plant concept in the category of innovation, or tested and proved?

Mr. MILLHONE. It would be in the innovative area.

Mr. FLORIO. Would the gentleman yield?

Mr. FISH. Certainly.

Mr. FLORIO. I am very interested in what I am hearing, because a number of witnesses have stated that the technologies are available, the economics are on line, and I have always felt that the biggest impediment is the initial capital outlay required for many of these facilities. I have often felt that the loan guarantee program is one way to induce the private sector in at a minimal cost, and hopefully at no cost to the Federal Government.

Now we find that the program is, in fact, nonoperational. At best, you have two people dealing with the whole program, and that it does not seem to be very viable.

It seems to me that at this time, when the President is advocating a movement toward alternative sources of fuel, someone has got to make some decisions before too long as to whether or not we are going to just talk about that, or whether or not we are going to do something about it.

Admittedly the Department of Energy has not been in operation very long, but it does not seem to indicate that the search for alternative sources of fuel is a very high priority.

As I understand what the President said the other night, he was talking about the creation of a new order, or a new semiautonomous agency. It may very well be that this is something that is deserving of some considerable investigation, because the existing system does not seem to be at all conducive to emphasizing the next important step, which is to get the private sector involved in this area.

I am convinced that the economics and the technology are such that we are at the tipping point. All it will take for the massive utilization of these resources will be the creation of a loan guarantee program to induce the private sector to make the commitment to become involved in this area at virtually little or no cost to the Federal Government.

I would just like to thank Mr. Fish for developing this line of inquiry, because I think it reveals to the members of this committee what is happening, or perhaps more appropriately, what is not happening.

Mr. FISH. I will be happy to yield any time to hear such an eloquent statement on behalf of the loan guarantees.

As you know the Appropriations Subcommittee did not go along with the authorization levels set by the Science and Technology Committee, and we will be making an effort on the floor to recover that when the Department of Energy appropriation bill comes up.

I had just one other question. When we were focusing on pyrolysis plants, Mr. Millhone, there has been some experience, I understand, in San Diego and in Baltimore of significant difficulties in the operation of these plants. In the light of this experience, could you comment on the possibility of future commercial scale pyrolysis plants?

Mr. MILLHONE. I would like to, if I could, respond to some of the earlier questions you raised very briefly, and then ask Mr. Don Walter, who is the branch manager in charge of the program, to answer your question about the pyrolysis plants.

I would like to respond by making three quick points. One is that much of the work on this program is contracted to Argonne National Laboratory, so the two people that we have at DOE headquarters is not an accurate description of the people who are involved in the management of this program.

Second, the point that you made is quite accurate. With the loan guarantee program, that is designed to deal with the high initial costs of some of these projects, and the long-term feasibility of them. So it is designed to make it possible to move ahead with these programs, with a relatively low risk in Federal funds, and deal with that financing problem.

The third area is whether the President's latest messages will have some impact on what is being done in this area. It certainly

appears as if that is possible. There has been no information passed down through the line to the Department of Energy that would indicate just what this effect would be. I think that it would be a clear mistake to speculate on that.

If there is further information in this area, we can see that this information is relayed to the committees.

Mr. FISH. I hope that you will take the message back to the Department that both of the committees represented here today have taken a very strong position. We have written it in the law twice. No one has explained better than yourself the value of loan guarantees.

Mr. WALTER. Mr. Fish, I am Don Walter. I am the Chief of the Urban Waste and Municipal Systems Branch at the Department of Energy.

I first should say that I speak from the excellent position of having hindsight on pyrolysis. The two projects, in California and in Baltimore, demonstrate graphically the problem of scaling up too fast. Both of those were scaled up over 20 times. The chemical industry people, unless they are putting a very great effort on something, like to retain their scale below a 20-time scale.

In terms of pyrolysis, we think that it has a tremendous amount of potential. It has potential because it can solve many of the problems we have been discussing today. It provides you with a very flexible market. It produces a fuel such as a clean combustible gas.

For instance, you could introduce such a clean combustible gas into any type of utility, or industrial boiler, without any additional pollution controls, without any concern for corrosion or erosion of parts of that boiler.

In addition, when you go to that type of gas, which is a mixture of hydrogen and carbon monoxide, you are essentially attacking the very market that a fairly large amount of our natural gas now goes to.

What I can recall off the top of my head is that 4 percent of our natural gas goes to make ammonia. Those are weighed by shifting the natural gas into carbon monoxide and hydrogen, the hydrogen that is combined with nitrogen to make ammonia.

One, if we are careful in our scale up, I think we can get pyrolysis. Two, if we do get the pyrolysis, it will expand our markets tremendously.

Mr. FISH. Thank you, Mr. Chairman.

Mr. FLORIO. Mr. Wolpe.

Mr. WOLPE. Thank you, Mr. Chairman.

I represent an area in southwestern Michigan where a number of communities, because of the solid waste disposal problem that accumulated, have become increasingly interested in exploring options and alternatives.

Up to this point, we have approached this from the standpoint of the bureaucratic comparatives, in terms of what happens within the bureaucracy.

I wonder if you could, perhaps, carry me through for a moment, the steps that a group of communities, or a single community ought to properly go through, in order to make the decision, and then to implement such a decision?

What would be the first kind of thing that they ought to be doing, and what ought to be the Federal position on that?

Mr. PLEHN. I will not give you our 4-inch document, but I will try to summarize that briefly. Really, the community has to go through several phases. The initial phase would be the prefeasibility stage. At that point, the community ought to get some rough sense about how much waste it has. It ought to take a preliminary look at what markets might be available, who might use the energy in particular, and are there markets for the glass, aluminum, or ferrous materials that might be developed.

They ought to take a look, roughly, at their landfill availability, and determine what kind of costs they are going to be facing for landfill. I might say that the control of sufficient waste stream supply is often the most critical question. Can the community, in fact, deliver the waste somewhere. Then they make a decision on whether it is a practicable idea, or it is not a practicable idea.

Mr. WOLPE. If I could just interrupt for a moment.

Who specifically would be the best kind of people to consult in putting together that kind of analysis at this point?

Mr. PLEHN. They could, for instance, contact our regional office in Chicago, and I am sure we could make available to them through our technical assistance panel program, an expert or several experts to guide them in pursuing those initial steps.

Mr. WOLPE. You will actually come in and sit down with people?

Mr. PLEHN. We will actually come to the community, sit down with them, talk it through with them, and come back at a later point.

That is the prefeasibility. Once that is accomplished, then you get into what is the feasibility stage. At that point, you really do all of those things over again, but in a great deal more detail. You really get out to talk to your energy markets, and endeavor to secure a preliminary commitment from them that they are, in fact, interested in the energy.

You, in fact, make sure that that waste stream supply is available. You begin to look at the technology alternatives that are available, and determine which one seems to make the most sense. Is it a steam market, then there would be certain things. Is it an electricity market? Is it a cofiring with coal; that would suggest that you go in an RDF direction.

Perhaps, if those are smaller communities, they would want to look at these modular incinerators which can be used to provide steam for factories, or shopping centers, or other smaller energy users.

Mr. WOLPE. On both the prefeasibility phase, and the feasibility phase, what are the funding options to provide the kind of technical assistance for the work that needs to be done within those areas?

Mr. PLEHN. As I said, we have our technical assistance panels program, which we can make available to provide that kind of assistance. We have done that to 160 communities in the country in the last 18 months.

Beyond that, we have our urban grant program, which makes grants to communities to specifically finance exactly this pattern of analysis and planning that I have described.

In Michigan, we have made a grant to the city of Detroit, to the city of Flint, to the Muskegon area—those three—and we are hoping, dependent upon the Congress response to the President's budget request in fiscal year 1980 for an additional moneys for this program, we are hoping to make an additional solicitation sometime in this fall. If that occurs, that is something which your communities could apply to.

Mr. WOLPE. Beyond the urban grant program, are you saying that these are funds that are available for the technical assistance, the preparation of the documents, and the application materials?

Mr. PLEHN. That is correct. What these funds would essentially do is fund one or two full-time people who would report to the county commissioner, or the mayor, or whoever the governing unit would be, that would carry this project forward on a day-to-day basis. Their work would be supplemented by various kinds of consultant and other expert assistance which these funds would also support.

Mr. WOLPE. Up to this point, the Department of Energy need not get involved? This is, under the terms of the new memorandum of understanding, strictly a function of the Environmental Protection Agency?

Mr. PLEHN. That is correct.

As this community would be moving down the line, and starting to sort out the specific technologies that it might be interested in, there would be the question of whether any of those were ones which the Department of Energy was interested in supporting, either as a demonstration, or through loan guarantees.

We would be making available the community information to that effect, and they could, then, be exploring that with the Department of Energy.

Mr. WOLPE. It would be helpful if you could supply, for the record, a copy of EPA's information on DOE's loan guarantee program.

Mr. PLEHN. I am not sure I understand.

Mr. WOLPE. What we are looking for is the material that is available to the communities with regard to the DOE funding.

Mr. PLEHN. We will be glad to provide that to you, however, the information will not be available for quite sometime.

Mr. WOLPE. Thank you.

It has been very clearly indicated, in earlier testimony, that there is very little funding available at the present time for the kinds of projects that we are discussing this morning.

Do we know precisely the number of requests that have come in either to the DOE, in terms of the technology end of it, or to the EPA?

Mr. PLEHN. Let me respond first, and then Mr. Millhone can.

Our solicitation went out last September. We received requests from over 1,000 communities that were interested in receiving that. We provided 90 days, as I remember it, for communities to develop the information to reply to us. We had 205 communities that applied to us. Out of the 205 communities, we selected 68 for initial grants.

Mr. WOLPE. I take it that this was strictly a funding problem, and that you would have liked to have supplied more?

Mr. PLEHN. That is correct.

Mr. WOLPE. What was the shortfall?

Mr. PLEHN. On the average, and there are bigger community problems and smaller community problems, the 68 planning efforts that I described here cost something less than a half million dollars, about \$450,000 or \$460,000 on the average. But some of these are bigger, and some of these are smaller.

Mr. WOLPE. Is that per application?

Mr. PLEHN. That would be per community, to carry this whole process to the end. That would be spread out over a 3- or 4-year period.

Mr. WOLPE. I have one specific question regarding the criteria which establishes whether or not it makes sense for the community to move in that direction. I understand that two determining factors are the marketing issue, and the availability of waste material.

Can one generalize, in terms of size of population, what is required to generate a sufficient amount of urban waste to make this economic?

Mr. PLEHN. No, not really. There are technologies available that will provide resource recovery for all sizes of communities. For the large waterwall system, or a large RDF plant, you need the waste of about a half million people in order to make the system economically viable. But there is available the modular incinerator technology, which are off-the-shelf, factory produced units, which can be combined in various combinations, and that can deal with really quite small communities.

Mr. WOLPE. What is the smallest community, at this point, that has put in place, or is putting into place, that kind of system?

Mr. PLEHN. If I could just consult my staff on that.

Mr. LEVY. There is a community in Arkansas that processed 15,000 tons a day. There is another community in New England that combines its waste with that of an industrial site, and actually only has enough waste to supply waste a couple of days a week. In very small communities, there is opportunity to join forces, perhaps with an industry or some other generator of waste.

Mr. FLORIO. Could you identify yourself?

Mr. LEVY. Stephen Levy, Chief of the Resource Recovery Branch of the Office of Solid Waste of EPA.

Mr. WOLPE. Thank you very much.

Thank you, Mr. Chairman.

Mr. FLORIO. I just have one last question which is primarily directed at EPA.

I am intimately involved in a number of the projects, the planning projects in south Jersey, and I am hopeful that the memorandum of understanding which has just been achieved between DOE and EPA will avoid, from this point forward, the type of thing that we have unfortunately had. We have one county in my area applying for a planning grant to DOE to recycle solid waste, particularly emphasizing the use of sludge. We have an adjacent county, which has all of the sludge coming from the city of Camden, getting a planning grant from EPA to go off in its own area. Most people with whom I have talked regarding this situation say that the two

counties are an ideal region where there should be some coordination.

They say:

It is unfortunate that this has happened. We will try to make the best out of a bad situation by getting those two entities to utilize those planning moneys to plan in a cooperative way.

But, more importantly, and it is a thread that runs through this whole hearing, the time is ripe for us to move into this new initiative. I am concerned that the local public bodies do not really have the assistance necessary to evaluate, not only the techniques and the technology, but to make some public interest determinations as well.

Many of the consultants and engineers are making suggestions which are not totally disinterested public interest suggestions. The company that is selling the hardware has an interest in selling the hardware, and to the degree that Federal moneys might be available to assist, we are not really sure that there is the high degree of sophistication in every community which is necessary to evaluate what is superficially an attractive proposal.

I think that we can appreciate the fact that the major problem in small communities is disposal problems. If someone comes in, and says: "Well, we can help you eliminate the cost of disposing," that is a very attractive point of entry. What I am suggesting is that we need some good thought-out analyses of the attractiveness of that proposal, especially in light of the fact that we may be losing other areas such as the recycling component and the energy generating component.

So I would conclude by asking a question of EPA regarding their technical panels. Are the technical panels waiting to be consulted or do they feel an obligation, or are they out there working in the field, reaching out to local communities?

Mr. PLEHN. Mr. Chairman, on every planning grant, we have a team drawn from our technical assistance panels resources, that have been out there during the past months, sitting down with these communities, and working up a budget and a scope of work for these projects. Those teams will stick with those projects all the way through, in addition to oversight from personnel in our regional office.

I agree with you, I think that these problems are extremely complex. I don't think there is any community that can, without assistance, really intelligently sort through these technical, legal, and other questions. I think that the obligation to provide information and support is extreme, and I think that the technical assistance panels is a useful mechanism for doing that.

We have been working out with the Department of Commerce an arrangement whereby the information which they will be generating on specifications and on industrial requirements relating to recovery will be disseminated through these technical assistance panels to interested communities in the field.

So we are both affirmatively providing that kind of support to each of the communities which have our grants, and are responding to requests from other communities as we receive them for assistance.

Mr. ROE. Mr. Chairman, just for the record, I think that it is important to get this into the record.

Mr. Plehn commented that there were 1,000 applications submitted.

Mr. PLEHN. There were 1,000 solicitations requested, and 205 applications.

Mr. ROE. That is right, and you funded 68 applications. Is that correct?

Mr. PLEHN. Yes, sir.

Mr. ROE. At about \$500,000 a piece, or somewhere in that range?

Mr. PLEHN. That is the way the budgets are working out. Yes, sir.

Mr. ROE. Therefore, it would indicate, just for the record, that the amount of funding for those 68 for these projects was roughly somewhere in the magnitude of \$34 million.

Mr. PLEHN. It is less than that, but it is in the neighborhood. If all phases for all of these projects are funded, it will be approximately \$30 million.

Mr. ROE. I just wanted to get into the record the shortfall of the funding. In other words, you said in your statement that part of your thought process in deliberations, and I am not being critical, was based upon the point of view of the limited funding. Wasn't that what you said?

Mr. PLEHN. Yes, sir.

Mr. ROE. So if we have 68 that we were able to accommodate at approximately \$500,000 a piece then maybe it is less than \$34 million. We turned down 137 additional applications which would have cost an additional \$68.5 million. In other words, if you had \$100 million to deal with, you would have been able to accommodate the 205 applications that were put in. Isn't that a fact, or isn't that a fact?

Mr. PLEHN. I think, in point of fact, Mr. Roe, we would not have provided awards to all of those communities because, based on an intensive evaluation process which the Department of Energy helped us with, we concluded that there were a number of those communities that really did not have the effective preconditions for successful resource recovery systems.

Mr. ROE. All I am trying to get at is, there are 30,000 counties in this country. If you multiply the cities and the dissertation that went on about being able to accommodate a community of 10,000, we have the technical ability and the different types of processing to get the job done. If we are talking about the problem of recovery, and all the problems of solid disposal, and we have the sludge and the contravening laws which we are all faced with, obviously \$34 million is like a pinch of snuff in the order of magnitude of the problem that we are faced with.

So, from a legitimate point of view, for whatever reason you turn down, and I am not even quarreling with that point of view, \$100 million to get a good handle on this program, and get it going, is reasonable. We have the technology. We have the impetus. The need is there. We ought to be looking for substantial higher funding if we are going to do anything at all in this field. Is that a reasonable assumption?

Mr. PLEHN. Yes, sir.

Mr. ROE. Thank you, Mr. Chairman.

Mr. WOLPE. I have two questions.

In my own district, there are two counties that are deeply interested in specifically pursuing the generation of waste-to-energy projects. They have been informed that somehow they need to reach out to a much broader regional area to make the thing work. This may be because of marketing criteria.

My question is, if they begin to talk about a much broader region, which in fact, they did, by viewing three regional planning areas as the geographical scope of the area that would be involved, how is that handled administratively in terms of who is the appropriate grant recipient? Or, are grants awarded only to counties, or municipalities, or to planning agencies? What is the mechanism?

Mr. PLEHN. We are quite flexible on that point. We do require that the unit to which we would make the grant be consistent with the solid waste planning effort which is going forward with EPA support, in your case, the State of Michigan. But provided that there is consistency in that respect, and I am sure from what you are saying there would be, then the problem of who the specific grant recipient is not a difficult point from our end.

Mr. WOLPE. The second question I would have is that the President, in his message just yesterday, spelled out tentative goals as to which energy source would account for the amount of petroleum displaced, and indicated, I think, a goal of 4.5 million barrels a day reduction that is being attempted, of which 0.5 was attributable to biomass.

I guess my question to you is, perhaps this is contained in testimony that has been presented earlier, what would you believe to be a realistic goal if we were very serious about using our waste for energy?

Mr. PLEHN. I think that you should direct that question to the Department of Energy, also.

In our urban areas in this country, and this estimate is now a little bit old, so I think that it would be greater than this, there is energy value in waste equivalent to about 400,000 barrels of oil a day. At the present time, in energy recovery systems, we are only recovering 2 percent of that.

We think that a reasonable goal for, let us say, 1990 is to raise that 2 percent to the 10 percent, or perhaps greater than that, level. That is not including the energy savings from the other avenue of source separation which, as I touched on in my statement, is also a significant route to energy savings.

Mr. MILLHON. I am a little hesitant to come up with specific figures until I have a chance to look at some of the funding and other kinds of mechanisms that are being considered.

I guess I would add that although we have been talking primarily about municipal waste today, the program needs to conceptually be expanded to look at industrial waste and agricultural waste, if you are looking at the biomass area as well.

Mr. GALLER. Regarding your concern of foreclosing some of the opportunities, I think that the technical panels that Steff described are doing an admirable job, except in one area. They do not include market surveys. I believe there is a risk of coming up with attractive technological fixes that do not take into account market poten-

tial. We are very firm believers in developing horizontal technologies that can be flexible enough to accommodate changing market conditions, and emphasizing the resource recovery aspects in toto, not merely the waste to energy via burning.

Mr. FLORIO. Thank you very much.

Mr. WOLPE. Mr. Chairman, I believe that there is one other response to that question.

Mr. PEACH. I just thought that I would provide some general figures for your consideration. I think that if you look out to 1990, which is the general figure that the President is looking at in the information he has put forward, you are dealing with about 225 million tons of solid waste as an estimate that has, as a total potential, about 2 quads of energy, or about 1 million barrels per day. Of this, you would see a range of 50 to 60 percent, somewhere in there, that might be recoverable because of the need to get adequate concentration to really make recovery feasible. So you are looking at maybe a total potential that exists there of about 500,000 to 600,000 barrels. The question is, what percentage of that can you actually expect to get a program to move to recover over that period of time.

Mr. WOLPE. It is helpful.

When you are referring to solid waste there, is that simply the urban waste, or is that the more general definition?

Mr. PEACH. The definition we are using is that of municipal solid waste, the disposable kinds of things that come out of a consumer society. We are just looking at that aspect of it.

Mr. WOLPE. Thank you very much.

Mr. PLEHN. If I may have the opportunity, I would like to correct some numbers that I gave you earlier. We presently recover energy from 2 percent of the waste. The 66 communities that we are helping in our urban grant program would raise that from 2 percent to 9 percent. In my statement I say that we think that a goal for 1990 would be something on the order of 15 percent of the waste stream converted to energy.

Mr. FLORIO. Gentlemen, if there are no further questions, we would like to express our appreciation for the very helpful testimony that you have provided to us. You can rest assured that we will be back in contact with you for the purpose of continued deliberations.

Thank you very much.

Our last panel is comprised of two individuals, Ms. Lucille Pattison, the county executive of Dutchess County; and Mr. Neal Montanus, who is the director of industrial development of the Port Authority of New York and New Jersey.

We welcome the two witnesses. We have copies of their statements which will be entered into the record in their entirety. We would ask them to proceed in a summary fashion. We have just been informed that we have an additional time constraint, and we are being physically removed from this room at 12:30. So you have approximately 45 minutes.

We would ask Ms. Pattison to please proceed.

STATEMENTS OF LUCILLE P. PATTISON, COUNTY EXECUTIVE, DUTCHESS COUNTY, N.Y., AND NEAL R. MONTANUS, DIRECTOR, INDUSTRIAL DEVELOPMENT DEPARTMENT, THE PORT AUTHORITY OF NEW YORK AND NEW JERSEY

Ms. PATTISON. Thank you very much, Mr. Chairman. We are happy that you, along with Mr. Ottinger, and of course special thanks to my Congressman, Hamilton Fish, for inviting us down here today.

I suspect you could say that my testimony today is really a case study that in some ways meshes quite well with the testimony that you have heard from the agency people. I will try to be brief, though my remarks will probably run something in excess of 10 minutes.

I was interested to hear the time frame that was outlined by several of the witnesses because it has little relevance to the experience that we have in Dutchess County for a number of reasons.

May I first say that Dutchess County is bordered just to the north of the Metropolitan New York area. We are bounded on the east by the State of Connecticut, and on the west by the Hudson River. We are about one-quarter of a million in population, largely located to the south and to the west.

In September of 1972, a comprehensive solid waste study was completed for the county to determine the long-term effects of the issue of solid waste in Dutchess County. The result of that study was to point out the need for the creation of a department of solid waste, that was created in 1972 by a previous county executive and legislature.

The first commissioner undertook at that time the alternative study of several proposals. In 1973, he reported that most of the solid waste in Dutchess County was deposited in landfills, and that many of those landfills were and are frequent violators of health and environmental laws. The areas in the most populous sections of the county have the least number of alternatives available for solid waste disposal, and furthermore restrictions on the creation of landfills added to the problem created by the scarcity of the sites.

The New York State Department of Environmental Conservation requires that before any of these landfills are created, soil must be tested geologically and hydrogeologically, and site engineering and operating plans must be produced to provide adequate proof that the surface and subsurface waters will not produce leachate.

Furthermore, in the county, we have a thin soil cover, high ground water levels and abundant rock ledges that severely limit the number of potential sanitary landfill sites. Beyond that, and this has been touched on before, it becomes next to impossible to even consider a sizable landfill because of the political ramifications of a community not wanting a landfill in its backyard.

Then in 1973, the commissioner looked at a number of systems—incineration, composting, high temperature combustion, Black-Clawson, three different forms of pyrolysis—Landgard-Monsanto, Garrett, and Union Carbide. It was concluded as a result of the study that pyrolysis offered more flexibility in achieving the principal purpose of refuse disposal, and in addition offered an improved method of energy recovery.

The Union Carbide system of pyrolysis had the lowest level of pollutants to air, land and water, and more importantly the gas produced in the system is a salable commodity in Dutchess where steam and other commodities studied had a limited or no market. I think that those who talk about markets from Commerce, and others, are absolutely correct. If you don't have a market, you don't have a system.

The determination was then made by county officials to proceed with developing a pyrolysis system for the county. We contracted in 1975 to have the preliminary engineering work done, and it was done in 1975 and in 1976. Based on those two reports, the county applied for grant monies from the New York State Department of Environmental Quality Bond Act. The application was approved, and we are currently funded at 50 percent of whatever the eligible capital costs of our proposed system will be.

After the engineers completed their contractual requirements, the county legislature studied these reports to determine in which direction we should implement. In 1977, it became that the Federal Government was not making available from the Department of Energy additional moneys to provide complete contract documents.

In June of 1978, Dutchess County was notified by the Department of Energy that its proposed Dutchess County pyrolysis program had been accepted for negotiation of work scope and funding.

An engineering firm in New York was selected by the county to provide the engineering services contemplated in the grant. Dutchess County accepted this grant in 1978, and the engineering firm is currently performing a number of tasks under the grant at the present time.

Due on my desk, Monday, July 23, is their design concept cost study, and we are looking with great anticipation at what the final, bottom-line tipping fees are going to be to the county, because it is the financial considerations that are going to help us make the determination of whether we proceed with this project, or whether we do not.

The total cost of the engineering study, which is being funded, is estimated at \$459,000. It was and still is expected that this project will successfully demonstrate the technological, economic, environmental and social costs associated with Union Carbide Purox system for the recovery of energy from municipal solid waste, utilizing a solid-waste-to-gas system and codisposal of municipal sewage sludge along with municipal solid waste. The price is to be determined.

In greater detail, the purpose of the project is to reprocess municipal solid waste and sewage sludge into a medium Btu fuel gas and extract ferrous metals by constructing and operating a full-size Purox system consisting of 200-ton per day modules. This is scaled down considerably from the experience that Westchester was talking about some years ago, and that Dutchess was also talking about some years ago.

The proposed purchaser of the gas derived from the Purox system is IBM. IBM has analyzed the purchase of gas at its plant located in Poughkeepsie, N.Y. In addition to the fuel gas produced by the facility, ferrous metals will be recovered. At this time, however, there is only a limited market for those metals.

The concept of resource recovery has been actively pursued by Dutchess County as the mainstay of the solution to its solid waste problems because that concept presents the greatest possible benefit to be realized by the country in terms of the environment and energy.

Resource recovery is the most complicated and technologically risky path to pursue, but the potential for quiet, clean, efficient disposal of solid waste and the added incentive of income from the sale of clean, reprocessed energy compel our county to consider resource recovery as a most viable option.

It is certainly in the national interest to develop a resource recovery policy addressing two of the major problems facing this country, disposal of solid waste and the production of reprocessed energy. Solving the first will achieve another milestone in renewed efforts to safeguard our environment. Solving the second problem will decrease our dependency on foreign energy sources and will limit the increasing demand on our national energy resources.

Congress has addressed the problem of solid waste disposal by legislation and I need not outline that for you. But it will be very difficult for a local government, like Dutchess' with its scarcity of acceptable sites, to implement landfills in light of various acts, both State and Federal, and other restrictive legislation.

On the other hand, Congress has recognized the desirability of developing alternative sources of energy programs, and we are very happy that we have been the recipient of some of this money. Such support takes the form of research and development grants, capital grants, price support for the reprocessed fuel, and loan guarantees.

Dutchess County has received some of this money, however, we do not see sufficient funding for other financial support programs, and we respectfully request, for our project and for other projects around the country, that loan guarantees and capital grant funding should be authorized and appropriated by Congress.

We do commend your subcommittees and committees for their efforts in the area of loan guarantees. Waste to energy is highly complicated and risky, but potential benefit to the national interest has been demonstrated. Local governments must have more support if they are to undertake the risk to develop such systems.

It must be remembered that local governments, such as Dutchess, are the pioneers striking out into uncharted land. We are developing working resource recovery systems not demonstration models. These systems, if successful, will not only solve our local environmental and energy needs, but a working pyrolysis plant in Poughkeepsie, N.Y., will provide a precedent for others all over this country, and in the end aiding all Americans to resolve successfully our environmental and energy problems.

The risk we bear by being the precursor is demanding. This project, if funded, will be the largest single capital project maintained by the county or a county agency. Even with State matching funding, our potential dollar debt is in the millions. Quite a large amount when one considers that our total operating budget in any 1 year is approximately \$90 million.

Direct capital participation by the Federal Government will greatly enhance the prospect of this project in Dutchess County, and other similar local government projects will get off the ground.

As a result of legislation, I am requesting that the Congress, your subcommittees and committees, place within the budget funding sufficient to provide loan guarantees for this and other similar projects. In Dutchess County, currently, we have a AA bond rating. Loan guarantees would give the bond issue an automatic AAA rating, and thus save from 1 to 1½ percent on interest costs.

Having Federal Government loan guarantees would also overcome any obstacles encountered due to the newness of the technology. This is also the best possible way for the Congress, we believe, and the President to endorse the initiative of a county trying to do its best to solve its own problems, and in addition create much needed energy, as pointed out in the President's remarks just recently.

We appreciate the opportunity to testify here before you. We commend you for your efforts and your very real interest. It is quite apparent to me as I sit here today that there are Members of the Congress and the executive branch who are far ahead of the rest of the country, and I encourage you in your efforts. We also appreciate all the help that you have given us in the past.

Thank you very much.

[Ms. Pattison's prepared statement follows:]



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Chairmen Florio and Ottinger, I want to take this opportunity to thank you for inviting me here today and especially want to thank Congressman Fish for his personal invitation and courteous remarks.

I want to begin my testimony today by giving you some background as to how Dutchess County became involved in the Waste to Energy discussion.

In September, 1972, a Comprehensive Solid Waste Study was completed for the County by William R. Trauman Associates. The Dutchess County Planning Department had arranged for this study to determine the long term effects of the issue of solid waste in Dutchess County.

The result of that study was to point out the need for the creation of a County Department of Solid Waste

In 1972, the then County Executive and Legislature created that new department. The first Commissioner, Carlton W. Laird undertook a review of several alternate waste disposal systems in 1973. He reported that most of the solid waste in Dutchess County ends up in landfills and many of those sites were and are frequent violators of health and environmental laws. The areas in the most populous section of the County have the least number of alternates available for solid waste disposal. Furthermore, restrictions and the creation of landfills add to the problems created by the scarcity of sites. The New York State Department of Environmental Conservation requires that, before creation of new landfills, soil must be tested for geologically and hydrogeologically. Site engineering and operating plans must be produced to provide adequate proof that surface and subsurface water sources will not pollute with leachate. Dutchess County's thin soil cover, high ground water levels and abundant rock ledges severely limit the number of suitable sites for sanitary landfills. Beyond the above, it has become next to impossible even to consider a sizeable landfill within Dutchess County because of the political ramifications of a community not wanting a landfill and all the attendant environmental impacts, in its backyard. The Commissioner took a look at incineration, composting, high temperature combustion, the Black-Clawson paper pulping experience, and three different forms of pyrolysis: Landgard-Monsanto; Garrett; Union Carbide-oxygen refuse converter (or Purox).

It was felt, as a result of this study that pyrolysis offered more flexibility in achieving the principal purpose of refuse disposal, and in addition to that offered an improved method of energy recovery. The Union Carbide system of pyrolysis had the lowest level of pollutants to air, land or water and more importantly the gas that is produced in this system is a saleable commodity in Dutchess County whereas steam and the other commodities looked at had no market then or now in Dutchess County.

The determination was then made by County officials to look into developing a pyrolysis system for Dutchess County.

The County contracted with R. Martin Bodner Associates to do a siting study by May of 1975 and Preliminary Engineering Study by April of 1976.

Based on these two reports, the County applied for grant monies under the New York State Environmental Quality Bond Act. The application was approved with an initial appropriation of \$4,772,000. This appropriation was increased by the New York State Legislature to \$13,449,000 in March, 1977 for the construction of this project. The total cost based on 1976 prices was to be \$29,922,385.

Bodner Associates completed their contractual requirements. The County Legislature then established an advisory committee to review these reports and to determine how they were to be implemented.

It was determined at a later date that Federal funding was available from the Department of Energy to further analyze this system and to provide monies to develop complete contract documents.

On June 21, 1978, Dutchess County was notified by the Department of Energy that its proposed "Dutchess County Pyrolysis Program" had been accepted for negotiation of work scope and funding. Charles R. Velzy Associates, Inc. of Armonk, New York was selected by the County to provide the engineering services contemplated in the grant.

Dutchess County accepted this grant in 1978 and Velzy Associates are performing a number of tasks, under the grant at the present time. They are due to submit their design concept cost study to me next Monday July 23, 1979 (as scheduled). The scope of this task involves investigations, updating and confirmation and/or modification of the recommendations of the 1975 and 1976 Bodner Report. Velzy has been verifying the waste quantities, the markets for the gas and ferrous metals, the sites suggested for placement of the facility, sludge quantity and characteristics, conceptual plant design and cost estimates.

The total cost of this Velzy study is estimated at four hundred and fifty nine thousand, five hundred and three dollars.

It was and still is expected that this project will successfully demonstrate the technological, economic, environmental and social costs associated with Union Carbide Purox System for the recovery of energy from municipal

solid waste utilizing a solid waste-to-gas system and co-disposal of municipal sewage sludge along with municipal solid waste.

In greater detail, the purpose of this project is to reprocess the municipal solid waste and sewage sludge of the County into a medium BTU Fuel Gas and extract ferrous metals by constructing and operating a full-size Purox Resource Recovery System consisting of two 200 ton per day modules.

The proposed purchaser of the gas derived from the Purox System is IBM Corporation. IBM has analyzed the purchase of gas at its plant located in Poughkeepsie, New York. In addition to the fuel gas produced by the facility, ferrous metals will be recovered. At that time there is only a limited market for these metals.

The concept of resource recovery has been actively pursued by Dutchess County as the mainstay of the solution to its solid waste problems because that concept represents the greatest possible benefit to be realized by the County environmentally and energy-wise. Resource recovery is the most complicated and technologically risky path to pursue, but the potential for quiet, clean, efficient disposal of solid waste and the added incentive of income from the sale of clean, reprocessed energy compel the County to consider resource recovery as a most viable option.

It is certainly in the national interest to develop a resource recovery policy addressing two of the major problems facing this country: disposal of solid waste and production of reprocessed energy. Solving the first will achieve another milestone in renewed efforts to safeguard our environment. Solving the second problem will decrease our dependency on foreign energy sources and will limit the increasing demand on our national energy resources.

Congress has addressed the problem of solid waste disposal by passing the Solid Waste Disposal Act of 1965 and the Resource Conservation and Recovery Act of 1976. These acts and the rules and regulations promulgated to implement the latter statute will place tough restrictions on continuation of landfilling as a means of solid waste disposal. It will be very difficult for a local government like Dutchess with a scarcity of acceptable sites to implement landfills in light of this Act and other restrictive State legislation.

On the other hand, Congress has recognized the desirability of developing alternate sources of energy to end depletion of our natural resources and decrease our dependency on foreign fuel sources. The creation of the Department of Energy and the passage of the Department of Energy Act of 1978--Civilian Applications address these two problems. The Department of Energy Act of 1978 provides statutory authority for federal financial support for the development of municipal waste to energy facilities. Such support takes the form of research and development grants, capital grants, price supports for the reprocessed fuel and loan guarantees. Indeed, Dutchess County has received the grant referred to above from Department of Energy for research and design costs for its project. This is pursuant to Congressional funding of that program. However, Congress has not funded any other financial support program. It is respectfully submitted that loan guarantees and capital grant funding should be authorized by Congress.

Waste-to-energy technology is highly complicated and risky, but potential benefit to the national interest has been demonstrated. Local governments must have more support if they are to undertake the risk to develop such systems. It must be remembered that local governments such as Dutchess County are the pioneers striking out into an unchartered land. We are developing working resource recovery systems not demonstration models. These systems, if successful will not only solve our local environmental and energy problems, but a working pyrolysis plant in Poughkeepsie, New York will provide a precedent for others all over this Country--in the end aiding all Americans to resolve successfully our environmental and energy problems.

The risk we bear by being the precursor is demanding. This project, if funded, would be the largest single capital project maintained by the County or a County agency. Even with State matching funding our potential capital debt will be in the tens of millions of dollars. Quite a large amount when one considers our annual budget is over ninety million dollars. Direct capital participation by the Federal Government will greatly enhance the prospect that this project in Dutchess and others in similar local governments will get off the ground.

As a result of the legislation, I am requesting that the Congress, that your subcommittees and full committees place within the budget funding sufficient to provide loan guarantees for this and other similar projects. Dutchess County currently has a double "A" bond rating. Loan guarantees would give the bond issue an automatic triple "A" rating thus saving 1% to 1½% on interest costs. Having Federal Government loan guarantees would also overcome any obstacles encountered due to the newness of the technology. This is also the best possible way for the Congress to endorse the initiative of a County trying to do its best to solve its own problems and in addition create much needed energy, as pointed out by the President Sunday night.

Thank you again for the time you have allotted me.

Mr. FLORIO. Thank you.  
Mr. Montanus?

#### STATEMENT OF NEAL R. MONTANUS

Mr. MONTANUS. Thank you, Mr. Chairman.

My name is Neal Montanus. I am director of industrial development of the Port Authority of New York and New Jersey, and I appear here today on behalf of Alan Sagner, who is the chairman of the port authority, who sends his regrets.

The port authority is the bistate agency of New York and New Jersey which over the last 50 or so years has invested some \$4 billion in port terminal and transportation facilities, and in facilities for the protection of the commerce of the port region. We have done so on a basis that is entirely free of recourse to tax or the credits of either of our parent States.

Last year, the two States enacted legislation which permitted us to get into a new endeavor, the creation of the so-called urban industrial park, a vehicle by which we believe we can do much to restore the economic vitality of our bistate port region, particularly the manufacturing base of that region.

In exploring the problems and potential solutions that we face in trying to create within the inner-city that which exists in terms of the industrial park in our suburbs and other areas of the country, we found that one of the most substantial problems we faced was that of high cost energy in our area. The highest cost in the Nation, and the deterrence that this would put before a manufacturer to make his investment in our area was, indeed, formidable.

Our solution that we have now spent some 2 years in the investigation of, is resource recovery. We are not in the business, nor do we have the responsibility for the disposal of solid waste in our area. Our mission is not environmental. Our interest in resource recovery is the gain that can be gotten primarily in terms of economic development, while at the same time making a contribution to the environmental protection, and end the problem of the municipalities in finding ways of disposing of their solid waste.

We are, and I was pleased this morning to hear Mr. Plehn say so, a successful applicant for funding under the President's urban policy. We are now proceeding to make final all of the research work that we have done in connection with resource recovery facilities to support our industrial parks.

I would hope that by this time next year we would be in the process of evaluating specific proposals with a specific plan of construction of these facilities.

We are convinced that municipal solid waste—that is a title which I must comment on again. Let me call it garbage, if I may—has tremendous potential, not only for our program, but for everyone else who is concerned with this. We need strong coordinated Federal direction to overcome the problems that do exist.

The concept is relatively new in this country. It is expensive. It lacks the appeal of development of solar energy. It is, after all, garbage that we are talking about. Its development in the United States has moved at a lower pace than in Europe where collection and disposal of waste, and the generation of energy often are the responsibility of a single governmental entity.

Nonetheless, resource recovery promises particular benefits for our metropolitan centers, which are both high cost fossil fuel energy areas, and vast garbage sheds. The port authority in its work in considering this problem, in having accumulated a very substantial working knowledge of the field, urges the Congress and the administration to consider a more intense Federal involvement, one which would be extremely timely.

Let me leave you with three suggestions. To confirm and support what Ms. Pattison has said, it is absolutely essential that we have a program of Federal participation in the capital cost of garbage-fueled resource recovery facilities. I don't have a position to recommend to you as to whether it is an outright grant, or a loan guarantee program. I have had some experience in the past with loan guarantee programs, and their effectiveness is conditioned entirely upon the extent and commitment of the funding behind them.

I think that in terms of grants, as we have applied grants in the Urban Mass Transportation Administration, and in airport development, to serve other national interests.

We know that a half-ton of garbage contains energy roughly the equivalent of about a barrel of imported oil. The benefits in providing a facility to produce energy from garbage are national, but the financial risks are being borne by local governments and private enterprises.

Federal participation would, in our opinion, materially advance the schedule of the many resource recovery facilities. I think we heard of some 100 which are standing in the wings, or in the planning stage, and waiting for this type of incentive to get started.

When I stress to you, as I intend to, this need for Federal participation in the capital aspects, it does not mean that we don't support the continuing demonstration efforts that are going. The technology is still developing. There is need, not only for systems technology, but for component technology, demonstration grants, and research funding.

The second of the suggestions that I would leave with you is an intensification of the mutual efforts, and we heard about them this morning, by the Federal departments involved to do three things:

Sponsor the best applicable research solutions to technological problems such as development of a lower cost reliable, emission cleaning hardware for resource recovery facilities, or development of a boiler technique which will overcome some of the inhibitions that the utilities now have in accepting refuse derived fuel.

Second, fund and intensify efforts for the use of recycled materials, of which we heard this morning, too.

Third, develop educational programs to make the real advantages of resource recovery programs known to the American public.

Let me get back for a moment to my garbage theme. Over the last several months, I have visited, and have been visited by, more than 300 individuals and community groups in our metropolitan port district, all of whom are in support of the concept of revitalization of our basic industries, but many of whom are appalled by the thought of bringing garbage into their community.

They are not aware, as our European friends with their experience, of the compatibility of a resource recovery facility with a

community. In Europe, in every city that I have visited where these facilities exist—In Zurich, for example, where a chocolate factory exists next door to a resource recovery facility; in Dauville, where in a resort community, expensive villas are across the road from the resource recovery plant. They know that these are acceptable, compatible community facilities.

I think we must do a lot with Federal leadership to educate the American public in the advantages of what resource recoveries are, and that they are not just piles of garbage as some people fear.

In terms of the three basic recommendations, we would urge consideration of Federal leadership in the creation of a national data bank of resource recovery operating experience, from which can be drawn, by people like ourselves and everyone else who is considering these systems, such information as seasonal variations in garbage energy potential which is a problem, employee requirements and cost of facility operations and maintenance, service life of system components. The hard economic information that an investor such as ourselves, and such as we hope the Federal Government will be, will have available to him.

There is information of this nature available. It is of greatest importance to local planners, but it is scattered, unorganized, and to some extent proprietary.

The port authority believes strongly that resource recovery efforts is an excellent opportunity to contribute to a number of national priorities—domestic energy production, environmentally sound disposal and reuse of solid waste, and in applications such as our industrial park's economic development.

Resource recovery is not the only, nor is it the total response to any of these priorities, but it can make its meaningful contribution if there is Federal interest, leadership, and encouragement.

May I commend this committee for its leadership, encouragement, and interest. It is a field which can make a vital contribution to our Nation's needs.

Thank you.

[Mr. Montanus' prepared statement follows:]

Prepared Statement of  
The Port Authority of New York and New Jersey

before the

Subcommittee on Transportation and Commerce  
of the  
House Committee on Interstate and Foreign Commerce

and

Subcommittee on Energy Development and Applications  
of the  
House Committee on Science and Technology

Joint Hearing on Waste-to-Energy  
Tuesday, July 17, 1979

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(On Behalf of The Port Authority of New York and New Jersey:  
Neal R. Montanus, Director  
Industrial Development Department)

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I am pleased to have the opportunity to appear before these Subcommittees to offer the Port Authority's views on the matter of converting solid waste to energy.

The Port Authority of New York and New Jersey, a financially self-supporting agency of the States of New York and New Jersey has, since its inception in 1921, invested over \$3.8 billion in facilities of transportation and commerce and to advance projects that contribute to promoting and protecting the commerce of the New York-New Jersey Port District, an area within a radius of approximately 25 miles from the Statue of Liberty.

In 1978, legislation providing for Port Authority participation in a new program of industrial development was enacted by the States of New York and New Jersey. The major objective is to create jobs within the Port District's central cities through the vehicle of large-scale industrial parks. These parks will be of scope sufficient to provide adequate space for single-story industrial plant construction and off-street vehicular needs, and to create a secure, attractive environment. On July 12 -- last Thursday -- six potential sites for the development of urban industrial parks in the metropolitan area were designated in a master plan adopted by the Commissioners of the Port Authority.

A key element in making this program work will be our ability to furnish and guarantee attractive energy costs to industrial park users. We live and work in one of the highest energy cost areas of the nation, and these costs are a significant deterrent to the revitalization of our economic base.

To provide lower energy costs at our industrial parks, the Port Authority is studying the development of resource recovery facilities for each. These facilities would create enough energy through the incineration of municipal solid waste to meet the long-term power needs of the industrial parks. It may also be possible to recover basic materials from the waste stream such as metals, glass and paper to serve as a source of supply and, therefore, an attraction for certain industries.

The Port Authority is a successful applicant for a grant from the U.S. Environmental Protection Agency to support resource recovery planning. The scope of the work to be performed under this grant represents a continuation of our prior efforts and will include technical, environmental and economic studies. It will also include a program of public participation and education, which is critically important to making resource recovery facilities acceptable public institutions.

Resource recovery systems generally involve the collection of municipal solid waste at a central plant where it is subjected to one of two possible processes: "mass burning" or "refuse-derived-fuel". Mass burning systems have been widely used in Europe and Japan for over 25 years. The technology is relatively straightforward, but

many potentially valuable recoverable materials are destroyed by incineration. Refuse-derived-fuel systems permit full recovery of valuable materials before incineration, and appear to be gaining wider acceptance than mass-burning in the United States and Canada. They are, however, much more complicated to build and operate efficiently.

While the conversion of municipal solid waste into energy and recyclables offers real potential, strong and coordinated efforts are required to overcome remaining problems. The concept is relatively new in this country, it is expensive, and it lacks the immediate appeal of other approaches to providing alternate energy sources. Its development in the United States has moved at a slower pace than in Europe, where collection and disposal of waste and the generation of energy often come under the jurisdiction of single governmental entities.

Nevertheless, resource recovery promises particular benefits for our metropolitan centers, which are both high-cost fossil fuel energy consumers and vast "garbage sheds". The Port Authority of New York and New Jersey urges the Congress and Administration to consider a more intense Federal involvement than exists now, reflected by:

1. A program of Federal participation in the capital cost of garbage-fueled resource recovery facilities. A half-ton of garbage contains energy roughly the equivalent of a barrel of imported oil. The benefits in providing a facility to produce energy from garbage are national, but the financial risks are being borne by local governments and private enterprise.

2. Intensified and mutual efforts by the Executive Departments to: (a) sponsor the best, nationally-applicable research solutions to technological problems, such as development of lower-cost, reliable "emission-cleaning" hardware for resource recovery facilities; (b) promote strongly the use of recycled materials; and (c) develop educational programs to make the real advantages of resource recovery programs known to the American public.

3. Creation of a national data bank of resource recovery operating experience, from which can be drawn such information as seasonal variations in garbage energy potential, the employee requirements and costs of facility operations and maintenance, and service lives of systems components. This information, which is of great importance to local planners, is now scattered, unorganized, and to some extent proprietary.

The Port Authority of New York and New Jersey believes strongly that resource recovery offers an excellent opportunity to contribute to a number of national priorities: domestic energy production, environmentally sound disposal and reuse of solid waste, and, in applications such as our industrial parks, economic development. Resource recovery is not the only, nor is it the total, response to any of these priorities. But it can make its meaningful contribution if there is Federal interest, leadership and encouragement.

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Mr. FLORIO. Thank you very much.

We appreciate the testimony of both witnesses.

I would just like to make an observation. I concur with what both of you have said, particularly Mr. Montanus who made it very clear that he feels the need for a Federal role in this new area.

The only difficulty I would have with anything that either of you have said, and both of you really said it, is the philosophic question as to whether or not the Federal Government should actually become involved in capital construction grant funds for public body construction, as opposed to turnkey operations which would be turned over to the private sector, or some loan guarantee assistance for the private sector.

Perhaps I am a creature of my own experience, but with regard to sewage treatment facilities that have been operated by public authorities, I have just had an experience, and Mr. Roe has had his own experiences, perhaps he will comment on them, that we have seen tremendous inefficiency. We have seen tremendous cost overruns. I have no interest in duplicating that, if it would happen.

I would be much more enthused to talk about loan guarantees for the private sector, and maybe even loan guarantees for public bodies under turnkey operations, if the ultimate management of these facilities are not left in public bodies.

Ms. PATTISON. May I comment?

Mr. FLORIO. Yes.

Ms. PATTISON. I really cannot disagree with you. I would only make the distinction between sewage disposal projects and a project such as this. We are talking here, in our case, of a brand new technology. I think that until we have one of these systems on line, there are going to be severe problems with the funding. If we could work it out with the private sector, I have no problem with that. But I think that until we have one of these systems on line, it is highly unlikely that you are going to find many of those approaches successful.

Mr. FLORIO. The only countervailing argument might be the fact that this new area, that is, solid waste, involving recycling, involving the need for more markets for the ferrous materials you discussed, involving the potential for energy generation, and the seeking out of markets for gas, or steam, or whatever, injects even more complicated areas into the public domain which the public domain may not be as competent to deal with as the private sector.

I am concerned that we have not done, in my opinion, a very good job in the sewage treatment public authority area. Now we are going to have a new area that is even more complicated, and in some respects is more conducive to utilization of the private sector expertise than sewerage.

I would be very apprehensive about duplicating the experience in the sewage treatment area.

Mr. OTTINGER. Would the gentleman yield?

Mr. FLORIO. Certainly.

Mr. OTTINGER. I sympathize with the gentleman's desire to maximize having this actually done in the private sector. So far in the waste-to-energy field, there have been a great number of proposals made and experiments tried, and a frightening number of them have failed.

When a principality takes the risk of going forward with a new technology such as the conversion of waste to energy, there can be very serious results if it does not work right.

Furthermore, there is a financial burden on the municipality, which they are frequently not in the position to be able to undertake. So whether it is done by a public body or a private institution under contract, I do think, and I wonder if the gentleman would agree with me, that the municipalities are going to need some help in order to venture into this new field, otherwise they are going to go to the tried and true.

They have got to get rid of their waste, and they are going to say, "Well, I don't want to take a risk on this new technology, with the tremendous costs that are involved, on taxpayers' money. I am just going to go and put this in a landfill some place, or whatever is going to be permitted."

I do think that they need some assistance, whether it goes public or private.

Mr. FLORIO. My only observation is that, in fact, I am not sure if that degree of risk is risk that is appropriate in the public sector. We are talking about public moneys, and if, in fact, the risks are so large, then maybe that is not an area where the public dollars should be put into, in the volume that would be needed in terms of capital construction.

I am not saying that the health areas, the health considerations, likewise the need to become involved in the new technology would not justify some degree of public investment. I suppose that we talking about degrees.

When we talk about the planning, I certainly have no problem with EPA and the planning moneys. I do not have any difficulties, as I said before, with loan guarantees. When we get down to the literally billions of dollars that will be needed to fund and construct these types of facilities, I am not sure that that is an appropriate area for public dollars.

Ms. PATTISON. I would again say that I would distinguish between those areas which are proven, and have applicability because they are already in existence somewhere, and those which are not.

I will further add that I think there is additional reason to have Federal and State participation, many communities, or most communities are forced out of the landfill business, or out of the sludge disposal business by State and Federal regulations. We are forced into taking action for either political, economic, or governmental regulations. I think gives us, certainly, from a parochial point of view, an added incentive for our thinking that there should be Federal participation.

Mr. FLORIO. Yet, at the same time, those actions are making the economics much more attractive for the private sector.

Ms. PATTISON. In some cases, that is true.

Mr. FLORIO. Mr. Fish?

Mr. FISH. Thank you very much, Mr. Chairman.

Lucille, thank you for being with us today. I had several questions that your testimony amply responded to, as well as the colloquy that you have just had, which I think is important.

Let me be a little specific so that we can get the benefit of your experience. Have you found, in dealing with the problem in Dutch-

ess County, that Federal regulatory requirements, such as permit requirements, pollution control requirements, have significantly hindered the movement toward construction of the municipal waste-to-energy facility?

Ms. PATTISON. They, without question, have added to cost. I think that our experience with the Department of Energy, we are delighted with their participation. It is public money, it is not county money, but we are really quite amazed at how expensive this whole thing is, just to get through the rules and regulations, and the planning process. The Federal Government is paying for it in our particular experience.

I do wonder how long this can continue going on, whether this will have to be done in every single municipality throughout the country. This is why I emphasized the importance of the early stages.

We have not had much to do with EPA, as you know. Our responsibility has been largely with the Department of Energy. My staff has gone to one of the national seminars, which was held in Virginia, and I believe it was this spring. They found it quite valuable. I think they came back with the feeling, again, that you have to put on either your own staff or with Federal money you have to hire an awful lot of experts to help you through this whole process, again adding to the cost.

It may be essential, I don't know. But sometimes one does get the impression that there might be a simpler way to do it, and get these projects off the ground a little more quickly. It is not so much the fee as it is the cost.

Mr. FISH. If you have any suggestions, at any point, as to how the process might be streamlined, I know that this committee would be grateful for them.

Ms. PATTISON. I can tell you that the task force that we have established in Dutchess County, at the suggestion of the Department of Energy, has been very good. They are working very hard on this, and they have many suggestions. I would be happy to send them along to the committee, if that would be useful.

Mr. FISH. Thank you.

The resource recovery system that you contemplate consists of two 200-ton per day modules. Does this contemplate processing any municipal waste from neighboring counties?

Ms. PATTISON. Not the two 200-ton modules. If we were to talk about a regional approach, we would have to talk either about larger modules, or additional modules.

Mr. FISH. You start out with two 200-ton per day modules, this allows you to add more modules?

Ms. PATTISON. Yes; we can add on 200-ton modules.

Mr. FISH. Just keep adding modules on?

Ms. PATTISON. There is that potential, yes.

The original plan for Dutchess County was to build two 300-ton modules. That became cost prohibitive and when we quantified the amount that was being generated within our core area, it was not there. Certainly, I took the view that I had no problem with the regional approach, and I agree that we should view our garbage as a resource and use it as such, but needless to say that there is

always going to be political or other reservations about that particular approach.

The State of New York, as you well know, is encouraging us to go to the regional approach. I don't have a problem with it, and I suspect that in the long run there will be a cooperative effort between our county and other counties, or at least a portion thereof.

Mr. FISH. So we could add to this initial plant size to accommodate growth in Dutchess County, or even beyond.

Ms. PATTISON. That is correct. We do have the Hudson, and I have often thought that we underutilized the Hudson River in terms of transporting lots of things, and I think that garbage may be one of them, either in our locality or in other localities.

Mr. FISH. Do you remember earlier today, in a line of questioning to the Department of Energy, I asked about the experience and operating difficulties they had had with pyrolysis in San Diego and Baltimore? Have they been taken into account by any of the public officials in Dutchess County who are working with you on this?

Ms. PATTISON. Yes. I think that one of the processes was Garrett and the other one was Monsanto. Our commissioner, in 1973 looked at both of those systems, and discarded them for applicability in Dutchess County. He simply felt that they did not have the technological potential that the Union Carbide system has. I remember talking to him about it years ago, and this was before I was an elected official.

He foresaw problems with those, and at that time eliminated those two particular pyrolysis systems from consideration. I think that there is not much question but that Purox system is not a bad system, it is just an expensive one.

Mr. FISH. You listened this morning, very patiently, for many hours to representatives of several Federal departments and agencies discussing in general terms a problem that you have dealt with on specifics, on the operating level.

I wondered, did you have any comments to make on what you heard in term of whether you felt there was going to come out of this a better coordinated Federal approach, or is there any criticism that you would like to pass on?

Ms. PATTISON. I was somewhat encouraged, actually. We sometimes at the local level get the impression that down here in Washington you are all going off in your own little direction, and that nobody is talking to anyone else. The agencies themselves, apparently, are aware of that.

I was happy to hear about the memorandum of agreement. You know, at the local level we seem to talk about Washington, and we don't separate all of these Federal agencies; and we get very frustrated, when we get this far, and they say: "Well, you have to go over here, and you have to go over there." I think that there is no question that there has to be some sort of coordinated effort. How you do that without adding to the bureaucracy has always been a mystery to me.

Mr. MONTANUS. May I comment on that, Congressman?

Mr. FISH. Certainly.

Mr. MONTANUS. In terms of personal experience, if I were to say anything, I would say that the Federal participation in the energy

problem has not paid enough attention to municipal solid waste. It has been given a short shrift than some things which may not prove as applicable in the future.

However, I think that the report of the General Accounting Office and the identification of problems, and the memorandum of understanding between the two departments is very good progress.

They need funds. It is as simple as that. There are many things that they would like to do, but they are hamstrung by the lack of funds. We are, however, at a point where we think that we have done enough in the way of basic research to know that there systems, there are benefits to be derived from those systems. Let's move ahead with them, rather than to continue the Federal interest in resource recovery on a research and planning grant basis.

Ms. PATTISON. May I make one last comment. I think that given the President's speech on Sunday night—I don't know what he said yesterday out in Kansas City—we ought to seize this opportunity. The local governments, the Congress and the agencies, I think that we ought to seize this opportunity to say: "There is the potential. Now is the time to take advantage of it." I don't think that your timing could have been better.

Mr. FISH. One final question, and this relates to the discussion you had with the chairmen of the two subcommittees a few minutes ago.

We are talking here about the need for financing and the problems that are peculiar to local governments in financing very large operations involving a new technology, with high risks and high front-end costs.

What would happen to a project such as yours if there is no Federal assistance, either in the form of loan guarantees or grants or anything else?

Ms. PATTISON. I will be better able to answer that question on July 23, when I have the bottom line in front of me. I happen to know from advance knowledge that the figures that are coming in are very, very borderline. The costs will determine whether we proceed with our project or not. I think that they are going to be on the high side, and it may very well be that if we do not have additional kinds of assistance with our funding, the whole project will simply be dead along about July 24.

We are anticipating financing through revenue bonds. Because of political considerations that you well know about in the county, a general obligation bond for the entire county is not likely to be a successful political consideration. I don't have the votes. However, I think that it could be done, possibly, through a revenue bond. But the revenue bond financing, of course, is considerably more expensive. This is what we need that kind of assistance.

I am not talking about a tremendous amount, but several dollars a ton, I think, is going to be necessary.

Mr. FLORIO. Would the gentleman yield just for one moment?

Mr. FISH. Yes.

Mr. FLORIO. Has Union Carbide ever been asked to volunteer any thoughts as to whether or not they would be willing to not only sell you the material, but actually operate the facility?

Ms. PATTISON. Yes. They did not used to have an operation mind on operation. They now do.

Mr. FLORIO. Is that still a viable option?

Ms. PATTISON. Yes, it is an option.

Mr. FLORIO. Thank you.

Mr. Ottinger, do you have a question?

Mr. OTTINGER. I would like to say, Ms. Pattison, that your testimony is very good and eloquent. We appreciate it.

Ms. PATTISON. Thank you, Mr. Ottinger.

Mr. FLORIO. Mr. Roe?

Mr. ROE. Just one short point for the record.

What is the estimated cost of your plant, Ms. Pattison?

Ms. PATTISON. I will tell you that on July 23.

Mr. ROE. Do you have any dimensions at all, without the figures that they have given you, because I realize that this might be privileged? What was the general target that they thought about?

Ms. PATTISON. The original cost was \$7 million, and then it went to \$13 million. Then it went to about \$30 million. The only thing that I can say is that from the last figure the cost is coming down, but I am not willing to share that figure publicly at this time.

Mr. ROE. I understand that.

What we are saying is that the population in your service area is about 250,000 people.

Ms. PATTISON. Slightly under that.

Mr. ROE. Then we are talking about a rather substantial expenditure. The point I am trying to get at is, even with revenue bonds, it does not seem to me to be feasible, unless you get some kind of aid to go along and be helpful to you.

Ms. PATTISON. We fully recognize that the solution for Dutchess County, in terms of resource recovery, is not an easy one. We further recognize that if we had a large market for steam, we could get into a system that is on line, and it would be somewhat less expensive. We don't have a market for steam. We have one big customer in Dutchess and that is IBM. We are delighted to have IBM, but they don't use any steam.

Our utility happens to be located across the river. They are oil fired. They may be coal fired at some point. So there are other considerations, largely related to market potential, which drove us in this direction, which I tried to outline in my earlier remarks.

Mr. ROE. Thank you, Mr. Chairman.

Mr. FLORIO. I am not being critical at all, but shouldn't those determinations, the market determinations, have been worked out before you got as far along as you apparently have?

Ms. PATTISON. That is part of the process. Our original market, going way back some 5 years, was to be Central Hudson, and that is our local utility. There was no question about it. We have letters of intent and communications between the county and Central Hudson at that time.

Without going into the Velzy engineering study, I can only say that to get our gas across the Hudson River, we get into the EPA, and we get into a lot of things, trying to get a pipeline across the river that contains gas.

So the engineers really decided to alter that consideration, and not try to sell the gas to Central Hudson, but rather to find a market on our side of the river. The only market, quite frankly, is IBM at the moment of that magnitude.

Mr. FLORIO. I understand.

A final question to Mr. Montanus. What if the port authority has formalized or finalized its thoughts on the subject, realizing they are just getting into the planning process, do you contemplate as the role of the port authority with regard to actual operation of any facilities in the industrial park?

Do you see the port authority as being the entity to finance and continue to operate, or do you foresee that as part of the industrial park a scenario that the utilizers of the steam, or whatever fuel is going to be generated, would be the operators; or do you see some opportunity for someone else to operate?

Mr. MONTANUS. I think that I can answer yes to all of those, Mr. Florio, in the sense that there will be conditions that vary from site to site. For example, we may, as has been done in our area enter into an arrangement with the utility company to own and operate the electrical generation equipment.

We have reached no decision on mass burning, or the production of refuse derived fuel, and which facility we will use. In either case, we would be prepared to operate it, but in the case of the refuse derived fuel system, I think that our source of construction would potentially also be the source of operation because those people who developed that technology are also the operators of facilities.

I am giving a very general answer. We are prepared to accept any role in the situation that makes sense and gets these things going, from complete operation to no participation in the operation.

Mr. FLORIO. Thank you very much.

Mr. OTTINGER. I would like to thank both of you and to say that I think it is outrageous that the Department of Energy, and particularly the Bureau of Management and Budget, have not given an emphasis on waste to energy.

As Mr. Montanus indicated, it offers so much promise in terms of resolving our energy crisis at far less cost than the synthetic fuels which are presently being talked about at a \$30 or \$40 per barrel equivalent. At the same time, you have the set off cost of communities being able to resolve their waste disposal and sewage disposal problems.

I can just assure you that I, and I know I am speaking for Mr. Fish and Mr. Florio in this regard, will continue to push this very promising source of energy, to see that it is, in fact, tapped. It is being tapped in other countries, and on an economic basis.

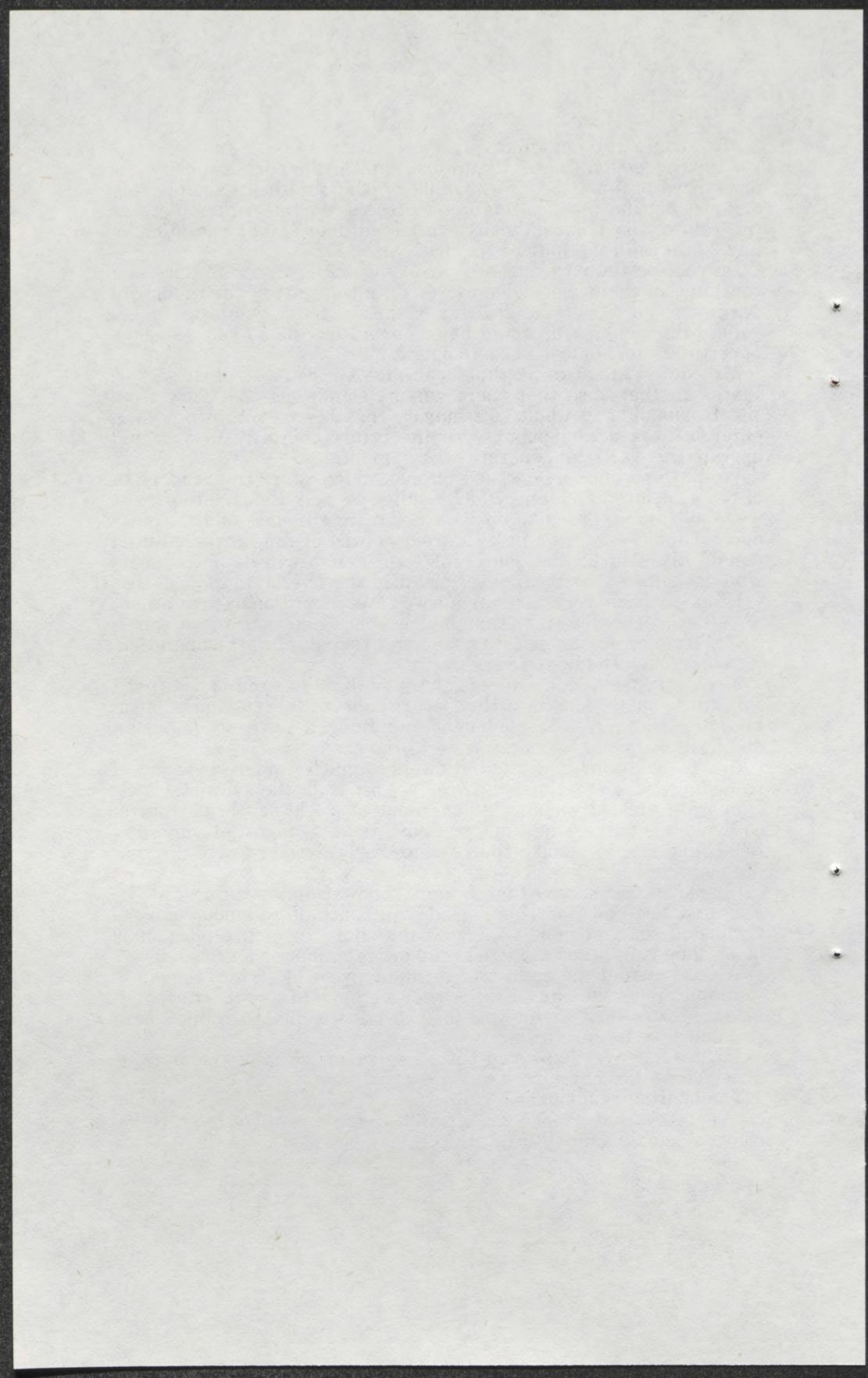
We are behind the eight ball in many areas of energy consumption and production, and I think that we have to turn that around.

Mr. MONTANUS. Thank you for the opportunity to come before you and present our views.

Mr. FLORIO. We thank you both, and we appreciate your appearance before the committees.

The hearing is adjourned.

[Whereupon, at 12:35 p.m., the subcommittees adjourned, to reconvene at 9:30 a.m., July 18, 1979.]



## WASTE TO ENERGY

WEDNESDAY, JULY 18, 1979

HOUSE OF REPRESENTATIVES, SUBCOMMITTEE ON TRANSPORTATION AND COMMERCE, COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, AND THE SUBCOMMITTEE ON ENERGY DEVELOPMENT AND APPLICATIONS, COMMITTEE ON SCIENCE AND TECHNOLOGY,

*Washington, D.C.*

The subcommittees met, pursuant to notice, at 9:30 a.m., in room 2318, Rayburn House Office Building, Hon. Richard Ottinger (chairman of the Subcommittee on Energy Development and Applications) presiding. [Hon. James J. Florio, chairman, Subcommittee on Transportation and Commerce.]

Mr. OTTINGER. This morning, the Subcommittee on Energy Development and Applications, which I chair, and the Subcommittee on Transportation and Commerce, chaired by my colleague James J. Florio, continue with the second day of oversight hearings on the Federal waste-to-energy program.

Yesterday we had a very productive day. We received testimony from the Environmental Protection Agency concerning their planning and procurement role, the Department of Energy concerning their technology development role, and the Department of Commerce regarding their activities in marketing waste-to-energy systems.

The General Accounting Office also presented their conclusions with respect to the potential for waste-to-energy systems and some of the problems they believe exist at the Federal level in coordinating and implementing an effective program.

In that regard, I would observe that, although the involved agencies appear to be improving the interagency situation, I am still not convinced that any of the agencies charged with this responsibility have given the subject appropriate priority or sufficient attention. The staffing commitments by each agency alone indicate to me the low priority given to the potential for improving both our environmental and energy status. That is a question that we will continue to pursue.

Finally, we heard the views of some State and local representatives regarding their experience with waste-to-energy systems. Their comments impressed upon me some of the difficulties of getting municipalities, utilities, and industries involved in adopting waste-to-energy systems.

Today, we will hear the views of representatives of the private sector, including manufacturers, owners, consultants, and various interest groups that are concerned with the subject. It is my hope that we can focus this morning on some of the more promising

technologies and hear some suggestions on how we can expand and expedite our efforts at the Federal level.

Your experience with the development and implementation of waste-to-energy systems will be helpful to the subcommittees. We are particularly interested in hearing your views about the effectiveness of the Federal program, and what can be done to improve it.

Finally, let me expand on some remarks I made yesterday. We have been impressed by the interest shown by other Members of Congress and their constituents concerning the potential for waste-to-energy systems. They have many suggestions for witnesses who could testify on this important subject. Accordingly, we will be having at least 1 more day of hearings on this subject in September. At that time, we would like to consider, in more detail, some of the legal, financial, and institutional barriers to the acceptance of waste-to-energy systems. I believe that this important program deserves sufficient attention from both of our subcommittees.

At this juncture, I would like to recognize my colleague, Mr. Florio.

Mr. FLORIO. Thank you very much.

I would just like to reinforce the point made by Congressman Ottinger. Yesterday was a very productive day. It was very helpful to get the broad framework of Federal involvement laid on the table. As a result of that, I am very impressed with the need to harmonize the Federal initiative.

I think that it is clear from the testimony that we heard yesterday that the economic climate is extremely conducive to private sector development and growth in this area of resource recovery at this time.

However, though we are near the point of economic maximization of the opportunities to develop this new initiative, there remains an overriding need to stimulate and insure the existence of markets for energy recovered from waste. Perhaps we can expedite the growth of the private sector activity by, at the very least, removing the institutional and economic obstacles that do, in fact, hinder the development of the private sector in this area.

To this end, I have recommended to the New Jersey Board of Public Utilities to compare the cost of conventional fuels with the cost of fuels and energy derived from municipal solid waste. In this way, by providing for a cost comparison, we will at least require the utilities to consider and evaluate the economic feasibility of such alternative fuel sources.

I am looking forward to hearing from the very impressive group of panels that we have here today, and I would once again express my appreciation to Mr. Ottinger for his cooperation in putting together these joint hearings.

Mr. OTTINGER. This morning we will have three panels. The first is Dr. Harvey Alter, director of research programs, National Center for Resource Recovery; Wilbur Campbell, assistant director of the Community and Economic Development Division of the General Accounting Office; and George Brown, vice president of Grumman, Inc., on Long Island.

We welcome you, and unless you have some preference as to who goes first, why don't we hear from Dr. Alter first.

STATEMENTS OF HARVEY ALTER, PH. D., DIRECTOR OF RESEARCH PROGRAMS, NATIONAL CENTER FOR RESOURCE RECOVERY; WILBUR D. CAMPBELL, ASSOCIATE DIRECTOR, COMMUNITY AND ECONOMIC DEVELOPMENT DIVISION, GENERAL ACCOUNTING OFFICE; GEORGE L. BROWN, SENIOR VICE PRESIDENT, GRUMMAN ENERGY SYSTEMS, INC.; AND CLINTON C. KEMP, PH. D., VICE PRESIDENT, GRUMMAN ENERGY SYSTEMS, INC., ACCOMPANIED BY ROBERT W. MADEY, PH. D., VICE PRESIDENT, DEVELOPMENT

Dr. ALTER. Thank you for having me, Mr. Ottinger and Mr. Florio.

I will try to give an overview from our perspective of the state of the art of resource recovery of energy from waste. But first, I believe it is worth repeating that societies have always discarded solid waste. Indeed, ancient civilizations merely buried it on the floor of the houses, where it dropped, and moved away when the pile was unbearable. Organized and institutionalized disposal or dumping came with the industrial revolution. As far back as the latter part of the 19th century, New York City and several cities in Europe used waste to generate steam and electricity. Sanitary landfill practices were an outgrowth of World War II, and now we are entering a new era of extracting valuable resources from our municipal discards.

Society will continue to have discards and the modern challenge is how to extract the values in an economical and environmentally acceptable manner.

In spite of recent progress, municipal solid waste, or MSW, is a virtually untapped resource, both as a conserver of energy and as a source of fuel.<sup>1</sup> The fuel should be considered for new boiler installations, and can be a low sulfur supplement to coal in many existing installations. As some of the members of today's panel will point out, there are also future opportunities for using the waste as a source of fuel gas. Most of the opportunities are here today.

Resource recovery processing of MSW can provide an additional source of raw materials for industry, for the remanufacture of paper, steel, aluminum and glass. Today, some postconsumer wastes are used as a raw material, particularly paper of several grades. And the use of recovered paper, steel, aluminum, and glass saves energy compared to using existing sources of virgin materials.

By my own calculation,<sup>2</sup> the amount of MSW estimated to be in the SMSA's today could provide enough materials to save the Nation four-tenths of a quad of energy per year. These calculations did not include recovered paper.<sup>3</sup> The combustible portion of this

<sup>1</sup> Municipal solid waste refers to the discards normally collected in packer trucks from residences, stores, offices, and perhaps light industrial activities. Not included are construction and demolition debris, hospital and laboratory wastes, and heavy industrial scraps, sludges, etc.

<sup>2</sup> H. Alter. "Environmental Conservation" (1977), v. 4, pp. 11-20.

<sup>3</sup> There have been past discussions whether paper should be recovered for reuse of the fiber or burned as a fuel. This point is almost moot; paper should be recovered at its highest value. Few grades of paper (or paper products) in MSW can be reused in a paper mill, for a number of technical and economic reasons, so are best suited as fuel. At least one grade, newsprint, often has value for manufacture of new paper products. Current practice is to separate the newsprint at the source to keep it clean and facilitate recovery through separate collection. Removal of newsprint from MSW is unlikely to greatly affect the fuel value. Similar arguments concerning relative value of different papers can be made for segregated office or store wastes where there is a larger fraction of reusable grades of paper than in household wastes.

waste could provide the country nearly nine-tenths of a quad per year.<sup>1</sup>

I believe these estimates are more accurate, if only because they are more conservative and lower than the ones published by EPA and DOE. They do not include the uncertainties of trying to estimate the amount of waste likely to be available in the future. My estimates also reach for conservatism by allowing for the laws of nature which dictate that there will be thermodynamic losses in processing and using any fuel.

For example, this allowance includes the energy necessary to process the waste so as to convert the heterogeneous mixture into specification fuels. The amount of electrical energy required to process is perhaps only one-eighth or less of the total amount of energy which could be derived from using the product fuel to generate electricity.<sup>2</sup>

To do this, MSW can be used as received to generate steam in a heat recovery incinerator, such as a waterwall incinerator. Alternatively, the waste can be mechanically processed by a number of schemes to produce a shredded product for use either by itself or as a supplementary fuel with coal, to generate steam. The major advantages of processing waste are to enable convenient storage and transport of the new fuel, and to produce a specification commodity of constant properties, day to day, that meets the handling and burning requirements of the boiler. The latter point is essential in any commerce and especially important in resource recovery.

There is healthy competition among purveyors of various water-wall incinerator designs and of mechanical processing systems. A disadvantage of the competition is the present confusion over which system is best, if indeed such a judgment can be made. The bases for picking a system are initially simple: Cost and compatibility of the fuel with the intended boiler. For example, if the fuel is to be stored, mixed, and burned with stoker coal, obviously the waste has to be mechanically processed and densified into pellets or other form to resemble the lump coal used in stoker-fired units.

The development of resource recovery technology, and its consequent cost, have suffered from an initial zeal and lack of R. & D. There was an insufficient technical base for a new industry with the result that after design, construction, and operation, plants did not meet ordinary industrial objectives for reliability and low maintenance. Also, the materials and fuel products did not always meet specification so could not be sold on a consistent basis. Consequently, municipalities and industry are now hesitant to invest. This accounts, in part, for an emphasis today on planning, and more planning, rather than on doing.

This overview of available waste-to-energy technologies will hopefully clarify what we have learned from past experiences and how future plants can be improved. I will comment on perhaps why there might be a reluctance by some to incorporate such technical improvements and to move ahead more quickly.

<sup>1</sup> For thermodynamic reasons, energy savings of this sort should not be expressed as barrels of oil equivalent. However, bowing to popular practice, 0.4 quad is equivalent to approximately 60 million barrels of oil and 0.9 quad to approximately 136 million barrels.

<sup>2</sup> H. P. Sheng and H. Alter. *Resource Recovery & Conservation* (1975), v. 1, pp. 85-94.

First, in giving an overview, I would like to arbitrarily divide waste-to-energy technologies into what is available now, and what is likely to be available some time in the future. Available now are several methods for processing MSW to solid fuels, broadly termed refuse-derived fuel or RDF.<sup>1</sup> There are several forms of RDF.

Likely to be available in the future are the technologies for biologically digesting MSW to produce methane, and pyrolysis or chemical decomposition, to produce a mixture of combustible gases or liquids, or both. Availability of these future approaches is contingent on satisfactory resolution of some tough technical and economic issues.

Because of this division of availability and in the interest of time, I include only the solid fuel application in this discussion. In other words, these are the technologies that can be implemented today to conserve and derive energy from MSW as an alternative to disposal.

Waste can be burned as received with no processing in a heat recovery incinerator. Installations to do this are in operation and generally are copied from similar plants extant in Europe and elsewhere. Plant capital and operating costs are high because this is probably the only industrial application for a nonspecification fuel. The plant has to accept waste of a wide range of properties, or that which we discard as MSW. An advantage might be that the European experiences can be used to extrapolate costs. The technology is generally considered proven, if only because there are many replicate plants.<sup>2</sup>

Alternatively, waste can be shredded, the magnetic metals removed, and the remainder burned, which is the approach used in the plant under construction in Albany, N.Y., and operating in Hamilton, Ontario. This is a relatively inexpensive approach which passes a great deal of noncombustible material through the firebox.

An alternative has been to air classify, or winnow, the waste which removes some of the noncombustible material, or ash. However, it still leaves behind a great deal of ash. Nonetheless, it can be burned by itself as in Akron, Ohio, or in Niagara Falls, N.Y., or with coal as in Ames, Iowa, Milwaukee, Wis., Chicago, Ill., or Monroe County, N.Y. When burned with coal, the fuel is shredded a second time to reduce the particle size.

In all of the above examples, the waste is shredded and classified dry. In some instances, such as Hempstead, N.Y., and the plant under construction in Dade County, Fla., the shredding and classification are done in water suspension and the fuel is squeezed to remove most of the water.

Various processes of these sorts differ in detail but broadly, not in principle, something which is often overlooked in descriptions of

<sup>1</sup> Implying that only solid fuels are available today is not totally correct. For example, gas from landfills and anaerobic digestion of sewage could be included. Only solid fuels are mentioned here for brevity.

<sup>2</sup> It appears that the Europeans are much less sensitive to the high cost of waterwall incineration than we because they have not had the luxury of cheap landfills, as in many parts of the United States. For this reason, incineration has been a common method of disposal in Europe, but not here. Still, contrary to some popular beliefs, a relatively small proportion of the waste is incinerated (with or without heat recovery) in European countries: Belgium (Flanders) 29%, Germany 22%, Netherlands 30%, Italy 33%, and England 9% (Commission of the European Communities, "Household Waste Sorting Systems," 1979). Other estimates are: Sweden 33%, Switzerland 60%, and Denmark 60%, based on conversations with representatives of these countries.

competitive thrust. When possible, implementors seek to cofire the RDF with coal in a utility boiler because such boilers are generally large enough to accept all of the RDF a community could produce and obviously resource recovery costs less using an existing boiler. However, there is no technical reason why a purpose-built boiler could not be used to provide steam or electricity, or both, from RDF.

There have been proposals, and some test firing, to use forms of RDF for other than raising steam. Particular proposals have been to use RDF in cement manufacture, aggregate drying, and as a fuel for the incineration of sewage sludge, something termed codisposal. The first industrial application of codisposal will be a plant soon to begin operation in Duluth, Minn.

One of the objections that fuel users have raised has been to the high ash content of most RDF. A few installations, such as Milwaukee and Ames, have retrofitted screens to sieve the RDF at some stage of processing to remove the ash. In a different approach, one plant in Madison, Wis., sieves the shredded waste as part of producing RDF, and two plants, New Orleans, La., and Bridgeport, Conn., sieve the as-received waste to remove noncombustible material before the first shredding step. This latter approach is reported to be extremely effective in producing a low ash fuel.<sup>1</sup>

Future plants must, in my judgment, include some type of screening step in the process flow so as to narrow the range of fuel properties and thus improve the quality of the product sold. Screening is relatively cheap and effective. Some day screens may supplant air classifiers. However, more R. & D. is needed so as to be able to choose one type of screen over another.<sup>2</sup>

As a brief example, research today indicates that shredded MSW contains about 30 percent material smaller than one-fourth inch in size and about 90 percent of this fraction is noncombustible.<sup>3</sup> Material of this size cannot be completely separated in an air classifier, so screening has to be used. The screening could remove up to 27 percent of ash-forming material and thus greatly improve the quality of the fuel.

I stress the application of screens as an example that the knowledge is available to overcome many of the recognized inadequacies of waste-to-energy plants. Generally these plants have a poor reputation, sometimes deservedly, but given a chance the plants can be greatly improved. New ones are likely to be much more reliable.

The reason waste-to-energy plants have a poor reputation is perhaps because unlike some more familiar technologies, resource recovery has not matured through a process of research, pilot plant, semiworks, et cetera. Rather, it began and continues as an art. As a result, technical problems and questions constantly arise, plants

<sup>1</sup>J. F. Bernheisel, P.M. Bagalman, and W.S. Parker in *Proceedings of the Sixth Mineral Waste Utilization Symposium*, E. Aleshin, ed. IIT Res. Inst. and Bu. Mines, Chicago, 1978, pp. 254-60. Also, the New Orleans plant was designed as a material recovery, rather than RDF, plant prior to the 1973 OPEC action. It is in an area of the country that does not use much solid fuel. However, there are now marketing efforts to find a customer nearby for the low ash RDF now produced as a by-product.

<sup>2</sup>The Department of Energy received proposals July 11, 1979, for research and development on rotary screens as primary separation devices, in response to their solicitation PRDA DE-RA03-79CS20490.

<sup>3</sup>H. Alter. *Materials Recovery from Municipal Solid Waste*, Final Report on Grant R803901 to U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio, 1979.

do not work as well as they might, and implementors are finding their investment insufficient to meet technical, sales and cost objectives.

Importantly, profitability is not high enough for the private sector to invest large sums in R. & D. Several Government agencies, notably the Bureau of Mines, EPA, and DOE have established R. & D. programs but at present the DOE program is the only one alive and maybe well.<sup>1</sup>

The DOE program is directly mostly at solving operational and design problems as they are identified in existing plants. It will be a long time before the results of this research can be incorporated into new or existing plants. In the meantime, implementors perceive technical and economic risks and are fearful that the plant they build will not work and they will not be able to sell the recovered materials and energy products on a consistent basis. Apparently, implementors are waiting until such risks either disappear, or are greatly lessened. In the meantime, few new plants are being built and our resources are being buried.

To overcome this, there have been many proposals of programs for alleviation of risk, such as guaranteed loans and construction of demonstration plants. Clearly, we need more plants, incorporating the new designs based on what has been learned from operating the old. As an art, resource recovery cannot advance if there are no new trials, no new experimentation, no new facilities.

At present, implementors of new plants are generally reluctant to incorporate innovation. Understandably, a municipality must be prudent and thus seeks the proven technology of processes which are in operation elsewhere. As with other areas, Government support of innovation and R. & D. is viewed as a Federal role, and not State or local. Local governments would be hesitant today to invest in a process which merely placed a screen in a different location than as in the present plants, or to accept a new kind of screen or let alone a more complicated device which maybe has great promise, but has not yet been used in resource recovery. A way must be found to encourage what I term "prudent innovation" in order to advance the art of resource recovery.<sup>2</sup> This brief technological overview hopefully communicated that the state of the art today permits construction and operation of waste-to-energy plants.<sup>3</sup> The question at hand is, what can be done to build more and better plants.

More R. & D. would help, and attached to my written testimony is a copy of a magazine article [see p. 135] published last year which

<sup>1</sup>The Bureau of Mines R. & D. activities in municipal solid waste have changed little or shrunk over the past several years. The EPA-ORD budget for municipal resource recovery R. & D. for fiscal year 1980 is zero. DoD has some R. & D. activities in this field but directed at the special problems of wastes generated at military facilities. DoC, particularly at the National Bureau of Standards, has a research program on recovered materials, as required by Sec. 5002 of Public Law 94-580 (RCRA).

<sup>2</sup>Of the two plants which retrofitted disc screens, one is privately owned. Of the three that initially included trommel screens, two are privately owned and the third leased the equipment against a performance guarantee, rather than invest capital funds. Thus, municipalities are reluctant to try even a simple device like a screen, because it has not been widely used before in the same type of plant.

<sup>3</sup>As of March 1979, there were at least 21 resource recovery plants either under construction or in various stages of shutdown or operation in the United States. The announced capacity of the waste-to-energy plants operating of this date is approximately 12,000 tons-per-day. This is a small fraction of the amount of waste in the SMSAs (about 3 percent) but a great deal of experience.

addresses this question. Much of what was described then is apropos today.

As forms of encouragement for more plants, there have been past proposals for guaranteed loans and demonstration grants, and these have been well considered, but little has been done. So today I would like to offer some new proposals to address the risks perceived by resource recovery plant owners and by fuel users.

The owners are concerned if the plants will work to specification and the users are concerned whether the new form of fuel will damage or otherwise interfere with the efficient use of their boiler or other production processes.

The owners' concerns can be alleviated by a program which, after a review of plans prior to construction, provides a fund, which may be a maximum percentage of total capital costs, which can be available for repairs and retrofits after construction and startup to correct deficiencies. After some period of time, operating shortcomings, such as failure of equipment to recover to specification, can be documented and identified and a plan formulated and costed to change equipment, or whatever else is needed, to make the plant fully operable. During the periods of problem identification and correction, the fund may also supplement the revenue shortfall from selling nonspecification products at a discount. This feature will encourage continued operation of the plant, even if it is suboptimal.

The concern of fuel users is about the long-term effect on their equipment from the new fuel. This may be alleviated by the establishment of a new form of boiler insurance against the extra and unknown risk of premature failure due to the new fuel. Because private carriers could not now estimate the risk, the Government may have to participate in the underwriting, so as to bring the premiums within the range of normal types of business or boiler insurance premiums. This program could well be applied to some existing as well as new plants so as to expand energy conservation and take greater advantage of existing plant facilities.

New programs of these types are likely to encourage the construction of many new waste-to-energy plants because the owners will be assured that ultimately their plants will work economically and their customers will be assured that the new fuels and other products will not cause large maintenance at some future date.

I believe these new programs address and try to rectify two of what I regard as the three major risk categories in resource recovery. In this way, the current state of the art can advance and the Nation can achieve greater energy conservation and environmental benefits from what is today a waste. The technology is available today to make a significant start, and all we need, is the will.

Thank you very much.

[The article referred to follows:]

## A cautious look at resource recovery

Municipal solid waste can yield valuable materials and energy, but the technology to exploit this resource is still developing.

Resource recovery from municipal solid waste consists of reclaiming both useable materials and energy. Materials recovery means the preparation — to the customer's specifications — of iron and steel, aluminum, mixed other non-ferrous metals, glass, and paper. In the future, other materials, such as plastics, may be added to this list.

Energy recovery is the utilization of the organic fraction of waste as fuel. In some cases, solid waste is used directly — without processing — as a fuel. In others, it is processed either mechanically, chemically, or biologically to yield a fuel meeting particular specifications. The output is known as refuse-derived fuel (RDF).

The temptation always exists to count the number of plants now operating or under construction, and to try to predict how many more will be operating within some given number of years. It is safer, however, to list only those plants that are now on line, or scheduled to come on line in the immediate future:

- Eleven generate steam or electricity
- Ten produce RDF
- Two may be classified as "other"

In addition, there are — or soon will be — eight plants that recover an array of materials. This group does not include the many shredder sites that recover iron and steel, and the water-wall-type incinerators that generate steam for internal use.

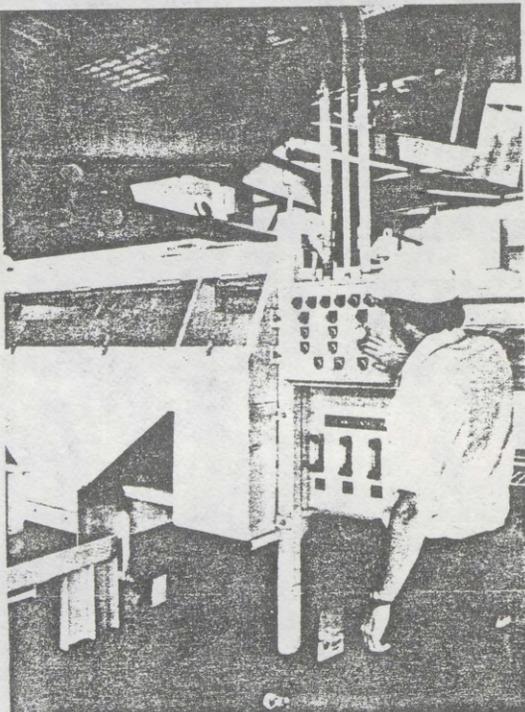
The plants now operating or under construction illustrate that the various unit processes for resource recovery are deemed workable. The evidence is the willingness of the public and private sectors to buy the recovered materials and fuels. In some cases, they have even contracted to buy in advance of plant start-up.

The point is further emphasized by the large number of facilities in various stages of advance planning or design, or for which construction funds have been made available.

Conceptually, there are three categories of resource recovery unit operations:

- Those considered today to be proven

By Dr. Harvey Alter  
Director of Research Programs  
National Center for Resource Recovery



An eddy current separator handles aluminum recovery.

- Those that are less developed, but are likely to be proven in the near future
- Those for which major development or even inventions are required

Examples of the first category are shredding, screening, and recovery of iron and steel. In fact, some may argue that even these operations could benefit from improvement.

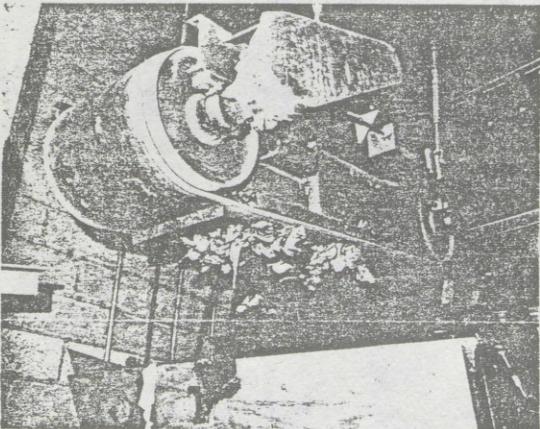
Examples of the second category are air classification and the recovery of

aluminum and glass. Large advances have been made here. Several plants will soon be operating to recover these materials, and it is likely that in a few years such recovery operations may be commonplace. Still lacking are the fine tuning and economic proof that come from several operating plants.

Examples of the third category, that requiring major developments, are pyrolysis and the mechanical recovery



A technician monitors the froth flotation separation of recoverable glass.



Magnetic separators are state-of-the-art devices.

of commercially useable paper from mixed household or commercial waste.

Although equipment and processes are available to upgrade low quality paper furnishes in a papermill, the price may be high. Moreover, this procedure merely transfers the disposal of contaminants from the waste processing plant to the papermill. Equivalent processes to recover and/or upgrade low quality furnishes so that they are commercially useable in papermills are

not available in any waste processing plants. Admittedly, there are some claims that this upgrading is possible in the resource recovery plant.

It appears that, for both paper recovery and upgrading and for pyrolysis, new inventions are not required. What is needed are merely improvements in existing pilot technologies.

Methods of energy recovery may be classified into four categories:

- The use of unprocessed (as-received)

waste in an "incinerator" to generate steam

- The mechanical processing of waste into a refuse-derived fuel (RDF) which is burned alone to generate steam
- The use of RDF as a supplementary fuel with coal in an existing boiler
- The biological or chemical conversion of waste to a fuel, as by pyrolysis

The first category is considered proven technology in Europe. In addition, several examples of such plants are operating today in the U.S.

Examples of the second category are facilities under construction in Hempstead, N.Y., and Akron, Ohio. Furthermore, a Niagara Falls, New York, chemical company has announced that it plans to build a plant of this type that will generate electricity for captive use by the plant owner. One of the attractions of this category of energy recovery is that it uses proven boiler types from other industries, generally wood-waste boilers.

Examples of the third category are operating in three cities and are under construction in two more. Still others seem to be announced every month. This method of energy recovery, using the existing boiler capacity of a utility, has the strong economic attraction of avoiding the large investment in a new boiler. This technology could be considered almost proven.

The fourth category requires additional development. Three demonstration pyrolysis plants, having 75, 100, and 200 ton-per-day capacities have been constructed; however, the experiences from these plants have yet to be translated into other operating examples. Numerous claims and announcements of "new" methods of pyrolysis surface at regular intervals.

Any assessment of energy recovery technology must be tempered by an acknowledgement of its limited time-frame. Although experience to date burning RDF has generally been good, boiler operators are accustomed to decades of operation. Corrosion or other detrimental effects to a boiler cannot be easily or reliably determined in a laboratory or by short-term testing.

Recovering materials and energy from municipal solid wastes is technically feasible on a commercial scale. Moreover, the use of the recovered materials and fuels is technically feasible, as judged by the willingness of users to enter into long-term commitments to purchase these products.

It is worth restating the obvious: resource recovery is no different from other industrial activities. The methods are likely to develop and improve as more plants are built and operated over longer periods of time. ■

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Mr. OTTINGER. Thank you, Dr. Alter, for a very helpful statement.

I think that we will hear from the other witnesses before we have questions.

Mr. Campbell?

I would like to say, with respect to all of the witnesses that we will put your full statements in the record. If you wish to summarize, you may.

#### STATEMENT OF WILBUR D. CAMPBELL

Mr. CAMPBELL. Thank you, Mr. Chairman.

We are here today to discuss our recent report to the Congress entitled "Codisposal of Garbage and Sewage Sludge—A Promising Solution to Two Problems."

As the volume of garbage and sludge being generated increases sharply, and the current disposal options become more restricted or even eliminated, it becomes increasingly important that as a Nation we begin to consider some alternative technologies. We believe that codisposal of these two wastes is a potentially viable alternative which is both economically and technologically feasible.

The Nation's garbage is generally disposed of in landfills, open dumps, or incinerators, while the most common methods of disposing of sewage sludge are ocean disposal, landfilling, land application, and incineration. All of these practices can cause major environmental and/or economic problems and some may be ultimately eliminated or severely restricted. For example, EPA regulations and the 1977 Marine Protection, Research, and Sanctuaries Act prohibit ocean dumping after December 31, 1981. The drawback to landfilling is that it can create odors and public health and ground-water contamination problems. The future of landfilling is questionable as a viable alternative because the availability of suitable sites is diminishing and new Federal regulations to be issued under the Resource Conservation and Recovery Act (RCRA), as well as the Clean Water Act, will tend to restrict the practice and make it more expensive.

Incineration may present problems with air pollution control and the possibility that the ash and air pollution control residuals may cause ground-water contamination when landfilled. In addition, incineration is expensive and often requires large amounts of auxiliary fuel or electricity for drying and incinerating sludge.

#### THE FUNDAMENTALS OF THERMAL CODISPOSAL

There are two basic codisposal approaches, both of which use garbage as a fuel to facilitate sludge drying and/or burning. One approach uses garbage incineration equipment, while the other uses processed garbage as the auxiliary fuel source in a sludge incinerator. Both have been demonstrated to be technologically feasible, but the use of garbage burning incinerators has the best track record. Using garbage in sludge incinerators has not yet been proven on a commercial scale.

The objective of codisposal is to use the heat released by the burning garbage to dry the sludge to its self-burning point, which is about 30 percent solid. The heat form used is either hot flue gas or steam. After it is dried, the sludge can be burned along with the

garbage. The heat value of dry sludge can be relatively high, as great as 10,000 Btu's per pound of dry weight solids. Excess or exportable energy for such purposes as powering wastewater treatment plants may be produced.

#### CODISPOSAL IS TECHNOLOGICALLY VIABLE

Western European countries have been using technologies to recover energy from the combustion of garbage much more extensively than has the United States. One of the largest integrated wastewater treatment codisposal facilities in Europe is the Krefeld, West Germany, plant which began operating in 1975, and can serve a population equivalent to about 300,000 for garbage disposal and 600,000 for sludge disposal. Another codisposal plant has recently become operational in Ingolstadt, West Germany, and three plants that we are aware of are operational in France.

Despite the success of the European experience, widespread large-scale implementation of the technology has not taken place in the United States. There have been many reasons for this, one major factor may have been the absence of detailed operating and technological data on the plants. EPA and the Department of Energy are trying to address this situation by contracting for studies which include evaluating some selected European facilities.

Only a few plants have operated successfully in this country in recent years. Many failed due to technological and related economic problems. Generally, the previous attempts involved co-incineration in garbage incinerators, which were not designed for codisposal, and were incapable of adjusting to the new feed material. Frequently the fire was extinguished and the material did not burn properly.

Attempts to correct these technological problems were generally expensive and ineffective. There was not much incentive to invest in new equipment because inexpensive land disposal alternatives were often available for both types of wastes. Separate sludge incineration also remained an attractive alternative because the cost of auxiliary fuel was relatively low. As a result, codisposal was often abandoned and by 1975 only a few plants were still in operation.

Since the mid-1970's, however, both Government and industry have had a renewed interest in codisposal. The energy crisis, improvements in incinerator technology, and diminishing land disposal options have contributed to codisposal's reemergence. The renewed effort has included developing new technologies and planning and constructing codisposal facilities. Both EPA and the Department of Energy have been involved. At least five codisposal facilities costing about \$225 million are either under construction or in the planning phase. Each facility is part of a larger wastewater treatment project for which EPA is providing some funding under the construction grants program.

Mr. OTTINGER. Is that \$225 million the total for the five plants?

Mr. CAMPBELL. Yes, sir.

## CODISPOSAL IS ECONOMICALLY FEASIBLE

Although data on American facilities is lacking at this time, codisposal can be an economically viable alternative. In some cases, it may actually be less expensive than separate sludge and garbage disposal. It does, however, require a major capital investment, often well above that needed to implement other disposal options, such as landfilling. As a result the availability of construction money, particularly Federal funding, will influence whether codisposal will be implemented in a particular area.

Most of the cost information available represents estimates and projections. Although data on American facilities is not available due to the limited U.S. experience, projections and studies, particularly the 1976 study by Roy F. Weston, Inc., for EPA, shows that codisposal can be cost effective.

The Weston study is the most comprehensive on codisposal costs currently available and compares the projected total costs of separate garbage and sludge incineration with four codisposal options. Detailed data is developed in three primary cost categories—construction costs, total facility capital costs, and operating costs.

The study concluded that coincineration was the preferred option in all of the categories examined. While capital cost savings attributable to coincineration will vary as plant size changes, the percent differences should remain fairly constant. Coincineration's lower operating costs are attributable mainly to savings in manpower and auxiliary fuel costs.

All codisposal alternatives showed savings over separate incineration in total annual costs measured in total dollars or dollars per ton, the real economic indicators. Codisposal cost savings should be greater in 1985 since separate incineration is more susceptible to inflationary increases.

Although the four codisposal techniques are less expensive than separate incineration, the improved economies would not bring the costs down to the level of land or ocean disposal. Other sources also support the economic viability of codisposal. For example, the cost analysis for the project in Glen Cove, N.Y., showed that codisposal was the most expensive of the proposed options in terms of total annual costs, requiring a much higher capital investment than the other alternatives. However, when total offsets of about \$870,000 per year were considered for such items as electricity savings, revenues from ferrous metal recovery, and disposal fees, the total annual costs of codisposal were substantially less than those of the other alternatives evaluated.

One of the key factors affecting the future of codisposal will be the availability of Federal construction funds. Billions of Federal dollars have been made available to construct waste water treatment plants, including sludge disposal systems. This has been done under EPA's construction grants program. No similar mechanism exists, however, for financing the construction of garbage disposal facilities. The funding issue centers around whether construction grant money can be used to fund all or a part of a codisposal garbage component.

Those opposed can argue that already scarce funds should not be further limited by funding activities not of primary concern under

the Federal Water Pollution Control Act. However, compelling arguments also exist on the other side. Section 201(e) of the act specifically directs the EPA Administrator to encourage waste treatment management which integrates sewage treatment with other waste disposal facilities. In addition, the Resource Conservation and Recovery Act of 1976 seems to encourage integrated waste management approaches.

The 1977 Clean Water Act encourages innovative and alternative wastewater technologies, including sludge management, through increased funding. Although some changes have taken place, we believe that EPA's construction grants funding policy is confusing and has favored sludge-only disposal options. The confusion stems from the fact that EPA has funded codisposal projects differently throughout the country.

In May of 1976, EPA's region V approved a construction grant for a codisposal project in Duluth, Minn., for \$17.3 million or 75 percent of total project costs, including the garbage component. During this period, EPA's region II received several inquiries on funding codisposal projects and considered three options:

First, fund 75 percent of the entire project, viewing garbage as a fuel source;

Second, provide the same amount of funding EPA would use to fund the least costly single-purpose sludge incinerator.

Third, prorate costs and fund only those pertaining specifically to sludge.

The prorated formula is being used at the present time to fund the Glen Cove, N.Y., project. EPA calculated that 53.3 percent of total costs pertained specifically to sludge and was therefore fundable. EPA will fund 75 percent of this figure, or about 40 percent of total project costs.

The city would have received substantially more money if EPA had used the second option and approved an amount comparable to the least costly sludge incinerator. We were informed that Glen Cove went forward with the project, despite the relatively low level of Federal participation, primarily because the city was faced with major sludge and garbage disposal problems.

The prorated funding formula which was eventually published as the EPA funding policy has, to some extent, acted as a disincentive to codisposal implementation. However, it now appears that the 1977 amendments to the Federal Water Pollution Control Act will result in codisposal projects receiving more favorable treatment.

Under a proposed EPA funding policy, the grant eligible portion of a codisposal project which employs innovative or alternative technology, would be 115 percent of the ratio of the most cost-effective sludge option's present cost and the codisposal project's present cost.

In some cases, applying the formula may result in a grant eligible amount for codisposal which is less than the sludge-only option's capital cost. If this occurs, a minimum eligibility figure of 115 percent of the least costly sludge disposal option's capital costs would be used. Using this approach, the grant eligible amount for a codisposal project would be significantly higher than under the current prorated formula.

## ENVIRONMENTAL CONSIDERATIONS

Thermal codisposal, like other waste disposal options, involves some environmental risks. Potential air emission problems and to a lesser extent possible ground-water contamination resulting from landfilling of codisposal residual materials are the primary environmental concerns. Unfortunately, only limited specific data regarding these concerns exists. Additional hard data based on actual experience is needed to permit more effective and complete assessment of codisposal's potential impact on the environment and health. Numerous site-specific variables strongly influence how codisposal affects the environment.

Our review indicated that generally: one, environmental problems associated with codisposal should be no more serious than those resulting from separate sludge and garbage disposal; two, the problems are controllable; three, separating certain garbage items and pretreating industrial wastewater may reduce codisposal's environmental impacts; and four, thermal codisposal can be environmentally superior to certain waste disposal options.

## INSTITUTIONAL BARRIERS

Institutional problems have been a serious constraint to the consideration and implementation of codisposal. Institutional barriers are complex and encompass various problems which restrict the development and adoption of integrated and coordinated garbage and sludge disposal approaches. The most serious problem is constraining organizational arrangements. In many areas of the Nation, sludge and garbage disposal are handled by different governmental or political entities. Coordination between these organizations, which is essential to serious consideration of codisposal, is frequently lacking. To expect immediate changes in these established patterns would be unrealistic, even though the Resource Conservation and Recovery Act and the Federal Water Pollution Control Act encourage a more unified approach. However, there are some steps which EPA can take to foster greater consideration of codisposal as an alternative waste disposal process.

We recommended in our report that the Administrator, EPA:

Require that States and local communities consider codisposal technology as a possible alternative during the areawide and facilities planning process;

Require that future evaluations of codisposal projects provide for developing and disseminating actual operating cost data;

Establish a construction grants funding policy which, to the extent allowed under existing legislative authority, would provide at least the same level of funding for deserving codisposal projects as for single-purpose sludge-only disposal options;

Undertake research designed to identify and analyze thermal codisposal's impact on health and environment.

It should be emphasized that our primary concern has been with insuring that codisposal, which can offer certain advantages, such as significant cost savings, at least be considered during the waste disposal decisionmaking process. Decisions to implement a particular option can only be made by the responsible local officials on a site specific basis.

Mr. Chairman, this concludes my statement. We will be happy to respond to any questions you may have.

Mr. OTTINGER. Thank you very much.

At this juncture, I would like to recognize Mr. Ertel for a brief statement that he would like to make.

Mr. ERTEL. Mr. Chairman, I would like to submit, for the record, a description of a waste-to-energy plant that not only was built before this type of energy generation became fashionable, but also before the first energy crisis of 1973.

The city of Harrisburg is trying to successfully use this type of technology. It may be a plant for these subcommittees to evaluate. The Harrisburg Municipal Incinerator has the capacity to burn 720 tons of all kinds of municipal refuse.

In a brief report, which I am submitting for the record, there is a discussion of a plan to connect the incinerator with the Pennsylvania Power & Light's, oil burning, steam, and heat plant, which supplies Harrisburg's city center and the capitol complex.

I would like to note that since that report was finished, this has been accomplished and, in fact, they have been operating for about a year. The incinerator steam heat output can handle 100 percent of the P.P. & L. summertime load, and 30 percent of the wintertime load.

I want to commend the chairmen of the two subcommittees for holding these hearings. I am sure that they will be as gratified as I am to learn that some cities have already taken the initiative in utilizing this important resource. I would like to ask permission to submit the report for the record.

Mr. OTTINGER. I will be glad to receive the report for the record. [The report follows:]

#### THE HARRISBURG MUNICIPAL INCINERATOR EXAMPLE

Built in 1972 at a cost of \$8.2 million, the Harrisburg incinerator has a capacity of burning 720 tons per day of municipal refuse of all kinds. Over-sized refuse is reduced to six inch fragments in a steam driven turbine shredder, then conveyed to the storage pit for processing and burning with "normal" refuse.

Net plant heat rate averages 97,500 lbs. of steam per hour at an average temperature of 1500°F thus has the capability of producing approximately 5 megawatts of electric power. The original intent was to steam heat and air-condition a public works complex nearby which was never realized, thus at the present time and since it began operations, the incinerator's steam is condensed and released to the atmosphere. The current plan is to connect the incinerator with Pennsylvania Power & Light's oil-burning Walnut Street steam heat plant which supplies Harrisburg city center and the capitol complex. The incinerator's steam heat output can handle 100 per cent of the Walnut Street plant's summertime and 30 per cent of the wintertime load.

The facility occupies one acre, with fuel (ie: municipal waste) stored in a 6500 cubic yard pit (approximately 1440 tons at a conversion ratio of .22 tons per cubic yard), permitting two days storage. Refuse is reduced to 97 percent in volume, approximately 50 per cent in weight, to an ash. Four years accumulation of ash occupies a 2½ acre landfill adjacent to the incinerator. Ferrous metals are collected magnetically at the discharge end of the furnace for re-sale, while the ash is being tested as road paving material.

The incinerator burns no fuel other than refuse and is the second of its kind which accounts for its high construction cost. If we assume a generating potential of 5 megawatts of electric power, installed capacity approximates \$1600 per kilowatt. This is however offset by a "negative" fuel cost since refuse haulers pay \$12.80 per ton to dump at the incinerator.

While the Harrisburg incinerator is far from being an economic success because no use was made of its steam heat output, it serves to illustrate how such a plant can be combined with an urban TES not only to use the energy content of municipal

solid waste, but the side benefits of re-cycling metals and reducing the land use impact of solid waste disposal.

Mr. OTTINGER. I have read about the Harrisburg experience. I am very pleased to hear that it is proceeding successfully.

Mr. ERTEL. Thank you, Mr. Chairman.

Mr. OTTINGER. We will hear next from Mr. George Brown of Grumman. The subcommittee had the privilege of going to Grumman a short time ago to look at their solar work. We were very impressed and learned a lot from that experience. I would like to welcome you here.

#### STATEMENT OF GEORGE L. BROWN

Mr. BROWN. Thank you, Mr. Ottinger.

I am George L. Brown, senior vice president of Grumman Energy Systems, Inc., and I shall take only a few seconds to make a few introductory remarks.

Two weeks ago, your staff properly contacted us as the Grumman Ecosystem Corp. Since then, however, the Grumman Corp. demonstrated its continued commitment to energy, in addition to its other activities, by consolidating its resource recovery, solar and wind businesses into one wholly owned subsidiary, Grumman Energy Systems, Inc.

In making public this corporate commitment to help solve the Nation's energy problem, John C. Bierwirth, chairman of Grumman Corp. said:

Other countries are using garbage as fuel instead of dumping it and other countries are using the Sun instead of petroleum to heat most of the hot water they use. We believe the United States must begin to put these proven technologies to work now.

Today, I am accompanied by Dr. Clinton C. Kemp, vice president, project development, Grumman Energy System, and by Dr. Robert W. Madey, vice president, development, Grumman Energy Systems. We were asked today to speak to you generally about our experience with resource recovery, with special attention to our experience with codisposal. Dr. Kemp will present that statement, and with your permission I would like at this time to yield to Dr. Kemp.

#### STATEMENT OF CLINTON C. KEMP, PH. D.

Dr. KEMP. Thank you, Mr. Chairman.

I am Clinton C. Kemp, vice president of Grumman Energy Systems, a wholly owned subsidiary of the Grumman Corp. Our business is developing and commercializing various energy systems, including solar systems for water heating, wind turbine machines for generating electricity, and refuse powerplant systems. The latter are designed for simultaneous disposal of municipal solid waste, sewage sludge, and other combustible residues with recovery of their energy value either as steam or as electricity.

Your interest in energy recovery from codisposal of municipal solid waste and sewage sludge is very well taken, and very much in the national interest. We would save the equivalent of about 270 million barrels of crude oil per year and thus reduce the demand for foreign exchange by about \$6 billion a year if all the municipal solid waste and sewage sludge available in this country were proc-

essed in modern refuse powerplants. Moreover, this disposal technology also simplifies solid waste and sewage sludge disposal without creating other problems such as huge demands for water or pollution problems. Obviously, therefore, we welcome this opportunity for reviewing this matter with you, and we hope our remarks will contribute to your understanding of it.

Sewage sludge is an increasingly troublesome material because traditional methods for its disposition are falling out of favor, and the amount produced is growing more as our sewage is treated, and as its treatment becomes more thorough. Because sewage sludge and municipal solid waste are continuously generated in populated places, it is appropriate to consider their disposal simultaneously in the same system.

The appropriateness of such codisposal is all the more logical because the most valuable resource which can be recovered from each is their fuel value. It is not surprising, therefore, that considerable attention is being given to disposing of these wastes by burning them, and producing steam from the heat released in special facilities equipped for avoiding air, water, and land pollution.

Burning sewage sludge by itself has never been particularly successful. Thus in the majority of cases sludge is co-fired continuously with natural gas or fuel oil in order to keep the incinerator operating steadily, or it is allowed to accumulate for several days and the resulting batch is then burned. If this latter practice is followed, the incinerator is used only intermittently and it cools off between uses. It must be reheated each time it is used, with natural gas or fuel oil. Either way, considerable amounts of natural gas and fuel oil are used with the result that at present and prospective prices for oil and gas, sludge incineration is becoming the most costly processing step in a sewage treatment plant. The EPA estimates this fuel consumption to be the equivalent of more than 2 million barrels of fuel oil per annum.

Municipal solid waste is produced in substantially greater amounts than is sewage sludge. For instance, about 500 tons of solid waste per day versus 35 tons of bone-dry sewage sludge per day in a community having a population of about a quarter of a million. As a consequence, modern waterwall refuse powerplants and other refuse incineration equipment serving communities with populations of more than 250,000 are generally operated 24 hours a day, 7 days a week. These plants rarely use auxilliary fuels of any kind. If sewage sludge could also be handled in such equipment, the need for auxilliary fuel and its cost could be avoided, both of which are very much in the national interest.

These considerations led to the development of systems for codisposal of solid waste and sludge in this country and abroad. At least 14 facilities have been installed in Europe, and 3 in this country since 1967. There are two more in Europe under construction, and at the present moment there are three under construction in this country. Five of the European facilities already in operation are in France, and another five are in Germany. The other European facilities are in Denmark, Holland, Sweden, and Switzerland. Of the European plants, VKW and Martin have each built four,

Bruun & Sorensen and Von Roll each built three, and Widmer and Ernst and Lurgi have each built one.

Designers and builders of the facilities in operation or under construction in the United States include Envirotech, Parsons-Whittemore, Raytheon, Martin, and two consulting engineering firms. Unfortunately, none of these has more than one plant in operation or under construction in this country. However, on the basis of the European experience, where more plants have been in operation, it is obvious that refuse powerplant codisposal technology is established and proven. Since four of the major European sources of this technology have licensees in this country, the technology is a here and now technology for our use also.

As a case in point, my company is the licensee in North America of the VKW technology from Germany, and we have been promoting it widely for the last 3 years or so, including, for example, in Indianapolis, Knoxville, and in New York's Westchester County. We are also the contractor to the Department of Energy on a critical operation study of the VKW-built disposal plant in Krefeld, West Germany. That is the plant that Mr. Campbell mentioned a moment ago. This facility went into operation in 1974, and serves an industrial community of about 300,000 people, and has a capacity for handling about 700 tons and 80 tons of bone-dry sewage sludge per day. The purpose of the study is to determine materials and energy balances for the plant, and to characterize all of the emissions from the plant. The study is scheduled for completion in December.

Our developing experience with this sewage sludge codisposal technology shows that offers several important advantages for communities in this country, and particularly for those having populations of a quarter of a million or more. I have already mentioned one of the advantages, no fossil fuel is needed for processing sewage sludge, when it is coprocessed with solid waste in a refuse powerplant.

Another advantage is that the sludge can be coprocessed with solid waste without detracting from the heat being recovered from the solid waste. As an example, for a community having about 500,000 people, which means that it produces about 1,000 tons of solid waste a day, and about 75 tons of bone-dry sewage sludge per day, the steam produced from the modern mass burning waterwall codisposal refuse powerplant will be equal to that produced from about 570,000 barrels of fuel oil per year.

Mr. FLORIO. Sir, you keep saying bone-dry sewage sludge. It is my understanding from my local sewage plant that this is, in itself, a big project. Most of the sewage sludge that is going to be disposed of, under whatever methodology, is not going to be bone-dry, and that changes the equation substantially. Is that the case?

Dr. KEMP. Yes; it does, but I have made allowance for that. Actually, I have been measuring it in bone-dry tonnages because the moisture content varies from place to place. But characteristically a sewage sludge leaves the sewage treatment plant, for example, to be trucked away, it is about 1 pound of bone-dry sludge and about 3 pounds of water.

Mr. FLORIO. That is after how long a period of drying out?

Dr. KEMP. That accomplished with machinery, a filter press, for example, a ribbon press, so that the actual drying out time would be measured in minutes.

Mr. FLORIO. In the area with which I am familiar, the way it dries out is in the middle of the city. The residents are not as enthused as they could be about having this stuff, with the odors which are associated with it, dry out.

Dr. KEMP. Indeed, it makes its presence well known.

In all my numbers here, I actually have assumed that we have sewage sludge that is three parts water and one part sewage sludge by weight. I have been reporting the tonnages on a dry weight basis, so that they are all comparable.

I was mentioning that in this town of 500,000 people, the steam that would be produced per year from burning the 1,000 tons of solid waste a day available in that community is the equivalent of about 570,000 barrels of fuel oil per year.

Now, if the steam were used to make electricity, which is clearly possible, about 200 million kilowatt-hours per year would be produced, which is about enough to supply the electricity for 25,000 homes for an entire year, or for about 15 percent of the community's population. Nationwide there is enough municipal solid waste and sewage sludge to supply the electricity used by 12 million homes a year.

Another advantage of codisposal is that air pollution will be easier to control from a single plant in which solid waste and sewage sludge are processed, than from two separate plants, one of which is processing solid waste and the other sewage sludge. This is an important point because control of air pollution from sewage sludge incinerators has historically been difficult, partly because so many of them are operated intermittently.

A further advantage of codisposal is the thorough burnout of putrescible material in sludge, and the absence of foul odor often associated with sludge incinerators.

Thus, the established advantages for codisposal of sewage sludge with solid waste in a mass burning waterwall refuse powerplant are elimination of a notable need for fossil fuel, a moderate increase in the total energy recoverable for useful purposes from the refuse powerplant, easier air pollution control and a more inert residue from the sewage sludge.

The only possible disadvantage codisposal may entail is the probability that in many localities it will not be possible to install the codisposal facility immediately adjacent to the sewage treatment facility. In many cases, therefore, it is likely that the sludge will have to be transferred from the sewage plant to the resource recovery plant, entailing a truck haul and some cost. It is not believed that this disadvantage will be a crippling one, even though for a community having a population of 500,000 about 20 truckloads of sludge would have to be hauled every day.

The capital cost of the sludge processing capability in a codisposal refuse powerplant is only about half of the corresponding capital cost of a modern sewage sludge incineration facility of the kind that is put into a sewage treatment plant. Moreover, operating and maintenance costs for sludge processing in a codisposal system are very substantially less than for sludge processing at a sewage treat-

ment plant because no gas or fuel oil is required, and because manpower costs are lower. Overall, therefore, the cost of sludge codisposal in a refuse powerplant will be notably less than for a modern sewage sludge incinerator at a sewage treatment plant. This is a major advantage.

We do not recognize any serious unresolved technical problems with codisposal. The fate of heavy metals in the sludge is not entirely certain yet, part of the work to be done at Krefeld under the DOE contract that I have mentioned earlier is to better establish the fate of these materials and hence the need, if any, for additional air pollution control capability in a codisposal refuse powerplant. It is also known that the possibility of air pollution control problems arising when processing sewage sludge with solid waste depends on the relative amounts of sludge and solid waste being processed and on the nature of the sludge. For instance, the incidence of heavy metals in sewage sludge varies from community to community.

I think I have identified the major attractive features that codisposal refuse powerplants offer a community. So the question now becomes: what can be done to make more widespread use of the system?

First, for the systems to be financially viable, we must have assurance of a solid waste supply and energy customers for a specified period of time, characteristically about 20 years because that is the amortization period for the bonds used to finance these plants. This assurance has been a problem for many potential energy customers for the simple reason that 20-year forecasts cannot be made with any kind of certainty.

The energy customers can project their energy needs for 10 years, perhaps, but after that the crystal ball becomes rather hazy. So offset that uncertainty, I would like to recommend the establishment of an energy bank, formed to guarantee energy markets for communities using codisposal systems. Let me illustrate the purpose of this bank.

Suppose a particular community wishes to build a codisposal refuse powerplant and the XYZ is prepared to be its energy customer. But XYZ cannot commit itself firmly to buy the energy for a period longer than about 10 years. If at any time after the 10-year period, XYZ found it was unable to take all the energy available from the codisposal plant, the bank would fill the breach by compensating the codisposal plant for the income not available from XYZ.

The bank might achieve this by any of several means: A direct subsidy, for example; finding another energy customer, perhaps not able to pay as much as XYZ, and making up the difference; and we can see other possibilities also. Clearly, this energy bank might become part of the energy security corporation that we have been hearing about in the last 2 or 3 days.

This concept of an energy bank, quite frankly, has only recently occurred to us, and we are working on it to determine how much it might cost and how it might operate. Our initial evaluation is that the monetary requirements will be modest, and that the potential for increasing codisposal utilization will be very substantial.

In addition to this financing problem, there are regulatory vaguenesses which impede operations. They originate at the Federal level. For example, the air pollution new performance standards are not the same for refuse powerplants as for sewage treatment plants. The latter are more severe. We have no argument as to whether this should be so, but there appear to be uncertainties about how a refuse powerplant will be classified if it is used for coprocessing sewage sludge.

We understand that it might be classified on a basis almost as severe as is used for a sewage treatment plant. We doubt whether this could be justified because such a small part of the total input to a codisposal plant is sewage sludge.

We urge that this matter be reviewed promptly, and we seek your support for such review and for any legislative or administrative changes that may be needed to clarify it.

There is confusion also at the local level on the availability of Federal water pollution control funds for codisposal plants, a major point of Mr. Campbell's presentation. Under certain circumstances, the amount of Federal funding which might be available for sludge processing capability in a codisposal facility may be less than would be available to the same community if the sludge were processed in a facility capable of processing only sludge.

It is possible that if this quirk in the EPA regulations were allowed to stand, the communities might be led erroneously to opt for noncodisposal option, thereby making impossible the substantial energy, foreign exchange, and cost savings available from codisposal.

We understand that the EPA is proposing a modification to its funding policy to rectify this. We urge that such modification be adopted, and we seek your help, again, in support of it, and for any legislative action that may be necessary to accomplish it.

In conclusion, Mr. Chairman, codisposal of solid waste and sewage sludge in modern mass burning waterwall refuse powerplants offers the following major opportunities and advantages to the Nation.

A substantial reduction in petroleum requirements, 270 million barrels per year, more or less, and a reduction of about \$6 billion in foreign exchange requirements at present petroleum prices.

No reduction in the amount of energy recovery from solid waste.

A significant reduction in the capital and operating costs for sludge disposal compared with those for conventional modern sludge disposal systems at modern sewage treatment plants.

Safe and efficient means for handling the increasing amount of sewage sludge being generated as a result, in part, of the federally funded sewage treatment plant construction program.

Simplification of air pollution control from sludge incineration and refuse powerplants although the fate of certain possibly troublesome pollutants from the sludge is not yet precisely known. The Krefeld study, which we have mentioned already, sponsored by DOE will be completed in December and will shed much light on this issue.

We perceive certain administrative impediments to adopting codisposal in this country. They are the possible confusion at the local level on funding available from the EPA for financing capa-

bility in refuse powerplants for codisposal of sewage sludge. The other one is the uncertainty about the air pollution performance standards governing codisposal facilities.

We also recognize that installation of codisposal refuse powerplants could be greatly facilitated by establishing an energy bank along the lines that have earlier recommended.

Mr. Chairman, we at Grumman Energy Systems thank you for this opportunity of appearing before you today, and we urge you to give serious consideration to codisposal of solid waste and sewage sludge as an important advancement in the conservation of vital energy resources for this country, and for reducing a major source of air pollution.

We also ask you to foster the dissemination of these conclusions, and to assist in the implementing in the widespread adoption of codisposal systems.

Thank you.

Mr. FLORIO [presiding]. Thank you very much, gentlemen.

I would like to ask a couple of questions, and perhaps, Mr. Brown, you might be the appropriate person to answer it.

It has been brought to my attention that the European experience in solid waste is not totally applicable to this country because of differences in the solid waste stream. The feeling is that there is much more organic material in European garbage, that there is less plastic and less processing. Is there any validity to that observation?

Mr. BROWN. I will let Dr. Kemp respond to that question.

Dr. KEMP. Historically, there may have been some validity, but in these days there is not. The question is with reference to the heating value of the solid waste. European solid waste is now approaching the heating values that we have in this country, and in certain parts of Europe it is actually higher, specifically in Sweden. There is one major mass burning refuse powerplant in Stockholm where the heating value is almost 6,000 Btu's per pound compared to the 5,000 that we have in this country.

Mr. FLORIO. Just to get my focus clear. It seems to me, off the top of my head, that the higher degree of organics, the combustibility would have been greater for European solid waste. Is that the correct way of looking at it?

Dr. KEMP. It is moving in that direction; yes.

Mr. FLORIO. I would have thought that Europeans, to the degree that their garbage is becoming Americanized and less organic, that European and American solid waste might have had the same Btu content.

Dr. KEMP. No, there are other differences. Several years ago, we got cinders and ash and that sort of thing from household heating out of our solid waste. In many European countries that displacement of coal for other fuels occurred somewhat more recently. So starting somewhere around 1955, or something like that, as the ash was dropping out of European solid waste, the heating value of European solid waste was increasing. That is one of the factors that brings it up closer to our level.

The second factor is that there is substantially more film plastic used for packaging purposes in Europe than there is in this country. We use a far greater amount, for example, of Kraft bags than

they do. The heating value of film plastic is substantially higher than that of paper, more than twice.

To the extent that some communities use a lot of this plastic, and particularly in Sweden, their heating value is higher than we have.

The important point here is that the Swedish installation which has been in operation for about 8 years, I believe, has been operating successfully and is a stellar example of how effectively these kinds of facilities can be operated. Incidentally, I am proud to mention that it was designed and built by our licensor—it is a VKW plant—although there are others built by others which are also performing at this level.

Dr. ALTER. Mr. Florio, may I elaborate this for you? I am sorry I do not have the answers in writing to give you. I have a book on European technology at the publishers now.

Talking about European waste is like talking about American waste. There is not a single composition, and it varies perhaps even more widely in Western Europe than it does in the United States, and yet more widely if we include Eastern Europe.

There appears to be a correlation in the composition and hence the heating value of the waste, depending upon the socioeconomic level in the country or the city which you are examining. There is a correlation with the availability of household refrigeration and the food distribution system.

For example, in Sofia, the waste contains about 1 percent metal, 2 percent glass, 13 percent paper, and 40 percent food waste. In parts of Italy, there are 35 percent by weight putrescible materials in the municipal solid waste, but as has just been pointed out for Stockholm, there is as much paper in the waste as we have, but maybe three times the amount of plastic. The waste in urban areas in West Germany and in England closely approximates ours because the food distribution and packaging systems are virtually the same. In rural areas of Germany and in France, it is quite different. Holland is again different.

So it is not an easy comparison or an easy extrapolation to make.

Mr. FLORIO. Our committee is giving some consideration to visiting some of these facilities, and we would be happy to receive anyone's recommendations as to what would be an approximate mix of facilities to be viewing?

Dr. ALTER. I will be more than happy to sit with your staff and share the information I have, either prepublication copy of the data I have, not only on the composition but what is happening in Europe, not only the waterwall technology, but there is also a good deal happening with RDF and materials recovery that just for some reason or other does not get widespread attention.

I might also note that there is a flow of people from the United States, and I have to include myself in here fortunately, that go to Europe to view their incinerators, and there is similarly a flow that comes to the United States to view our RDF technology. It is a great deal of fun, and we can learn from each other.

It is also interesting that as we may view the European technology as providing some ready answers, many of the people in Europe are viewing the U.S. technology as providing ready answers, from which I conclude that there are no ready answers.

Mr. BROWN. Mr. Chairman, we, too, would be more than happy to assist in any visit, and would make arrangements with VKW installations any place where you would be interested.

Mr. FLORIO. Thank you.

Let me ask one further question before asking Mr. Ottinger whether or not he has any questions.

With regard to sludge, I am aware of the fact that the caliber of sludge, or the quality of sludge in terms of the content, may dictate whether or not it can be used as a composting product. The presence of heavy metals, and things of that sort, dictates the feasibility of whether composting.

Is there any correlation between the content of sludge and its use in any of the things we have talked about today? Does improperly treated sludge which has arsenic or cadmium in it have any impact upon its use in codisposal facilities?

Dr. KEMP. Mr. Chairman, the evidence that we have indicates that that is not a problem. However, the more definitive answer to that question will come from the study of the Krefeld operation, which is a codisposal plant in West Germany that we have been mentioning on several occasions. That information will be available by the end of December.

Mr. FLORIO. It seems to me that if arsenic is in sludge, and it is incinerated, extra steps, perhaps more costly steps, will have to be taken to ascertain that it does not become an environmental problem.

Dr. KEMP. It depends on where it ends up. There are three different places it can end up. It can end up in the solid residue, the ash, if you will, from the burning materials. It can end up in the particular material that is recovered from the electrostatic precipitators that are used for a particular pollution control for the whole facility. Or, conceivably, it could pass all of those devices and end up in the atmosphere.

The evidence is that no substantial amount goes that third route, but we do not know what the distribution between the particulate material that is recovered from the precipitators and the ash actually is.

However, the important fact is that those are both dense materials compared with the original sludge which contained this material, so it is far easier to safely landfill that material than it would be to start with the original, much larger wet volume of sludge.

Mr. FLORIO. To make a specific reference to a situation with which I am familiar. We have, in the city of Camden, sludge that is not treated because there is a combined storm system and a sanitary sewer system, and the sludge is treated inadequately. Accordingly, we are not able to dump it into the ocean because of EPA requirements. We cannot dump it at the landfills because of the high percentage of heavy metals in it. It is being composted, and the composting process does not eliminate these materials. So we are now stuck with a storage problem of compost as opposed to a storage problem of sludge.

Dr. KEMP. Right. You would have a much easier storage problem if you simply stored the ash from that sludge. Characteristically, the volume of the ash is in the order of one-twentieth of the dry volume of the original sludge. So even though this may be a diffi-

cult material, and requires careful attention, because we have got it in a neat little package, we don't need anything like as much landfill or final depository for storing this material. Particularly, we don't spread it out all over the earth, where over some years it will begin to accumulate and for all we know will make that earth unusable for uses that would at least lead to food for human consumption, or anybody's consumption, for that matter.

Mr. FLORIO. I have some other questions.

Mr. Ottinger.

Mr. OTTINGER [presiding]. You indicate in your statement that there is a major problem in guaranteeing a buyer for the energy, and you recommend that we create an energy bank for that purpose. I don't quite understand that.

Couldn't we solve that problem by requiring the utility to take any electric energy that cannot otherwise be sold?

Dr. KEMP. You could, but that leads to serious economic problems. Let me explain what I mean by that.

Different from all of the other kinds of pollution control, water, air, and so forth, disposing of solid waste and sewage sludge in a refuse powerplant produces a valuable thing that can be sold, and that is the energy. Characteristically, if we can sell the energy as steam, then about two-thirds of the annual cost of operating such a facility is derived from the steam revenue, and about one-third is derived from the so-called tipping, the charge to the community for processing the solid waste.

When I talk about annual cost, I am talking about the cost of operating the facility, plus the cost of maintaining it, plus the cost of servicing the debt that was incurred to build it.

If we sell steam as the energy form, then in effect we have a market for every Btu there is in the steam. On the other hand, if we go to electricity, running the steam through a turbine or something of this kind and making electricity out of it, we actually end, because of some unavoidable laws of nature, with being able to sell only roughly 1 Btu in 4 out of the energy. This is the same problem that the utilities face.

Their efficiencies are higher. Their scale is bigger. But their efficiencies are rarely much more than 36 or 37 percent of the Btu available in the steam that end up in the electricity. That means, then, that our electric price, in order to make the economics of this thing come out right, tends to be very high compared with the price of electricity from a utility where the scale of operation is immensely larger.

So what we try to find is a steam customer who can use the steam for process purposes, as a raw material, a chemical plant, a food processing plant, or a refinery, something of this kind. Or what we even more prefer to find is a customer who can first take the steam, run it through a turbine and make some electricity, and then rather than condensing the steam after the turbine, to use the heat remaining in the steam for some process purpose. Cogeneration is the catchword for that these days.

We have such a plant under serious consideration in Toledo, Ohio. We have what will be the largest plant in the world, which is a cogeneration plant, under consideration in Houston. The plant in Indianapolis that I mentioned earlier is of that form. We hope that

the plant that is contemplated for Westchester County can also be put in that form.

What we are saying here is, we would prefer to sell steam rather than electricity. The economy is better that way, both for this plant and for the acceptability of the energy at a tolerable price. By and large to find such a steam user, we are looking at an industrial company. Their planning horizon rarely goes out as many as 20 years. By and large they can see 10.

What we really want is a fallback position if in the event, for some unplanned reason, at least at the moment, the market were to dry up for the energy from the steam customer who made the original installation of the plant possible. We are really proposing sort of an insurance arrangement, if you will. This, incidentally, is why we do not expect the bank will cost very much.

Mr. FLORIO. Would the gentleman yield?

Mr. OTTINGER. Yes.

Mr. FLORIO. I am interested in pursuing the point that Mr. Ottinger made about, in a sense, the captive market that utilities constitute. We know that they are going to be there beyond 20 years, and they are going to need a fuel supply.

If I understand what you said, perhaps the refuse fuel or the sludge solid waste utilized to generate the steam that is used to generate the electricity is not as efficient in terms of combustibility as would a traditional fossil fuel. Therefore, the economics are not as desirable on the part of the utility. Is that what you are saying?

Dr. KEMP. No, I don't quite mean to say that. The thermal efficiency of a refuse powerplant is about the same as a coal-fired powerplant of the same capacity. It is not as efficient, admittedly, as an oil-fired or a gas-fired plant.

Mr. FLORIO. Therefore, if that is the case, and we can assume that the fossil fuel costs will be going up, how did you seem to dismiss Mr. Ottinger's suggestion at the outset that, through some way, whether it be legislation or enlightened policies on the part of the utilities, they should switch over or become more reliant upon solid waste and, perhaps, sludge as a source of fuel. This would provide those individuals who would be inclined—hopefully in the private sector—to become involved in this new technology of utilizing those materials, with a captive market because the utilities are going to be there forever.

Doesn't that go to the point of creating a market?

Dr. KEMP. Actually it can, but does not create generally a market at an attractive price right now.

Let's go out some 10 or 11 years, and let's suppose that we built the plant now. We financed it by selling the energy to an industrial producer. I don't think there is any doubt that the cost of electricity from a utility will continue to increase, and some calculations that we have made for some communities, and Toledo is one, indicate that in the 12th or 13th year from now, it would make no difference whether the energy was sold as electricity to the utility, or whether we continue to sell the energy to the private customer in Toledo.

In the next few years, unless in effect the utility were to subsidize the operation of the refuse powerplant by paying for the electricity more than it would cost for the utility itself to produce

the electricity, then we need to rely, near-term, on finding customers who can use the steam rather than the electricity as the output.

Mr. FLORIO. I still don't understand why it is more expensive for the utility to produce the electricity through its own use of oil or coal than it would be for the facility, whether it be a municipal facility or a private facility, to use solid waste, perhaps with sludge, to generate the steam, assuming we have the location. I am appreciative of the transportation question.

I don't know if I am missing something, but I am really not sure that I got a response to Mr. Ottinger's initial concern.

Dr. KEMP. By and large, a utility can produce electricity on the scale at which it operates for considerably less than a refuse powerplant can produce electricity on the scale at which it operates.

Mr. FLORIO. No one is asking the facility to produce electricity. We are talking about alternative sources of fuel. In my area, I think 33 percent of the increases in the utility rates during the past couple of years have been directly associated with the automatic fuel adjustment factor. That is the cost of fuel.

To the degree that solid waste, particularly with sludge, is combustible and can be utilized to generate electricity in lieu of oil or coal, if I understand it correctly, is an inhibiting factor in the increased utility rates.

Dr. ALTER. Mr. Chairman, maybe I can elaborate from a different perspective, maybe from refuse-derived fuel, which I think is what you are alluding to.

I think that there are two factors. One you have mentioned is the fuel cost passthrough, with the result that a utility is indifferent to the price at which it receives the fuel. There is no incentive to use RDF.

The second is their perception of risk which I mentioned earlier. They feel they don't know what it is going to cost to operate and what is going to happen to the boiler long term. These uncertainties are reduced to a discount on the fuel, and an increase in the operating costs, so that, as Dr. Kemp pointed out, initially there is what I will call the appearance of a higher price for the utility to use the refuse-derived fuel.

That higher price can be in one of two forms. One, they say, "We cannot use your refuse-derived fuel because it will cost us more, and we are franchised by the State to keep the cost at the lowest average." Or, alternatively, as has happened, "We, therefore, have to pay you a very low price for the refuse-derived fuel to compensate us for the incremental cost of using it."

The latter case results in a lower revenue to the resource recovery plant and, consequently, a higher tip fee. Thus, there is the appearance of a higher cost. This is the reason that I suggested some program in order to alleviate the view of risk that the utility has.

The other is, it is a question of so many things in energy, whether we view lifecycle or initial cost. I grant you that we have to view things from the perspective of initial cost because we are paying for them that way. But the operating costs of a utility, or any of the refuse-derived fuel plant, are certainly likely to increase at the general or industrial inflation rate. The amortization is

going to be level because that is the way the bonds have been sold. The fuel revenue, though, is going to increase at something related to the fuel inflation rate. So that the result is that the first costs may be high, and the lifecycle costs are predicted to be lower.

These issues are generally amenable to analysis. A difficulty is that the analysis cannot be exact because we are all looking into a crystal ball. As Dr. Kemp pointed out, no one is going to forecast a 20-year energy requirement program. It still comes down to the municipality which has to make the decision to make the investment and/or to deliver the waste daily to a facility.

Municipalities come down to a bottom line of their analysis and are confused. We are probably confusing you, too, gentlemen. The poor municipal engineer is even more confused, and as a result he cannot make that judgment of what I called before the "best technology" if such judgment is possible by human beings.

At the end of any analysis a city usually makes, the bottom line dictates their action. In the case of resource recovery, right now the bottom line still dictates risk. The city throws up their hands, and nothing happens.

There are answers, often site specific, and they are often unclear choices. Nobody at the municipality usually has had the guts to say, "I know that it is unclear, but I will do it anyway."

Mr. FLORIO. Thank you.

Mr. OTTINGER. Are there codisposal plants at the present time in the United States, that are operating?

Dr. KEMP. Yes.

Mr. OTTINGER. How many are there?

Dr. KEMP. There are three. There is one that you have heard about earlier this morning in Harrisburg, which has been operating for about a year. That is based on Martin technology.

There is the one in Duluth that we have been hearing about. There is one in Ansonia, Conn. There are plants under construction, one in Glen Cove on Long Island. There is one in Concord in California. There is one in Wilmington, Del.

Mr. OTTINGER. What are the economics of the three plants that are operating? Are they producing electricity, or are they producing steam?

Dr. KEMP. Harrisburg produces steam for the local market. Duluth's market, I am not familiar with, but I believe that it is steam. Maybe somebody at the table is familiar with it. The Ansonia one is not producing any energy for sale. It is a very small plant, but it is a good example of codisposal, and it works.

Mr. OTTINGER. Do you know if any of these projects are federally financed? Do you know?

Dr. ALTER. Yes. Duluth is. Glen Cove will be partially so funded. Harrisburg has had some Federal funds. As the article Mr. Ertel furnished might cite, Harrisburg went for many years, maybe as long as 8 years, with no use for the steam. It was unfortunate situation of location, and a few years ago the Economic Development Administration granted the funds to build a steam line to connect the Harrisburg plant to the local utility.

Dr. KEMP. There is also a large plant in Memphis, Tenn., which is being funded by EPA as well.

Mr. OTTINGER. Is that constructed?

Dr. ALTER. No.

Dr. KEMP. They just approved the facility plans.

Mr. OTTINGER. Some people came to me yesterday from the Combustion Equipment Co. They are producing a fuel from municipal waste. I don't think that they use any sewage sludge. They apparently have a plant that is about ready to operate, or is starting initial operation, in Bridgeport, Conn. That would seem to be a very happy resolution of this problem because they do produce a fuel that is capable of use in a wide variety of different operations. They predict a bottom price of \$12 a barrel of oil equivalent.

Do you have any assessment of that, as a way to go with waste energy systems?

Dr. ALTER. Mr. Chairman, you have just made the first mention of what they think their bottom line would be. CEA have invested a lot of their own money in piloting that project in Massachusetts. They have burned some of their trademarked Eco-Fuel II fuel at industrial powerplants. The Bridgeport plant now will furnish the fuel to the local utility, and it is financed by the State authority. CEA has been tightlipped about the costs so we have not been able to make a final evaluation.

The advantage of their proprietary process, just from a technical standpoint, is that it does produce a more storable, transportable, easily handled fuel, a specification fuel that I referred to before as being so important.

I think that it remains to get some experience in the Bridgeport plant, and hopefully there will be enough money to correct any unforeseen errors. We will see what the operating experience is, and not before then can an assessment be made.

Mr. OTTINGER. Has anybody successfully operated a plant using bacteria or enzymes?

Dr. ALTER. Only at laboratory scale.

Mr. CAMPBELL. There is a federally financed plant at Pompano Beach which has been in operation for a year, or a little over a year, 100 tons a day or thereabouts.

Dr. ALTER. It is on the program for a later panel this morning, so you will hear about it.

Mr. OTTINGER. We have two more panels waiting; so we had better move on.

Thank you very much for your assistance.

Mr. FLORIO. Thank you very much.

Mr. BROWN. I would like to renew our invitation of help. We do have a seminar in November where we will take a group to visit our VKW facilities in Europe. We will meet with your staff about that.

Mr. OTTINGER. Our next panel is William Boardman, director of regulatory affairs at Wheelabrator/Frye; Peter Ware, the director of technical development, Waste Management, Inc.; and Robert Catell, vice president of Brooklyn Union Gas.

I think, in view of the hour, if it is agreeable to everybody on this panel, we will hear the statements from the next panel immediately. Terry Spenker, city manager, Ames, Iowa; Theodore Schwartz, National Alcohol Fuels Commission; and Mr. Carroll Hughes, president, Consumat Systems.

We will put the full statement that each of you has submitted, into the record, and we would welcome it if you could summarize your statement. We will hear your full statement, if you would prefer.

Let us start with Mr. Boardman.

**STATEMENTS OF WILLIAM J. BOARDMAN, DIRECTOR OF REGULATORY AFFAIRS, WHEELABRATOR-FRYE, INC.; PETER J. WARE, DIRECTOR OF ENGINEERING AND TECHNICAL DEVELOPMENT, WASTE MANAGMENT, INC.; ROBERT B. CATELL, VICE PRESIDENT, BROOKLYN UNION GAS CO.; TERRY V. SPRENKEL, CITY MANAGER, AMES, IOWA; CARROLL HUGHES, PRESIDENT, CONSUMAT SYSTEMS; AND THEODORE A. SCHWARTZ, MEMBER, NATIONAL ALCOHOL FUELS COMMISSION**

Mr. BOARDMAN. Mr. Ottinger, Mr. Florio, members of the subcommittee: I want to thank you on behalf of Wheelabrator-Frye for the opportunity to discuss our experience in energy conservation through owning and operating this country's first commercial waste-to-energy plant.

We hope that these hearings and this testimony will assist your committees to report on ways to accelerate our country's use of the energy potential in our solid waste. In this way, we can continue to protect our environment, while we develop our resources and conserve our energy supplies. We feel that your efforts are especially appropriate in light of our Nation's present critical needs for alternative energy sources.

Wheelabrator-Frye's Boston North Shore waste-to-energy project located in Saugus, Mass., is already bringing these benefits to 600,000 residents in metropolitan Boston. Let me briefly outline for you our achievements in Saugus to date.

Since opening our doors in October 1975, we have processed over 1 million tons of solid waste. We have generated over 6.7 billion pounds of steam, and recovered over 50,000 tons of iron. By using solid waste instead of oil to produce this energy, we have conserved more than 45 million gallons of oil, which otherwise would have been imported for equivalent energy production. Thus, our Boston North Shore project promises the energy of local industry. The General Electric Co.'s River Works at Lynn, Mass., a major area employer across the river from our project is now able to generate electricity, test its manufactured turbines, heat its plant, provide for a variety of other process requirements and, most of all, lessen its dependence on increasingly costly imported oil.

The Boston North Shore project is operated as a reliable waste disposal site for the area towns. Currently serving 13 Bay State communities plus parts of Boston, it will dispose of 355,000 tons of waste per year. Our plant is in compliance with all applicable environmental regulations. We are highly pleased with its performance, and are giving serious consideration to expanding the project so that it can handle more refuse and displace even greater quantities of imported oil.

Our Boston North Shore project offers proof that private industry can provide the public with full service waste-to-energy capabilities. We have assumed the complete responsibilities for project

design, construction, financing, and long-term ownership/operation of this plant. In so doing, we have provided the North Shore communities with long-term waste disposal services without having to draw upon limited municipal capital resources. The Boston area municipalities are now able to gain the benefits of environmentally sound solid waste disposal and energy conservation without having to acquire the necessary technical capability to manage the project. They are also receiving these services at costs competitive with existing land disposal alternatives.

Our experience has made us confident in the future of the refuse-to-energy industry.

In fact, as observed recently by Michael D. Dingman, chairman of Wheelabrator-Frye Inc.:

Wheelabrator-Frye is prepared to invest its money to build refuse-to-energy systems for other communities that understand the benefits these privately owned and operated systems can provide. Although we have had our share of surprises in learning how private industry can work effectively with governments, we now have the operating experience to take our proven technology to other metropolitan areas that want a service that not only cleans up the environment but creates energy—without raising taxes.

People across the Nation are beginning to realize that hauling garbage long distances to suburban dumps is costly, and it aggravates the health hazards posed by these dumps.

By following the Boston North Shore model, communities will pay a fair disposal charge to a nearby energy-producing plant instead of perpetuating the dumps. Sanitation services up and down the Boston North Shore "take it to RESCO," and we expect other U.S. cities to follow their lead.

This committee is already aware of the energy conservation benefits to the Nation to be gained from following the pattern set in Saugus. EPA's most recent estimates indicate that the country annually generates about 50 million tons of hazardous waste. A significant portion of this hazardous waste contains high Btu value, making it a prime candidate for energy recovery. Here again, Europe has already shown the way. Denmark, for example, processes its hazardous waste at a single, central facility, where its energy value is recovered. Other European plants are beginning to codispose of solid waste and sewage sludge while recovering the energy values in each.

The energy potential in the post consumer solid waste alone currently has a value of about 200 million barrels of oil. By 1985, this resource will grow to equal more than 260 million barrels of oil. To put this into perspective, let me quickly compare this energy potential to various alternative energy conservation measures currently being considered:

By 1990, the potential energy in the Nation's municipal refuse will be greater than the required savings of 400,000 barrels per day oil equivalent, as set forth in the President's energy message to maintain the 1977 target import levels compared to projected usage in 1990.

The Nation's refuse today represents an energy potential of over 400,000 barrels of oil equivalent per day. This is 80 percent of the 1985 target for synthetic fuel oil and other petroleum substitutes produced by a new coal industry.

A significant part of this energy savings from municipal solid waste can be realized in the New York/New Jersey metropolitan area. The abundant concentration of refuse in this region is equiva-

lent to about 10 million barrels of oil per year, and represents some 13 percent of the imported residual oil consumption of the area's three electric utility companies.

The Nation's refuse has energy potential nearly equivalent to the 185 million barrels of oil saved annually by raising the fuel efficiency on new cars manufactured between 1980-85 from 20 to 27.5 miles per gallon.

What are the prospects of drawing upon this ever increasing energy source in the near future?

Proven waste-to-energy technology is available today. Institutional barriers, however, continue to thwart the development and realization of energy recovery from municipal solid waste. Some means for overcoming these barriers are present in the Resource Conservation and Recovery Act of 1976. These have to do with multijurisdiction planning, long-term contracting authority, and the elimination of inexpensive open dumps. EPA is currently promulgating final regulations to cover these issues. We have high hopes that these regulations will be effective in eliminating such barriers. For example, to help identify open dumps, EPA has drafted regulations which would call for stringent performance standards. We are encouraged by these draft regulations.

Other institutional barriers have not yet been addressed in Federal legislation, and they will continue to delay the rapid implementation of waste-to-energy projects like our Boston North Shore project. One major barrier has to do with the value of the recovered energy.

As you have heard previously this morning, in privately owned and operated waste-to-energy projects there are two principal sources of revenue available to offset the project's capital and operating costs. We need to charge for disposal services to the public and for the energy produced for the industrial user. If we are unable to obtain a fair rate for the power produced from the project, we must charge high and often uncompetitive rates for disposal services to the public.

Historically, electric power utilities, which constitute the major market for our power, have paid the lowest possible price for power purchased from nonutilities. Such low rates often do not include a credit for displaced capital and operating costs. What is needed, therefore, is a procedure to assure fair rates for power produced from solid waste. We are encouraged by the potential for increases in the value of power produced from these projects, since they fall within the category of small powerplants under the recently enacted Public Utility Regulatory Policy Act. As applied to the field of waste to energy under this law, fair rates for power produced by these projects can have a significant impact on the cost of waste disposal, thus making it more competitive with land disposal alternatives and greatly accelerating the rate at which waste-to-energy projects will be built.

One other significant institutional barrier which delays the implementation of waste-to-energy projects has to do with the procedure followed by local governments in procuring waste disposal services. Many local governments, for example those in New York and New Jersey, follow a competitive bid procedure. This requires an award to be made to the lowest responsible bidder. Under this

procedure, we, who bid for long-term waste disposal, energy recovery services, are placed at a considerable disadvantage. In most instances, it is difficult to properly evaluate and compare the advantages and disadvantages of different proposals within the limitations of the competitive bid structure. Price alone is often not the best criterion for selection.

Let me now spend a few moments in a brief review of some of the proposed Department of Energy initiatives which can affect municipal waste-to-energy programs.

First, let me address the concept of loan guarantees. We are aware of the authority granted to the DOE to establish a loan guarantee program for nonnuclear fuels. In our opinion, such a program is unnecessary to attract the investment capital to economically viable refuse-to-energy projects. The technology to convert waste to useable energy is here now. The only risks are those which relate to the institutional and market barriers. These risks will not be overcome by loan guarantees, but they can be offset by the methods which I have just highlighted for you.

Other areas which Congress as a whole may consider to accelerate private investment in refuse-to-energy projects include stimulating more favorable tax incentives. These include extending the investment tax credit for recycling equipment beyond its present 1982 termination date and reducing the accelerated depreciation range for these projects from the present 8- to 12-year range to a range comparable for pollution control equipment, or 5 years.

In short, we feel that there are many institutional and market-oriented mechanisms which can accelerate the implementation of refuse-to-energy projects on a national scale. These mechanisms will turn American cities away from the wasteful land disposal of a valuable energy source.

They will complement regulations which will assess the true cost of making land disposal environmentally sound, and they will shortcut the timelag to eliminate the open dumping of solid waste. The technology to harness the energy of municipal waste is here now. We cannot afford the delay which would result if we waited for the elimination of less costly, polluting land disposal alternatives.

Once again let me thank you for the invitation to testify here today. I will be happy to answer any questions you may have.

Mr. FLORIO. I may not be able to stay for the entire hearing. Would you mind if I just asked one question of the gentleman?

Mr. OTTINGER. You are most welcome.

Mr. FLORIO. It is my understanding that your firm is giving some serious consideration to launching a project. Could you give us any kind of information as to what you are doing in the area?

Mr. BOARDMAN. Basically, it is the same type of project that we have in Saugus, Mass. We have been involved in the State of New Jersey now since I began with the company more than 4 years ago. The institutional problems I have been addressing this morning are very serious problems in your State.

New Jersey is still disposing of waste at costs of \$3 to \$6 a ton, as I am sure you are well aware of, this fee structure makes these projects very, very difficult. We are hoping to overcome some of these problems, and to, in fact, build a facility in New Jersey.

Mr. FLORIO. Are you dealing with a specific site? My understanding is that there is site in the city of Camden or Logan Township, which you are looking at.

Mr. BOARDMAN. I am not involved specifically with that project myself.

Mr. FLORIO. Thank you.

Thank you, Mr. Chairman.

#### STATEMENT OF PETER J. WARE

Mr. WARE. Mr. Ottinger, Mr. Florio, members of the subcommittees.

I represent Waste Management, Inc., which is one of the world largest refuse collection and disposal companies, and brings a number of different perspectives to the field of resource recovery.

We operate over 60 landfills which have long been regarded as the enemy of resource recovery. We own and operate Recovery I in New Orleans, which is a 600-ton-a-day materials recovery facility. For over 15 years, we operated in Chicago a 600-ton-a-day incinerator generating steam for industrial use.

We represent European technology in the form of the Voland incinerator system from Denmark.

I am primarily here today to bring you up to date on the RefCOM project in Pompano Beach, which is a Department of Energy funded project to convert refuse to methane.

The reason that I gave you that background is that I feel we, more than anyone, are able to give you an objective comparison of the available technologies, since we are involved in almost all of them.

The RefCOM facility in Pompano Beach is 100-ton-a-day proof of concept facility, designed to demonstrate at a small commercial level those things which have been proven at the laboratory test bench. The process is basically the same which occurs in a landfill over 30 years; the biological degradation of the organic portion of refuse.

In the facility in Florida, we are attempting to achieve this in 5 days. In doing so, we generate a premium fuel, methane gas, which is readily usable in existing distribution systems.

I think that the important thing to understand about this technology is that it is not a panacea. There are some serious drawbacks to it. It is not the answer to all of our problems.

Although we are at least a year away from completing the experiments—this is a 2- to 4-year program, and the plant has been operating about a year—we are able at least to draw some conclusions and some trends from the present data. I have included them in great detail in my written testimony [see p. 163], but essentially I would like to point out the following things:

From an advantage point of view, the RefCOM technology plant will cost less than most of the other state-of-the-art technologies for converting refuse to energy. It generates a premium fuel, as I mentioned, readily useable in industrial application. The gas as generated consists of methane of carbon dioxide, but the technology already exists to separate those two gases for sale.

The disadvantages do have to be mentioned. The first to be noted is that this is an inefficient process. At best, only half of the

organic material will be consumed and converted into gas. To get much more conversion than that we are talking of 6 month or longer residence times, which would determine the plant to be of inhibitive size.

Also, it is not very efficient when you consider the amount of energy used within the plant to effect the separation, to operate the machinery. The efficiency drops well below 30 percent, and no end of technological wizardry will change that. It may be improved by 1 or 2 percentage points, but essentially it is an inefficient process.

From the point of view of waste disposal, which I know this panel is not specifically addressing but it is of importance to us as a waste handling company, there is not a significant reduction in weight of the refuse flow. In other words, the organic material that is consumed and converted to gas is replaced by water, such is the essence of the process. In other words, we end up dumping about the same tonnage as we received at the plant.

The volume of that tonnage is somewhat reduced, approximately one-fifth of its original volume by the nature of the process, but nevertheless we could achieve a similar compaction in normal landfill operations. So the advantage lies not in refuse disposal, but in the generation of gas.

All of these things combine to make the technology applicable only in specific locations.

I have mentioned that we are interested, and represent a number of other technologies, including RDF, mass incineration. We believe that in most applications throughout the country the generation of steam from refuse by combustion is by far the most desirable way to go.

The revenues to be realized by the sale of steam or electricity are far greater and justify on an economic basis these plants long before we start talking of a RefCOM type technology. There are, however, some applications, enough, we think, to justify the continued development of the process. We are aware of a dozen sites, primarily on the east coast, where the available markets for steam do not exist. The advantages of generating electricity are such that existing facilities already provide more than enough.

The landfill consideration is not a valid question here. But the point being that the RefCOM facility will consume sewage sludge on a proven basis, and it will consume it in any form that it is generated, since it is a wet process, and will dispose of it in a useful manner.

The fact that the system generates a fuel which can be used just about any place in the country. Methane gas distribution lines—natural gas is the same material, of course—exist throughout the country. All we need is a site reasonably close to such a pipeline in order to dispose of a saleable commodity.

So my point here is that RefCOM is a valid technology. It is being funded by the DOE on a valid basis. It will have application, but only a limited number of applications as we see it. We are talking of facilities of 500 to 1,000 tons a day. Below 500 tons, the economics of such a plant become even less attractive. The manpower costs and operating costs go far above potential revenues.

So when you narrow the applications to 500 to 1,000 tons a day, and under the conditions that I have already mentioned, RefCOM does have some application, but not so many as we would have liked.

I will be happy to answer general questions as they relate to the industry when we get through this panel's activities.

Thank you.

[Mr. Ware's prepared statement follows:]

STATEMENT OF PETER J. WARE, DIRECTOR OF ENGINEERING AND TECHNICAL  
DEVELOPMENT, WASTE MANAGEMENT, INC.

Introduction

Waste Management, Inc. is pleased to share our knowledge of the Resource Recovery field and to offer opinions on its future direction.

As prime contractor for the Department of Energy's 'RefCOM' project in Pompano Beach, Florida, we are able to relay the information and trends indicated to date in the field of anaerobic digestion.

As the owner and operator of the pioneering Recovery I facility in New Orleans, Louisiana, and for many years the owner and operator of this country's largest privately-owned steam-generating incinerator, we feel qualified to be able to offer objective comparisons between the various energy conversion technologies.

RefCOM

In 1975, the U. S. Department of Energy (formerly ERDA) awarded Waste Management, Inc. a contract to design and construct a "proof-of-concept" experimental facility to demonstrate the biological gasification of urban solid waste and sewage sludge to produce methane-rich gas. Named RefCOM, the facility processes between 50 and 100 tons per day of the organic fraction of shredded urban refuse. Plant start-up was completed during the fall of 1978, and the experimental program will be of two-to-four years' duration. Waste Management has been awarded an operating contract to manage the program and operate the facility.

Proof-of-Concept

The generation of pipeline quality gas, if economically viable, would have certain advantages over low-Btu gas or solid fuel products. These advantages include an established market, established transmission and distribution facilities, available combustion technology and an environmentally preferred fuel. As a precursor to commercialization of urban waste methanation, however, a "proof-of-concept" experiment is needed.

The U. S. Department of Energy has funded a plant of 100 TPD scale because several process and engineering factors have to be studied before large-scale commercial exploitation of the system can be undertaken. The largest studies to date have been in 100 gallon fermentors, where the daily refuse feed varied from five to ten pounds.

The specific goals of the solid waste to methane proof-of-concept project are:

1. To establish information concerning the gas product quantities and values.
2. To evaluate process reliability and economics.
3. To determine optimum design and operation parameter values for each process stage and method of operation.
4. To establish a basis for comparing the process to other means of energy production and/or resource recovery from urban waste.
5. To establish the technological and economic bases for commercial utilization of the process.

Waste Management, Inc. Involvement

Waste Management, Inc. is primarily a service-oriented company, engaged in the collection, haulage and disposal of waste materials. Clearly any technology which reduced the volume of waste to be disposed of, and at the same time yields valuable products would be of interest to WMI.

WMI's incentive to commercialize the technology will surface if the prices commanded for the product gas escalate at a high rate than gas production costs; it is expected that this will happen but the exact data is uncertain, and determining gas production costs is the whole object of the project's experimental effort.

Project Schedule Milestones

Award of Proof-of Concept Contract	June 23, 1975
Start Construction	February 2, 1977
Complete Construction	February 1, 1978
Complete Start-Up (Start Experimental Program)	June 1, 1978
Complete Program	June 30, 1980

Project BudgetsA - Design and Construction

Engineering	\$1,150,000
Equipment	923,000
Construction	1,318,000
Project Management	144,000
Contingency	<u>115,000</u>
Sub-Total	\$3,650,000

B - Operations (Proposed Estimate)

Start-Up	\$ 435,000
1st Year Balance	876,000
2nd + 3rd + years (2 @)	<u>1,273,000</u>
Sub-Total	\$3,851,000
Project Total	<u>\$7,500,000</u>

## TECHNOLOGY

### Process Description:

Briefly, the process consists of the shredding of urban waste, (composed of both residential and commercial wastes) to three inch nominal size. Ferrous metals are removed from the waste stream as it is conveyed to a storage building. From the storage building, the waste material is fed to a classification system for pre-processing and then to two digesters for biological gasification. In the classification process, the shredded waste passes through a trommel screen to remove inorganic grit and fines, such as glass, silica sands, ash, etc. The material then undergoes secondary shredding to achieve a smaller particle size, and air classification, to separate the light organic fraction from the heavy, generally inorganic fraction. The waste material is then introduced into a pre-mix tank where it is blended with sewage sludge, recycled filtrate water, nutrients and steam for temperature control. This slurry is then metered into two mechanically-agitated anaerobic digesters in which a biological (bacterial) process converts approximately half of the organic feed solids into a product gas composed of approximately 50 percent methane and 50 per cent carbon dioxide. In full-scale commercial operations, this gas can then be upgraded to pipeline quality, using demonstrated gas clean-up or purification techniques.

The anticipated optimum digester process conditions will be: 5 days detention and 140°F. The digester residue is dewatered, and the water so separated is recycled back to the digesters as make-up for the feed slurry. Feed solids concentrations on the order of 10 per cent are contemplated. The dewatered residue--occupying only 30 percent of the volume of raw refuse--is relatively stable, and can be deposited in a landfill, or burned to a sterile ash and the heat recovered for use in the operation of the digesters.

Laboratory-scale studies performed to date by Dr. John Pfeffer of the University of Illinois, who is also technical consultant on this project, indicate that approximately 6,000 cubic feet of mixed methane and carbon dioxide gas are produced per input ton of raw refuse; thus, 3,000 cubic feet of methane (equivalent to pipeline quality gas) per input ton could be produced by this process. Based on an average home gas consumption of 100,000 cubic feet per year, a 1,000 ton-per-day plant could serve the gas needs of over 10,000 homes.

### Experimental Program

A detailed experimental program has been developed for the facility to evaluate, in phases, several independent variables. The most significant areas to be studied are: (1) methane production per unit of organic solids fed (2) reduction in solids remaining for ultimate disposal (3) mixing characteristics of the urban waste/sewage sludge slurry (4) dewatering characteristics of the reactor slurry (5) process stability (6) energy requirements for operation, and (7) chemical costs for nutrients and pH control.

The various phases of experimentation will include determination of optimum fermentation temperatures (mesophilic and thermophilic), evaluation of feed preparation, evaluation of feed solids concentration and residue recycle, evaluation of pH and nutrient requirements, residue dewatering, and residue disposal.

### Current Status

The facility has been processing waste and generating mixed gas (50% methane, 50% carbon dioxide) on a daily basis since November, 1978. The operability of the plant, after the solution of normal 'teething problems' is now well demonstrated.

The remainder of the program will serve to optimise the process by careful testing at various predetermined parameters in order to generate the maximum quantity of methane for the minimum energy input to the plant.

#### Short-term Plans

The product gas may be utilized 'as is' as a fuel for combustion systems including reciprocating and turbine engines, and furnaces.

WMI plans to install a pathological waste incinerator at the Pompano Beach site to utilize the gas as an auxiliary fuel. Concurrently a piston-engined generator set will be installed to provide on-site power. Both systems will be extensively monitored to evaluate the performance and utilization of the unprocessed gas.

#### Long-term Considerations

Development work is proceeding elsewhere to produce modularized gas treatment units which will separate the methane and carbon dioxide into pure, saleable streams. Such equipment will be usable both at landfill gas recovery projects and at RefCOM-type facilities. We believe this to be a separate and distinct technology, its development being concurrent with, but separate from the RefCOM project. Successful implementation, however, will vastly improve the viability of anaerobic digestion.

Several other techniques are suitable for later implementation at Pompano Beach including other forms of pretreatment, and multiple-stage digestion. The processes are currently being studied at 'bench-scale' and may be escalated to commercial scale testing at RefCOM.

#### Conclusions

Definitive design data for full-scale commercial facilities using RefCOM technology is still a year away.

The following points, however, are known and are offered for consideration:

1. RefCOM facilities will produce a premium fuel, equivalent to natural gas.
2. The plants will cost (in present values) on the order of \$30,000 per ton per day capacity - somewhat less than other high-technology refuse conversion processes.
3. The plant, at best, will achieve an energy efficiency of 30%, that is, less than 30% of the energy available in the refuse will be delivered as gaseous fuel. This is, by comparison, a poor level of conversion.
4. There is no significant weight reduction in the MSW flow stream - although the residue resulting from the process is significantly denser than the raw refuse. The organic material converted to gas is replaced by a similar quantity of added water.

#### Comparison to Other Energy Conversion Technologies

The applications for MSW conversion technologies are highly site-specific and local constraints more often determine the selection of a process rather than technical merit above.

It is clear that a number of factors are combining to render the operation of sanitary landfills more costly - transportation and land costs, tighter regulation

and increased public outcry among them.

It is our opinion that for many cities, economic parity between landfill disposal and refuse processing facilities (with energy recovery) will be reached in the next five to seven years.

In most applications, the mass-combustion steam-generating facility appears to be the most cost effective system. WMI is sufficiently convinced of the superiority of the system that we now represent the Danish Volund technology on an exclusive basis for North America. The steam offers the highest return when sold for industrial process use. A lower return is realized if electricity is generated from the steam.

The application of Refuse Derived Fuel (RDF) systems is necessarily less attractive since energy and equipment are consumed in preparing the fuel while no increase in thermal value occurs. It is, however, appropriate where potential fuel users already exist, or where social or other restrictions prohibit the location of a mass-burning facility.

RefCOM has application where the value of the product gases (preferably both) renders the overall operating cost of a facility competitive to landfill disposal and where no other energy sale options exist for steam. There are, at present estimate, about a dozen such applications in this country, particularly along the Eastern Seaboard, for plants of the 500-1000 ton per day range. The ability to consume sewage sludge is also a major consideration in some locations.

#### Relationship with the Department of Energy

We at WMI continue to enjoy a close working relationship with the staffs of DOE and EPA. This open communication insures that we are kept apprised of the state of the art throughout the resource recovery field, and at the same time are able to advise the appropriate personnel of suggestions for future development activities. A recent workshop in the Boston area served just such a purpose.

Mr. OTTINGER. Thank you very much. That is very interesting. I am sure that we will have some questions.

Mr. Robert Catell, vice president of Brooklyn Union Gas Co.

#### STATEMENT OF ROBERT B. CATELL

Mr. CATELL. Thank you, Mr. Ottinger, and Mr. Florio, members of the subcommittees.

My name is Robert B. Catell and I am a vice president of The Brooklyn Union Gas Co. Some of my major responsibilities include gas supply planning, acquisition of additional gas supplies, exploration, special projects involving gas supply, and other subsidiary activities. I am here today to present testimony on the subject of the conversion of municipal waste to energy, in particular, production of high Btu pipeline quality gas or methane.

Brooklyn Union is one of two major gas utilities serving New York City. We have over 1 million accounts representing over 4 million people living in three of the city's five boroughs. Nearly 80 percent of our sales are to residential customers. We provide gas for heating to approximately half of the homes in our service area, and gas for cooking to virtually every family in our territory. Almost all of our remaining sales are to apartment houses and small commercial and industrial customers.

Brooklyn Union is served by three interstate pipeline suppliers which provide the bulk of our natural gas supply. With the advent of natural gas shortages about 1971, these pipeline suppliers began curtailing deliveries to their utility customers. Even though the gas supply problem has improved over the near term, Brooklyn Union

continues to seek opportunities to develop alternate gas supplies which will be needed in the future.

We have taken many steps to assure an adequate gas supply for our customers. We have been involved in gas exploration primarily through a wholly owned subsidiary and have developed substantial underground storage to protect our high priority residential customers winter needs. We operate our own LNG liquefaction and storage facility in Brooklyn which is needed to meet our customers peak day requirements. We constructed a \$50 million substitute natural gas plant which converts naphtha to methane. We have a long term contract with the Distrigas Corp. of Massachusetts for 13 Bcf per year of imported LNG and are currently considering other supplemental gas supply ventures. However, one of our major efforts in developing alternate energy sources has been directed toward converting municipal solid waste—MSW—and sewage sludge into energy. Both of these waste materials which are readily converted to methane, are available in significant quantities in our area and represent a major disposal problem. The utilization of MSW and sewage would not only serve to produce energy, but also eliminate a major disposal problem, thereby helping to lessen two of the most serious problems facing our country.

Brooklyn Union has, over the past 5 years, undertaken various feasibility studies for converting municipal solid waste and sewage sludge to energy. We have explored a number of processes which partially oxidize refuse by burning to create usable forms of energy. In 1977, we did a joint study with the Port Authority of New York and New Jersey to develop a total energy system at John F. Kennedy International Airport based on MSW. The project called for the conversion of MSW to electricity by mass burning, and to medium Btu gas using Union Carbide's Purox process.

On several occasions, we have considered the generation of electricity in the former Brooklyn Navy Yard from raw MSW or refused derived fuel. To date these projects have not proven to be economically feasible and have not been pursued.

We have been involved in various programs to bacteriologically convert solid waste to methane, and in particular a number of projects to recover methane from sanitary landfill. These have included projects cofunded by New York State ERDA to characterize the landfill gas, and develop purification processes—Fresh Kills landfill in Staten Island, N.Y.

In 1975, we entered into a contract to buy purified landfill gas from a facility to be constructed, owned and operated in Staten Island by a company called Reserve Synthetic Fuels, Inc.

Reserve Synthetic Fuels is a California-based corporation which has previously demonstrated landfill gas recovery on the west coast. It should be noted that the landfills previously developed are very different from the type of landfills prevalent on the east coast.

We have also participated for a number of years in a program with Institute of Gas Technology to develop a commercially viable process to convert mixtures of MSW and sewage sludge into methane by bacterial digestion. This is called the Biogas process. This process utilizes essentially the same principle in a plant that occurs naturally in the landfill.

Unfortunately, all of these projects have been plagued with similar problems. Principal among these have been the high developmental costs and poorly defined and cumbersome governmental regulations, which have tended to bog down the projects in seemingly endless delays. It is unfortunate that the delays in developing this resource wastes not only precious fuel, but cause the costs to build such facilities to skyrocket. The delay is particularly tragic because the technology exists today to convert MSW and sludge to energy, and what is needed is some processes for the development and optimization of these technologies.

We at Brooklyn Union believe that conversion of MSW or sewage/sludge to energy can best be accomplished bacteriologically from renewable energy sources. Partial oxidation techniques, such as Purox, are relatively undeveloped, prone to have more difficulty in controlling pollutants, and tend to be more complex and thereby require more expensive facilities. Furthermore, such processes would tend to produce lower-Btu gas.

The use of low Btu gas depends upon being able to isolate an exclusive user or users, who would have to be permanently segregated from the local gas distribution system. Low Btu-gas cannot be mixed with natural gas because of different combustion properties. The users of low Btu gas would lack flexibility of supply, they would have to maintain an auxiliary system to supply energy in case of an emergency. The supplier of the low Btu gas would be completely dependent on the continued demand of the users, for the gas which it would make in a costly facility. If the users demand lessened or disappeared, the supplier would be left with a large investment in a facility which produces gas which cannot be transported economically to other users. Furthermore, such a facility would be particularly to isolate in populous areas where MSW and sludge is most available.

Bacteriological processes represent several advantages compared to partial oxidation techniques. The production facilities are relatively simple and the purification to high Btu gas is much easier. As was previously noted, the conversion to high Btu or pipeline quality gas is particularly advantageous in that it may be introduced into the existing gas distribution system and enables the gas to be utilized throughout the over 1 million mile long interconnected pipeline system. This existing methane delivery system currently delivers nearly 20 trillion cubic feet of natural gas throughout the country in a most efficient and environmentally acceptable manner.

We would now like to discuss two specific projects with which Brooklyn Union has had much experience. One is landfill gas recovery, and the other the IGT BioGas process.

#### LANDFILLS

The volume of gas which could potentially be recovered from landfills would have a significant impact on the overall energy supply. If all the landfills in New York City alone were developed, the equivalent of 25 billion cubic feet a year of natural gas could be recovered. This is approximately equal to almost 4 million barrels of oil. This gas could supply about 30 percent of Brooklyn Union's

total annual needs and could provide heating for over 100,000 homes each year. With such potential impact on supply, considering the current energy crisis, development of landfill gas recovery projects must be considered a high priority.

In landfills bacteria continuously convert MSW to methane and carbon dioxide. The gas which is produced is of a relatively high heating value—550 Btu/scf—but still well below that of natural gas. Removal of the carbon dioxide will increase the heating value of this gas very close to the 1,000 Btu/scf of conventional natural gas. Brooklyn Union has studied various processes to purify this gas and is now seeking to demonstrate the economic viability of the most favorable of these processes. The technique selected would use methanol to remove the carbon dioxide. This methanol would be regenerated and recirculated through the system, thereby having no impact upon the environment. The only material vented into the atmosphere is carbon dioxide, which is odorless and harmless. If landfill gas is not removed it gradually migrates to the areas surrounding the site. This gas has an offensive, pungent odor, but even more significantly it could be a potential fire hazard. Removal and purification of landfill gas would therefore have no detrimental effect upon the environment, and in fact to benefit the areas around the landfill.

As with any area of new technology, there are still problems to be solved, but it is significant that these problems are not mechanical or technical, but financial and governmental. The following is a litany of some of the problems we have faced in our work with the New York City landfills.

#### BUREAUCRATIC DELAYS

Brooklyn Union has experienced repeated delays when dealing with government agencies. These delays have taken various forms. The contract for the development of Fresh Kills landfill had to go out for competitive bid, even though RSF was the only company in the country offering to develop the landfill and the only company to have the necessary technology. The contract with Brooklyn Union was signed in 1975, but it took another 2 years before the New York Board of Estimates gave final approval to RSF's contract with the city. During this 2 year period, the project met with unwarranted political opposition, and was even challenged in the courts. All of this occurring for a project which has substantial environmental benefits and provides energy to the residents of the city, and revenues to the city from a 12.5-percent royalty received on every cubic foot of gas produced and sold.

To cite another specific case, as part of our NYSEDA landfill project, due to a delay in a decision by New York City officials, Brooklyn Union lost an opportunity to demonstrate the use of landfill gas in a steam boiler. The boiler was used to provide steam to drive a barge unloader at Fresh Kills. It was removed and replaced with an electric—oil-derived—unloader. Had some of the bureaucratic redtape been eliminated, the boiler could have been fueled with the landfill gas, a valuable study would have been performed, and an unnecessary use of oil-produced electricity could have been avoided.

#### MINERAL RIGHTS

The Fountain Avenue landfill is another landfill located in our territory. It is scheduled to become part of the Gateway National Park after closing in 1985. The site is presently owned by the Federal Government, which allows the city to continue to dump MSW at the site. However, the site was originally given to the Federal Government by the city for inclusion into the park. At the time this was done, the question as to who has the mineral rights and, therefore, who receives the royalties from the landfill gas is not clarified. This has been holding up the development of this site for at least 2 years.

Before any meaningful work can be undertaken, resolution as to who owns the gas and how the gas can best be recovered within the confines of a national park must be resolved by the appropriate governmental agencies. Brooklyn Union has been attempting, for the last 2 years, to help resolve this problem, so far unsuccessfully. We are prepared to invest the money in the testing and development of this landfill if the problem of the rights to the gas can be resolved.

#### LANDFILL COVER

Another problem has been cover on landfills. To achieve optimum gas evolution and recovery rates, the landfill must be covered with an impervious layer which would prevent the intrusion of air into the interior of the landfill. The introduction of air into the landfill disturbs the bacteriological process, makes purification of the gas difficult, and prevents economic recovery of the landfill gas. New York State regulations mandate that landfills must be properly covered, but the city's chronic financial situation makes compliance with the regulations impractical. The cost to cover the extensive Fresh Kills landfill of 3,000 acres would be several million dollars in material costs plus additional labor charges. The development of the specific 400-acre site at Fresh Kills by RSF faces possible further postponement, perhaps permanently, because of inadequate cover. Federal financial aid could help to alleviate this problem and enable the RSF project, as well as several other projects to be completed.

#### PUBLIC BIDDING REQUIREMENT

Another problem in delay has been with public bidding requirement. The majority of U.S. landfills are publicly owned, and development would probably require competitive bidding among developers of varying integrity. Regardless, public bidding can only serve to increase costs and development time at a time when our country's energy needs are critical. Such problems would be avoided by setting up evaluating committees to select the best use of the landfill, the most qualified developer, and a fair price for the rights to the landfill, in a short period of time.

## ENVIRONMENTAL IMPACT STATEMENTS (EIS)

Another delay has been the need for environmental impact statements in landfill development. As was mentioned earlier, these projects are beneficial to the local environment because they remove the offensive odor, and prevent the buildup of potentially dangerous concentrations of flammable gas. If the studies are deemed essential in all cases, they could seriously hamper the development of landfills by excessive delays. Certainly we do not object to taking all necessary precautions to protect the environment, and all environmental rules and regulations would have to be complied. But we believe the appropriate governmental agency must facilitate the performance and publication of the results of such studies so that the project may proceed in an expeditious manner.

## BIOGAS PROCESS

The last program that I would like to talk briefly about is the IGT biogas process. This program is in a preliminary state of development, and Brooklyn Union's involvement has been much more indirect than our involvement with landfill. This biogas process is an attempt to duplicate the conversion which naturally occurs in landfill in process equipment. Somewhat similar to the process which was referred to earlier by Mr. Ware. The bacterial digestion of sewage sludge and other similar materials has been done successfully for many years. The Department of Energy is currently funding a project in Pompano Beach, Fla., to digest a mixture of MSW and sewage sludge. However, all the work done in the past, including the Pompano Beach study, use single stage reactions which merely mixes sludge and MSW for final treatment, which also generates methane.

The biogas is an attempt to optimize the digesting of the MSW and sewage sludge through a knowledge of the biology and chemistry governing the process. The bacteria which convert the waste material are of two general types which require different conditions for optimum growth rates. A conventional one phase system requires each set of bacteria to operate in an environment which is optimum for neither. IGT's biogas process operates in two phases, so that conditions can be separately optimized for each type of bacteria. The result is that the digestion occurs much more quickly reducing the residence time that was mentioned here earlier, and also a higher percentage of methane is produced, simplifying purification. IGT has, in the laboratory, been able to increase the yield of gas by minimizing the conversion time. It is our belief that the Government should apply funds in developing improved biological conversion processes such as biogas.

IGT has succeeded in increasing the methane yield in the laboratory and is planning to verify, and attempt to improve the results in a pilot plant. The pilot plant study would also be aimed at analyzing the residual sludge, the waste material of digestion. Although the volume of this sludge would be about one tenth that of the original material it still would represent a disposal problem. The pilot plant study would be geared towards minimizing the amount of residual sludge produced.

Currently IGT is trying to put together a group of sponsors for their project. They would like to build a pilot plant. The total cost has been estimated at between \$3.5 and \$5 million, depending upon the location. Finding participants has been difficult. Most gas utilities do not have sufficient funds for such projects, since State agencies in the past have not encouraged this type of research and development.

Furthermore, the search for participants who can get regulatory approval is difficult, especially at a time when pipeline gas are currently plentiful and relatively inexpensive. A couple of major corporations as well as the New York State Energy Development Authority, if the plant were to be located in New York, have shown interest in the project. However, the need for sponsors has plagued this project needlessly for more than a year.

Government support of the biogas project and a generale interest in biological conversion to methane is essential develop this resource. The magnitude of the potential quantity of gas which would be produced from MSW is very impressive. For example, New York City alone produces 25,000 tons a day of MSW. This quantity of MSW could produce as much as 46 to 58 billion cubic feet of gas per year, and converting that to barrels of oil that is around 7 million barrels of oil equivalent, about 25 percent of the city's total gas usage, and about 50 percent of Brooklyn Union's total annual usage of 95 Bcf.

To briefly summarize, the conversion of MSW serves to major purposes, utilizing waste materials which represent a major disposal problem and producing significant quantities of energy, that is local and domestic. This area is perhaps less glamorous than other areas of research for alternative energy sources, and may not as large a source of gas as coal gasification. However, the quantities of gas are significant, and the technology is much more near-term than some of the more exotic proposals.

Furthermore, MSW is a renewable resource of energy and the technology for conversion of the organic material in refuse would be the same as that used to convert other renewable organic materials into gas. What is needed is governmental support both in the form of financial support and cooperation in the rapid implementation of MSW conversion projects. Developmental and capital costs are high, and the governmental regulations are too poorly defined and cumbersome for the development of these resources as rapidly as the Nation's energy situation requires.

I would like to thank you for the opportunity of being here today, and I would be happy to answer any questions you may have.

Thank you.

Mr. OTTINGER. We thank you.

We will hear next from Mr. Terry Sprenkel, the city manager of the city of Ames, Iowa. Congressman Harkin asked me to extend a special welcome to you. He had hoped to be able to be here, and perhaps he will be able to drop in. I had the pleasure of being in Ames at a Peace Corps training program a number of years ago, which the university did in a really first-rate fashion.

We welcome you.

## STATEMENT OF TERRY V. SPRENKEL

Mr. SPRENKEL. Mr. Chairman, it is indeed an honor and a pleasure to be invited to appear before Subcommittees of Energy Development and Applications and Transportation and Commerce to discuss with you my thoughts and comments relative to the use of refuse-derived fuel as a supplemental fuel source for the production of electricity.

Ames, Iowa, has operated, for more than 3½ years, the only successful municipal resource recovery refuse derived fuel system in the United States. This facility which was constructed with local tax dollars, involves the city of Ames, Story County, 12 other municipalities, Iowa State University, the National Animal Disease Laboratory, and the Iowa Department of Transportation as participants in a 25-year contractual agreement to provide the refuse generated in their respective communities as the basic material for conversion into refuse derived fuel for consumption by the Ames Municipal Electric Utility.

The success and experience of Ames solid waste facility, which has not been without its problems, can be evidenced by the fact that there are more than 15,000 people from virtually every State in this country, and from the industrialized country throughout the world, that have visited our operation. The visitors have included representatives of Federal agencies, State agencies, municipalities, engineering firms, researchers, and environmentalists.

The Ames solid waste facility was designed to serve an equivalent population of approximately 60,000 that were to produce approximately 50,000 tons of refuse annually. The expectations of the Ames facility were such that approximately 80 percent of total incoming refuse would be converted into refuse derived fuel to provide supplementary fuel for the Ames Municipal Electric Utility. The supplementary fuel was estimated to approximate 20 percent of requirements required to generate approximately 65 megawatts of electricity.

The commitment to the utilization of refuse-derived fuel speaks for itself in that the city is currently expending approximately \$52 million for the construction of a 65-megawatt generating unit that is being designed for the utilization of refuse-derived fuel in this new unit. The fact of the matter is that the figures in percentages that I have just mentioned are, in reality, somewhat less than those projected and predicted in the feasibility studies undertaken prior to authorization to proceed with the resource recovery refuse derived fuel facility.

The costs of operation are higher than estimated. The amount of refuse received has not met expectations, and the operational and technical concerns and problems that were not anticipated have arisen. I should state, however, that as I have the opportunity to review and understand and evaluate more recent projects involving refuse derived fuel, I am convinced that some difficulties experienced from the Ames system are now being anticipated, corrected, and properly evaluated.

Let me state that I am a firm believer and supporter of refuse-derived fuel systems as a supplemental energy source for this country. When one considers the number of municipal and private investor-owned generating facilities throughout this country, having

the same generating capacity as that of the Ames Municipal System, one can draw a very clear conclusion that the utilization of refuse-derived fuel is an untapped source of supplemental energy materials.

My support and belief in utilization of refuse derived fuel is based on my 3 years as a director of the Connecticut Resources Recovery Authority that is currently implementing a statewide system, and 3 years of experience as city manager and being directly involved in the Ames refuse-derived fuel facility and the Municipal Electric Utility system in participation with other local government officials throughout the country as they consider municipal or regional involvement in refuse-derived fuel.

I should indicate to you that some of my experiences, frustrations, and concerns in a few minutes, are not to be overshadowed by what I am convinced is a viable, pragmatic and readily available source of energy that I am told could provide approximately 5 percent of this Nation's energy requirements for electric power generation.

Refuse-derived fuel systems should be encouraged, developed and constructed only if the following facts of life of refuse-derived fuel are understood and accepted by potentially involved participants, whether they be government agencies or the private sector. I shall attempt to touch upon, briefly, some of the aspects that I feel must be considered by this committee and other interested persons if refuse derived fuel systems are to be encouraged and meet their expectations.

One: The need for realistic feasibility-economic studies;

Two: Acceptance of a rapidly-changing technology for the processing of refuse derived fuel systems;

Three: A strong acceptance of long-term intergovernmental and utility corporate agreements;

Four: Willingness to tackle and resolve unforeseen operational problems in a capital-intensified system;

Five: Long-term commitment by local, State and Federal officials to overcome initial problems and economics that are inherent in refuse derived fuel systems; and

Six: Better coordination of responsibility, goals and objectives of EPA and DOE as they relate to refuse-derived fuel systems.

#### REALISTIC FEASIBILITY-ECONOMIC STUDIES

My experience has convinced me without reservation that there is need for a comprehensive feasibility study of each and every potential project to determine whether all of the components exist to bring about a successful project. Specifically, I am talking about studies that will determine, over a long period of time, the specific types, the source, and composition of refuse being generated within an agreed-upon geographical area. The feasibility study should not consist of spot checks of the materials being generated, nor should it consist of outdated economic market or census studies. The feasibility study should do a complete evaluation of the economics of the region to be served. This should consider income levels, types of industries existing, the demographics of the area, population

trends, population densities, past and future land-use plans and policies, existing zoning practices, and transportation systems.

The study should further evaluate siting requirements for the facility, the location and availability of electric generating systems, types of fuel being used to generate power, conversion possibilities, transportation of raw materials for processing, the utility site, and method to move RDF from the processing plant to the powerplant, also the ability to find sources who will purchase and accept the sale of other materials from the refuse stream such as ferrous and nonferrous metals, glass, brick, and so forth. The Ames facility, for your information, is fortunate enough to have only about 8 percent of the residue of the refuse stream landfilled, since it cannot be sold as a related material. The studies are of extreme importance in determining the viability of the project. I am pleased to see an improvement in the sophistication of these studies in recent years, compared to the earlier feasibility studies.

#### ACCEPTANCE OF RAPIDLY CHANGING TECHNOLOGY FOR PROCESSING

The processing of refuse into refuse derived fuel is a relatively new industry process that has been subjected to considerable trial-and-error solutions to bring about experience that can result in the improvement and sophistication of processing equipment required to process acceptable levels, both in terms of quantity and quality, of refuse-derived fuel.

Unfortunately, the research, knowledge, experience and track record of refuse derived fuel plants has not yet reached that level where the plant can be constructed and components put together, and a plant dedication day can be determined, and with the pressing of a button by the mayor, everyone can be assured that the plant will start producing refuse-derived fuel at its daily rated capacity, whether it be 50, 200, or 2,000 tons per day.

During the past 3 years of operation, the city of Ames has expended approximately \$750,000 to bring out about modifications of the components of the plant, both in the processing of refuse-derived fuel and in the burning of refuse derived fuel in the electric utility system. These modifications have included the installation of grates within the boiler systems, modifications to the air classifier system, metal separation system, and other related aspects of the overall system.

I noted, and you may be interested, that the Milwaukee resource recovery facility, which has been in operation for a while, is going to expend \$4 million for plant modifications. It is my understanding that one of the problems with the continuation of the St. Louis experiment was the need for plant modifications and improvements. This has also been true in the Chicago facility. Again because of the fast changes and learning curves of refuse derived fuel, these plants, if they are to operate efficiently and effectively and produce sufficient revenues, must be modified to meet their maximum potential.

I should indicate to you that there is no stereotype resource recovery refuse derived fuel plant, in that each operation has its own unique and inherent problems. This causes a loss of revenue in the early stages, can extend the shakedown period, and the opti-

mistic fanfare that preceded the opening of the plant can cause and will cause economic, political and credibility concerns within the system. These problems can be, will be, and are being resolved as each new plant comes on line. I can only say to you that the learning process of its predecessor throughout the country is being acknowledged, understood, researched and resolved. I might add that Ames now feels that being first is not necessarily better.

#### LONG-TERM INTERGOVERNMENTAL AND UTILITY AGREEMENTS

The key to the potential of undertaking a refuse derived fuel facility is the willingness, ability, and regional attitudes of cooperation to enter into long-term intergovernmental agreements that have the terminology and legal backing to assure long-term commitments to provide the refuse stream that can be processed into refuse derived fuel. As I mentioned earlier, I am talking of long-term agreements, I am talking of periods of time of 20 to 25 years duration. On the other side of the coin is the equally important ability to enter into long-term contractual arrangements with either the municipal or private investor-owned utilities or corporations that will provide for the assurance of sale of refuse derived fuel over the same period of time as that of the contracting governmental entities.

The inability to have these tandem contactual agreements for adequate periods of time can only spell failure for the financing and implementation of the system. It is very obvious that the inability to negotiate good strong contracts with penalty clauses can result in the lack of funding to construct and operate the facility. This is particularly true if revenue bonds are to be considered as a source of funding, or if special districts are created to build and provide refuse derived fuel and moneys derived from fuel credits from the purchaser of the refuse derived fuel cannot be assured.

There must be commitments on the part of the regional or intergovernmental authority to assure there is adequate tonnage provided annually that will produce the required volume of refuse derived fuel that are being purchased by the user. There is a need for good strong clauses to determine the fuel credits that are based on the Btu values generated by the refuse, as compared to the normal fuels. This is also true as it relates to the volume of refuse derived fuel and as to the sale of secondary materials and other products from the waste stream that cannot be utilized as refuse derived fuel.

In the event the utilization of a refuse derived fuel facility is considered under a "turn-key operation" with private enterprise constructing, processing and providing RDF, as is the case in the Connecticut system, the contractual agreements gain additional importance as they relate to tipping fees, fuel credits, cost of operation and maintenance of the plant, potential escalation clauses, and guarantees that might be considered between the governmental entities supplying the waste stream and the "turn key" processor and the purchaser of the materials.

WILLINGNESS TO TACKLE AND RESOLVE UNFORESEEN DOWN COST  
CONSIDERATION

I feel it is important to bring to your attention the fact that RDF systems are, by design, function, and product processed, very capital intensified. I am specifically referring to the costs of construction, possible modifications, equipment, varying depreciation for equipment, and the annual cost of principal and interest charges.

Specifically, because of the costs of construction, the capital charges continue to exist day-in and day-out, whether the plant is in operation or not. The Ames facility daily charge for principal and interest approximates \$2,000 per day. If the system is not running or is down, the unit costs continue because of the fact that refuse must be either processed, stored or landfilled. To compound the concern when the waste stream is not being processed as refuse derived fuel, we are faced with landfill costs and a loss of fuel credits.

We are seeing as we gain greater insight and knowledge and understanding of refuse derived fuel systems, that we may not have allowed in the past sufficient time for shakedown of the system and unanticipated downtime. Very often, downtime and shakedown periods tend to be longer than anticipated.

The Ames experience of the past 3½ years indicates that our downtime for repair, equipment modifications, and other problems, approximates 13 percent of the annual operational time. I have alluded earlier to problems that have been experienced in other systems in other parts of the country. The very nature of the materials in the waste stream and the method of processing the waste stream for refuse derived fuel, and the rapidly changing technology, coupled with unforeseen problems, is the basic reason for the downtime problems and shakedown of the new plant.

I am extremely confident that those of us who have been involved in the early stages of RDF know these problems will be, and are being resolved and reduced as we gain more and more experience.

LONG-TERM COMMITMENT BY LOCAL, STATE, AND FEDERAL  
GOVERNMENT OFFICIALS

If refuse derived fuel systems are to become a reality and offer a viable alternative as a supplemental source of energy for the generation of electrical power in the United States, there must be a long-term commitment and awareness by all levels of government to encourage utilization of RDF. This should be based on the fact that as the costs of fuel in this country increase and supplies either become scarce, for one reason or another, that it is only reasonable to accept the premise that fuel credits and refuse derived fuel will increase in value.

The fuel credits which are the moneys received from the electric utility purchasing processed RDF are computed, based on some type of equitable formula taking into consideration the Btu content as it relates to the major fuel source. Costs of fuel and transportation, in all probability, will increase. This will then make the value of the per unit cost of refuse derived fuel increase as a revenue to

the producing entity. Unfortunately, there has not been awareness or acceptance that, in the early years of the operation of the refuse derived fuel system plants, costs are usually higher on a per unit basis because of the lack of efficiencies, volume and an understanding of the operation of the producing facility.

However, my experience has clearly indicated that the costs of operation can be decreased through good management, and control techniques, improved efficiencies, increased quantities of the water stream, and the experience curve. Unfortunately, the first generation plants have not had the benefit of the experience and problem-solving techniques that are being utilized today in the newer facilities that will be coming on line within the next several years.

The Ames system is a perfect example of this problem, but I am pleased to inform you that we are reaching satisfactory conclusions and implementing programs to bring about cost-effectiveness, better operations, and at the same time, increasing our fuel credit returns which will reduce the cost to the participating entities.

#### BETTER COORDINATION OF RESPONSIBILITY, GOALS AND OBJECTIVES OF EPA AND DOE

Unfortunately, it is my personal and professional opinion that the development and utilization of refuse derived fuel systems in this country has been somewhat overshadowed as a viable supplemental source of energy, as it relates to the development of the national energy policy. It is my opinion that there exists some conflicts and differences of priorities, and a lack of coordination between the Environmental Protection Agency and the Department of Energy, with specific reference to RDF systems. I feel very strongly that the National Resource Recovery Act as passed by the Congress provides the tools and can serve as a vehicle to expedite the use of RDF in the United States. There must, however, be an increased awareness and willingness to enforce provisions as they relate to landfills, dumps, and other waste stream discharge points.

The willingness to phase out landfills which present environmental problems and remove large acreages of land from production or property taxes, needs to be pursued. This, in turn, will increase the volume of the waste stream and enhance the economic and environmental advantages for refuse derived fuel. This is particularly true in our major metropolitan areas where land is scarce, such as in the Northeast where I have served, governments are faced with high costs of landfilling, facing environmental problems, and high costs of energy.

I respectfully suggest to this committee that refused derived fuel systems have a very important role in the energy production needs of this country. I encourage greater cooperation by the EPA and the DOE in this important area.

I urge that you consider the possibility of greater utilization of possible tax credits, or other inducements to the private sector to assist in boiler conversion costs with private investor-owned utilities and corporations, as well as other existing or potential incentives to local governments or regional bodies that would encourage greater participation in refuse derived fuel systems with specific

reference to the early years of operation which have proved to be financially difficult.

Thank you for the opportunity to appear before the committee. I urge your support of refused derived fuel systems as a viable source of supplemental energy for this country.

Mr. OTTINGER. Thank you very much.

We will hear next from Theodore A. Schwartz, National Alcohol Fuels Commission

Mr. SCHWARTZ. Mr. Chairman, I would prefer if I could deliver my talk after the next speaker, if that is all right with the members of the committee.

Mr. OTTINGER. That is perfectly acceptable.

We will now hear from Mr. Carroll Hughes, president of Consumat Systems.

#### STATEMENT OF CARROLL HUGHES

Mr. HUGHES. Thank you, Mr. Chairman.

I will try to squeeze mine up a little bit because I know that we are running short of time.

We are in that area where there seems to be quite a bit of vacuum in the facilities available. We have focused on producing equipment to convert waste into energy in the smaller size community and the larger industries. Since our approach is quite different from those approaches that you have heard about, I have a few slides which I would like to show, just to put it in perspective because our approach is focused in solving some of the problems that you have heard about this morning.

Ours may be an approach due to necessity. Today we are almost entirely dependent on the sale of equipment to produce energy from waste for our entire corporate income. It started because we were initially in the business of manufacturing and installing small systems and in an environmentally acceptable manner process waste for smaller municipalities.

This is one of the earlier systems. These systems all used auxiliary fuel to control pollution. Very early on, in 1970, as a matter of fact, we ran into the apparent lack of gas at that time in certain areas of the country, which made us investigate the whole fuel situation because of its obvious importance to us directly at that time.

Nobody likes to look at this slide, but it was produced in 1970, and it all shows what we know now has happened, and we are not producing the U.S. production of oil, and we really did not know where the rest of it was going to come from. It may not really be accurate, but the concept of it is there.

Now our objectives in developing the system were to process the waste at its source. A great deal of the cost that has been talked about has to do with the transportation, and in some cases the need to collect 1,000 tons to make it an economically viable system.

We wanted to meet the needs of both industries and municipalities. We required a system that was environmentally sound and had good overall conversion efficiency, and low capital and operating costs, and a dependable operation. Now, we selected an approach that controlled air, or sometimes called the starve air com-

bustion process with preengineered modular-constructed, factory-packaged systems.

All those things are an attempt to try to take away some of the uncertainties, some of the construction costs and avoid reinventing the wheel for each and every new application. The system that we came up with is something that looks like that. I will not go through the description, particularly, but that is, if you like a basic module. As you can see the material goes in one end, and it is processed, oxidized, and the system on the upper right-hand corner is the energy extraction system.

Those modules are similar and built in a number of sizes, the smallest being capable of processing something like 10 tons a day of municipal waste. The largest being capable of processing 100 tons in a single module. They can be packaged in various combinations to go up to 500,000 tons. We can manufacture them in an orderly manner. Combinations of modules make different systems to match the different applications.

That shows three systems, and that would be 150 tons as shown there. Or a system like this might be 250 tons installed. It is a redundant system so that you can always process 200 tons in that particular case.

This is a new system under construction. This shows a modular approach to putting two systems together. That particular installation is 100 tons of processing capability. It is located in Salem, Va. It processes their municipal solid waste. It makes steam, and the steam is sold to Mohawk Rubber Co. It is a commercial operation, and it operates every day.

The inside looks like this before you put the waste in. Again, it is an indication of factory-manufactured system.

Another system in Little Rock, Ark., which really was our first continuous duty system, and it has been in operation almost 3 years now. There are a number of improvements that have been made since that system was installed. That system is owned by the city of North Little Rock, Ark. The steam agreement is with the Koppers Co., and in that particular case they use the steam to process their facilities for railroad ties and telephone poles.

This is a 100-ton industrial facility, one of the large equipment manufacturers. Here is another one for 75 tons. This is the very smallest, and it is in a particular hospital where they process their own waste and generate steam.

I realized today, as I heard the other speakers listing the number of facilities and who manufactured them, we probably have more systems in terms of total number of installations than anyone else, although the tonnage is very small.

I think the importance of this system has shown to be accurately aimed at a need. As of today, the market is changing rapidly due to oil prices. Simply, the economics are very, very dependent on what the salable product can bring as revenue.

As an example, the systems are always site specific, but as an example, a 200-ton-per-day processing capability, and that would match a small community, and probably provide the energy for maybe a local industry.

The ones that are under construction—in Alban, Maine, there is a facility that will shortly begin construction, which will process

their solid waste, and the steam will be sold to Pioneer Plastic for laminating plastic materials.

Another system under construction in Dyersburg, Tenn., which will sell steam to Colonial Rubber Co. for their process. Another system in Michigan under construction to sell steam to an industrial park. A number of more systems are actually under construction.

The big turn has come, really, in the cost of energy, the available revenues that can be generated by selling the steam to industry at equivalent oil prices.

The systems do not require the long-term investments that we have heard about earlier. As I started to say, a 200-ton system typically in mid-America, fabricated with 250 tons of installed capacity, will give you an assured 200-ton operation, and will cost at today's dollars about \$4.2 million.

The debt service and operating cost actually are lower than the revenues generated by the steam. That is the first time that that has occurred. For us it is a system which you would not have to charge a tip fee, and the cash flow would in fact be positive on a 15-year basis. As a matter of fact, at oil costs of 75 cents a gallon, and I know that it is high in some parts of the country, but in some parts of the country it is already the case, that system would actually generate \$800,000 worth of revenue a year on a conservative basis. That is a very, very different situation than the situation that existed, let us say, 2 or 3 years ago, where oil costs were typically, for a large industry, 30 to 31 cents.

The systems are very sensitive. Our systems, as the ones that you have heard about from the other panel members, are very sensitive to the revenues, the value of the steam, if you like, which is generated.

The systems have the capability of coprocessing, and we are doing some work for the Alban, Maine, facility. It may or may not include coprocessing of sewage sludge. The test results are not conclusive yet. But we are very encouraged that you can, in fact, coprocess sewage sludge along with the municipal solid waste in this facility.

We have done some experimenting. The city of Little Rock has graciously let us use their facility for that experimentation. DOE has provided some of the funding for that test work. I think we do have answers to some of the questions that were being asked this morning.

The question of whether or not there is net energy in the sewage sludge as received is, as was pointed out earlier, very site specific, but for the most part you are going to get sewage sludge that is mostly water. It is 80-percent water generally, and on that particular basis it is about an even balanced energy produced from burning the solid portion required to evaporate the water. The driving mechanism is the energy in the solid waste, and there is zero net penalty, if you like, for processing sewage sludge in a facility of that sort, as long as you coprocess it with the solid waste that is being generated.

There was a lot of talk this morning about what we might do, what the Federal Government might do to stimulate the facilities. I think I can concur with Wheelabrator-Frye's approach than any-

one else. I don't really think that the Government needs to spend any substantial money. I think there are some things that have to be done.

Clearly, the largest barrier has to do with the uncertainties associated with the institutional barriers that have been talked about. I don't need to repeat them. I can only say that the major question that is always prevalent in every system we have discussed, every system that we have installed, worked on, if we make a long-term commitment, even 10 or 15 years, are we sure the laws are not going to be changed. Is EPA going to suddenly come up with another set of most stringent conditions, making our investment essentially worthless. That is the biggest that exists today.

I don't think that it matters particularly, within reason, how the environmental regulations are, so long as the people in opposition and the purchasers of these systems know that it will stay something reasonably stable for the life of that facility. That would be the biggest move that the Government could make to take those uncertainties away.

The obvious one that I think is going to happen anyway, whether we do anything or not, is that as fuel prices rise, the systems are automatically going to become economically viable. I don't think that there is anything that needs to be done any more rapidly than is already occurring.

As I said, with the new oil prices, the systems can, in fact, become positive economics at today's major prices, at least.

Thank you, Mr. Chairman.

Mr. OTTINGER. Can you give us, very briefly, a description of what your process is?

Mr. HUGHES. The starved air process, as the name implies, does not completely burn all the material in the process chamber. It is a semi-pyrolysis concept, if you like. Small quantities of air are introduced to burn essentially the free carbon. That heating process, then, drives the volatiles from the waste material, and you get some of the methane. Those materials come off very fast. They move into an oxidizing chamber, air is added. The materials are then oxidized to give you an environmentally acceptable exhaust. The exhaust is then passed through a heat exchanger system, steam is produced.

It is designed and fabricated as a package as a system from the ground up, and I emphasize this. It is all U.S. technology. It is the result of 15 years of work on our part in building the various steps of the system, and assembling them all in a final complex, which was first installed in Little Rock, Ark.

Mr. OTTINGER. Do you have to separate?

Mr. HUGHES. No. There is nothing wrong with separating, but we have come to a situation, so far, where we could honestly say that separation has any economic viability in these particular systems.

So we take the waste as it is received, and process it. As you have heard, you get a certain quantity of ash as you do that. Certainly in the larger facilities, and closer to the metropolitan areas, you could get some of the materials out, and it would help the process. But it does not have to occur, so we don't encourage separation.

Mr. OTTINGER. Does it have to go in dry?

Mr. HUGHES. No, we just take it off the trucks as it comes in. We don't do anything more than push it in the machine.

Mr. OTTINGER. Thank you very much.

We will now hear from Mr. Schwartz.

#### STATEMENT OF THEODORE A. SCHWARTZ

Mr. SCHWARTZ. Thank you, Mr. Chairman, for the opportunity to appear before this panel. My name is Theodore A. Schwartz of Livingston, N.J.

I served as a former deputy attorney general of the State of New Jersey with specific responsibility in the environmental area. For the past 8 years, I have served as a private attorney representing major firms involved in the management of solid waste, and the development of resource recovery facilities. My experience has involved both solid and liquid wastes, and the reuse of waste materials for fuel conversion.

I recently had the high honor of being named by President Carter to serve as one of the seven public members of the National Alcohol Fuels Commission, which is considered a key part of the Nation's efforts to develop alternate fuel sources.

Mr. Chairman, the Nation is suffering from the greatest threat to its survival since the Revolutionary War. The energy crisis and our overwhelming dependence on foreign fuel sources has placed our economic future in severe jeopardy. But there is hope for the future. It is the role of the National Alcohol Fuels Commission to find the answers that will make America, once again, an energy self-sufficient Nation.

In my own State of New Jersey, we have a unique situation that could provide one key answer to our future energy needs. New Jersey, as the most densely populated State in the Nation, has enormous amounts of solid waste generated from both households and commercial establishments. In addition, vast quantities of garbage are disposed of there by States on New Jersey's borders. Because of a U.S. Supreme Court decision, New Jersey cannot control the amount of solid waste disposed by those adjoining States.

The heaviest concentration of landfilling of solid waste in my State takes place in an area of northern New Jersey known as the Hackensack Meadowlands. More than 50,000 tons of solid waste materials are disposed there every week.

The northern New Jersey counties of Passaic, Hudson, Bergen, Essex, and Union have depended in large measure on the Meadowlands as their prime repository for waste disposal. But the Hackensack Meadowlands Development Commission, in its recently proposed solid waste management plan, ruled that all landfill activities in the area be halted by the end of this year.

The only exception to that ruling was the continued operation of the landfill for Bergen County, and a mechanical bailing facility to process 1,000 tons a day for disposal in a balefill. The HMDC in its management plan called for other landfills to be converted into recreational park areas.

The existence of the highly popular Meadowlands Sports Complex has made the area highly desirable to commercial developers

who are opposed to the continuation of garbage dumping on the valuable property.

In order to continue the processing of at least 50,000 tons of solid waste weekly, a number of resource recovery facilities is an absolute necessity for the Meadowlands area.

I would like to offer my strong support for legislation introduced by Congressman Robert A. Roe of New Jersey, H.R. 4789, calling on the Department of Energy to build a solid waste conversion demonstration plant in New Jersey, utilizing the State's extraordinary amounts of bio-mass materials to manufacture energy-producing alcohol.

The processing plant, to minimize the cost of the tipping fee, must develop a good market for the product it produces at the back end of the plant. The production of steam or electricity, because of a number of problems, including some legal ones, present some complex marketing techniques, which must be addressed. These problems, however, can be overcome. But the same cannot be said for ethanol alcohol.

Because of gasoline prices, ethanol has a significant market. Its use is universal and it can be stored. New Jersey has major refineries where gasoline is produced, wherein they could be required to use the ethanol alcohol in the production of gasoline.

Alcohol has all the potential to provide a better energy balance in its production than most other potential alternative energy sources. That potential will be closely examined by the National Alcohol Fuels Commission. We need the type of demonstration project called for in Congressman Roe's bill to determine if it is feasible.

I have sat here for a considerable period of time listening to many of the speakers who are involved in technology for the production of energy, whether it be refuse-derived fuel, steam or electricity. I have been personally involved in many projects of that nature from the legal and administrative end, and share with many of the speakers some of the substantial institutional constraints that exist toward the development of the type of refuse-to-energy plants that we need in the United States.

The central theme of most of the speakers was principally in the difficulty of establishing a marketing area. In the alcohol fuels area, we do not have that problem because we presently have the greatest market available in the world in view of our substantial gasoline and fuel problems.

Additionally, the Northeastern part of the United States, particularly New Jersey and New York, Pennsylvania and Delaware, face a substantial sludge disposal problem with regard to the elimination of ocean dumping by 1981.

As the other speakers have pointed out, there is a substantial amount of energy available from sewage sludge, and there are processes that can be employed that do work, and do not require a substantial amount of experimentation.

One area that nobody touched on today, and which is of very great interest to me and should be to you, is the substantial liquid waste crisis that we have in New Jersey relative to the disposal of hazardous waste. This problem also exists in New York, and exists

also in Pennsylvania, and in all your heavy industrialized areas of the country.

I have also been involved in projects wherein waste materials, particularly hazardous waste materials, have been converted to supplemental fuels to be used in utility boilers. That technology does exist, and I think that with support of Congress and the Federal Government this could become an area of very great importance, which is presently lacking.

I have attempted to cut my talk as short as possible, and I will terminate now, and respectfully answer any questions that you may have.

Mr. OTTINGER. Thank you very much.

I note that the gentleman from New Jersey, Mr. Roe, has joined us. It is at his invitation, as I indicated earlier, that we had you on the panel, and I am glad that we did.

Mr. Roe, we welcome you.

Mr. ROE. Thank you, Mr. Chairman. I am sorry that I couldn't participate in all of the hearings this morning.

I think that your testimony, and I have read some of it, has been excellent, and I think that what is becoming crystal clear is that there are already many technologies that are available which can be applied to different dimensions, if you like, of the solid waste disposal problem.

I think that the value of our testimony yesterday, particularly from the Commerce Department, was the point that any type of bio-mass waste disposal process that we are talking about in an institutional form ought to be tested. The question is what to do, in effect, with the end product, the byproduct. In this case you were talking about steam, and the different residuals from that process in different sections of the southern part of our Nation.

It seems to me, those who are in the manufacturing field, such as Mr. Hughes, ought to take into consideration the economic dimensions, a town, a community, or a regional community gets together to build such a plant, and the total overall cost system?

Usually, if they have a waste disposal problem, as Mr. Schwartz indicated we have in New Jersey, this is because there is a lack of landfill. When they evaluate, do they only evaluate economically the full product that you put out, the garbage that you put in plus the resources coming out, or do they take it as a systems approach, saying, without this type of system, we get some recoverable costs. It may not be 100 percent, but if we don't do something it is going to cost us 10 times as much in the landfill action.

Mr. HUGHES. I think that it is true. The systems always bear out the same approach in the end, and you just pointed it out. Typically, a community would be happy to install a resource recovery facility, energy particularly, if they would only be assured that the cost did not exceed their existing cost, or the cost that they perceive in their upgrading, let us say, of a landfill.

So if you look at the facilities, say, in our case, that are in existence now, for the most part they are all in existence because there was a special disposal problem. I think, as I pointed out in my testimony, as energy prices rise, the reverse will be true. You will be able to make systems economically viable in areas where a landfill exists today under reasonable conditions, simply because

the revenues are, at least, enough to offset the operating costs and the cost of owning a facility of that sort at the higher energy prices.

The economics are very sensitive to the value of the fuel that is produced, whether it be steam, methane, or ethanol.

Mr. ROE. I understand that point. What I am trying to get at is the hazard liquid waste disposal. For example, I sit on the Public Works Committee, and we are involved in sewage disposal, hazard waste, and ad infinitum. We find that even in the Federal Government, they take and have a tendency to compartmentalize problems. This is waste water treatment, and that is one problem. This is sewage disposal over there, and it is another problem. This is solid waste over here, and it is another problem. This is landfill, hazard waste, and whatever.

In effect, what we are saying, as I see this emerging, if we put those elements together and say, OK, you don't just have a combustible item of garbage. We are not just talking about the separation of metals, and we are not just talking about producing steam. We are not just trying to solve that problem. We are saying the general waste hazards that exist in this area—take the northern part of the State of New Jersey—embody the following. One, we are forced to accept, through a Supreme Court decision, solid waste from New York and from Pennsylvania, which rankles a bit, I must admit. No. 2, in that region of the State, the number of landfills that are available are practically negligible at this point. Now as information evolves, the people that are dumping chemical waste, for example, and huge amounts of waste that has heavy metals in it, all are beginning to permeate the water supply, the ground water table in particular. That is an economic factor in this matter.

In talking about that aspect of hazard waste dumping, we must include sewage sludge, plus the solid waste, and what do we do with it. What I am getting at is, when we are proving the economics, we ought to be in a position of saying that the pure cost of buying your system and installing it, garbage in and products for sale out, is not the real total cost. That is the point that is being missed so far in the discussion.

Mr. HUGHES. I think that you have hit on a very critical point because that also impact the overall environmental concerns. For instance, the solid waste authority in a given community may be very anxious to solve their problem, whereas the air quality people, who are a different group, see that as an aggravation of their problem. So there is not an overall coordinated approach, which could really improve the situation dramatically.

Mr. OTTINGER. Mr. Sprenkel, did you want to add something there?

Mr. SPRENKEL. I think you are very right, Mr. Roe. I am faced right now in the city of Ames, the Department of Environmental Quality, the U.S. Environmental Protection Agency, the Department of Energy of the United States, and there seems to be a lack of goal setting and priorities. There is a very obvious conflict as to who is going to support the city's ongoing efforts.

You talk about compartmentalizing, I think cities have been encouraged to compartmentalize their problems because of the

grants system and the levels of funding. The other thing, it seems to me, is that there is very obviously a dichotomy of all the agencies that I, as the city manager of a city of 50,000, have to contend with in trying to determine stack emissions, so on and so forth.

The incentive for local governments, very often, is taken away because of the constraints, and the problems of priorities and who has the most clout and dangles the biggest carrot.

Mr. ROE. One more point on that for the record.

Mr. HUGHES. I would like to touch on that a little. I think what really happens, particularly in smaller communities, you get overlapping authorities, the local, the State and the Federal, and it is very difficult for anyone, even those of us who are in the business daily, to really know what is involved. Who are all the contacts that you have to satisfy, and what the rule is. It is very, very complex. That is, I am sure, the biggest barrier that exists today.

Mr. SCHWARTZ. I would like to make a practical observation on what Mr. Roe said relative to the economics, and some of the problems that Wheelabrator-Frye, and Occidental Petroleum, and CEA and everybody else has been facing. It is the substantial difference between the cost of landfilling and the cost of resource recovery systems.

You can hear all kinds of numbers from a lot of different people depending on where you are. However, I think the point that Mr. Roe made is a point that some of these people that are promoting these systems could make. What is the economic value in the tipping fee vis-a-vis the nonutilization of land, the nonwasting of other resources. We are paying \$10 a ton for a tipping fee, and they sell steam for \$3 or \$4, and the net out is at \$6. That is really not the real economic saving.

The economic saving is that we are using a different way of handling the waste, and we are saving valuable land. We are saving a lot of other indirect costs which are sometimes very intangible to figure out.

I think if you are correct, Mr. Roe, if that type of approach were taken in promoting refuse-to-energy plants, the public would be much more receptive to the economic change in tipping costs.

Mr. OTTINGER. You all seem very adept at defining the problems. Does anyone have any solutions for us?

Mr. BOARDMAN. I think that I addressed this in my testimony. The largest single problem I think we all face and the reason why we have a major resource recovery facility in the Greater Boston area, and not one in Camden, N.J., has to do with the realistic tipping fees found in Boston and not in New Jersey.

Mr. ROE. The tipping fee.

Mr. BOARDMAN. We are looking at \$12 to \$15 a ton because landfill sites are not available in the Metropolitan Boston area. The refuse in the State of New Jersey is under the control of the PUC, and tipping fees are limited to \$3 to \$6 a ton. You cannot build a refuse-to-energy facility with that kind of tipping fee. That kind of tipping fee does not recognize the environmental problems associated with dumping.

We have all spent a considerable amount of time looking at the problems in New Jersey. We know that New Jersey dumps waste in wetlands and every other conceivable place. The landfill sites do

not meet the requirements of the Resource Conservation and Recovery Act.

The problem is that we don't have adequate enforcement. EPA has been fooling around with the problem for a number of years now. They have been doing demonstration projects which are not necessary. They have been looking at a lot of exotic ways of encouraging these technologies which are not necessary, as is obvious from all of the testimony you have heard today.

What they have not done is to enforce the Resource Conservation and Recovery Act. EPA has moved its focus away from solid waste. We are now hearing from EPA about the problems of hazardous waste. The technologies that will be applied to hazardous waste, while a bit different in some cases, are basically the same as for solid waste.

The regulations that are coming out under the Resource Conservation and Recovery Act are significantly different than the regulations for solid waste, as they well should be, but they are not out yet in final form. Industry cannot make the commitment to bring its resources to bear on the problems of either solid waste or hazardous waste until all of the ground rules are set. That is the problem.

Mr. ROE. Mr. Chairman, I just have one more point, and I know that it is late.

I know that you have very diligently worked toward some solution. Mr. Hughes made the point that in his experience along the line he had to kind of demonstrate that whatever the cost of the project would be, there had to be something coming out of the other end that offset the cost/benefit ratio.

We came back and said earlier in the testimony, maybe we don't need any Federal money if we can get people to move ahead in the direction we are talking about.

When we look at the bigger picture, one of the debates that came up yesterday, and rather fiercely, by the way, was whether or not the Federal Government should be going into another big program. The original cost, I think they said, was \$36 million for 68 cities they were financing on a preliminary basis. They had 200-odd applications. They need \$100 million just to do the preliminary review. Again, the same old bag of time and delay.

So the idea of whether or not the Federal Government should go into the enormous direction of guarantees, does not solve the problem. It would seem to me that if we looked at the problem as being an environmental problem in toto of what we are trying to achieve, we may be looking in the direction of a combination of guarantees and grants.

The idea being, if you could put together a box that was going to produce, through different processes, such things as steam or alcohol depending on what the economics and the demands of an area were, there are going to be some voids in that whole process. Economically, if we had another \$180,000 here to offset that environmental cost, this whole thing would be self-sustaining.

Are you with me?

It seems to me that a combination of what we are trying to achieve is loan guarantees together with grants to the nonproductive aspects of developing some product at the end of that, which is

salable. To balance those economics may trigger many, many more communities to participate at that point. Does that have any merit?

Mr. BOARDMAN. In my opinion, no. We have had grants that have gone to numerous communities. The problem has been studied to death.

Mr. ROE. I am not talking about that. I know that. Believe me, I am not a planner or a studier. I have had that up to my ears.

Mr. BOARDMAN. That was my introduction. If I may continue on the grant and loan guarantee aspect.

I think that it exacerbates the problem of getting qualified companies involved in this process that have the financial capability to withstand the problems. We, too, in our plant in Saugus have had substantial problems with start-up, and technological problems. During that whole period, we never turned away a truck. We put our own money into the project to solve those problems.

When you have loan guarantees, you encourage companies that do not have the capital base to get into this industry. You do that, and you are in for an awful lot of problems. I think the water treatment program is an example of a grant program that has turned into an absolute disaster. You are on the Public Works Committee, and I am sure that you are aware of the problems in that area.

We, too, are involved in waste treatment. We have been telling EPA for some time now that it should get people out of the business who should not be there to begin with. The way that you do that is to allow people to bid on a realistic negotiated basis for projects. You sole-source jobs where that makes sense in large municipal projects. You don't allow people to go in in a bid shopping mode, and undercut qualified bidders on the project.

If you do that, you will have plants built. If you don't do that, the solid waste area will have the same problems you have in the waste water treatment area.

Mr. ROE. I think that the chairman was trying to get that point across. It reminds me of my own experience. I have been in government for 25 years, so I am a little bit knowledgeable in government. Everybody gets done with the hearings, and the meetings, and the gatherings, and we all wrench our hands, and say: "What are we worrying about?"

What we are looking for, if I may, Mr. Chairman, out of these hearings is some direct method. The idea that you are suggesting is fine, but except for the point of view that it does not work that way. You know that as well as I do.

Institutional barriers notwithstanding, you can only sell your program to those communities that have been able to resolve their political problems, and where they are going to make a profit out of it. Otherwise, it is not going to sell. Our responsibility is in that direction. It is our responsibility to say that throughout the Nation, we are being buried in garbage, which was the problems 3, 5, 8, 10 years ago. Environmental pressure on the situation eliminates landfill dumping, and so forth, and so on. Here we have a gold mine that can be converted into recoverable metals, and energy, and alcohol. What do we do to make that work?

Then, we add another codicil to that, and I am highly knowledgeable on the water pollution control. We are coming back and saying: "On hazardous waste, on hazardous liquid waste, on sludge disposal, what they are saying, is you cannot dump into the ocean after 1981. But you are not going to be able to dump on land either because you have heavy metals, and concentrations of materials that are going to get into the water supply."

Somewhere along the line, somebody has got to put that together and say, either we are going to carry the waste into the ocean, or the rivers or the stream. We are going to carry the waste and convert it mechanically into the air. We are going to take those wastes and convert them and put them into the ground and the water. Some place, we have to look to the totality of it to be able to say: "What do we do on that, and how do we put it together." There is no community including mine, or yours, or in Boston, withstanding, that is going to have the money to be able to do that. That is what we are trying to achieve.

Mr. BOARDMAN. I think that one of the points that I am making is that there are industrial companies out there today that are willing to make that capital commitment. We are not asking New Jersey, or Boston to pay for the capital cost of this. We want to be able to recover our capital costs through the tipping fees, and through the energy sales.

If the institutional barriers are resolved through adequate enforcement, then such revenues are going to begin to come closer and closer to the levels necessary to finance resource recovery plants.

Mr. ROE. I am not going to run a government to accommodate your needs, and please don't misunderstand. I am usually quite blunt.

This is your need as to how you are going to put your thing together to make your profit, otherwise you are not going to do it.

Now, I am going to come to you, and I am going to say: You have got the permit to build in the Meadowlands, and we are going to spend \$50 million. Now, I have got a problem. Under my Hackensack sewage disposal program, I have 25 tons of solid waste I want to get rid of, and I want you to do something about that.

You come back to me, and you say: "Well, I can handle that. But I cannot do it for nothing because the economics are not there." Should there be some input from some other source? The total economic debits and credits cost effectiveness has to be considered.

Mr. SPRENKEL. Mr. Roe, could I make a very unpopular statement?

First of all, I think any municipality or any governmental agency—I have been involved in this in Connecticut and in Ames—who goes into refuse-derived fuel with the idea that somewhere there is going to be a profit made is being led down the rosy path. There is, indeed, a possibility that you could receive good revenues. But if you can reduce your costs to what are the true costs of landfilling, then I think you are telling the people the truth, and they will accept it.

Point two, if the governmental agencies, EPA and the States, close down just half of the illegal landfills that are operating in this country, the volume of RDF and refuse would increase so

much that there would be an incentive and a desire, and an awareness, to do something about it.

The third point, I think, we have funded consultants and studies to death on this thing. I would say that if we are going to provide some kind of low-term guarantees, or something, as I indicated in my testimony, it should be done up front in the early years when they are not cost effective, and until you get all the ifs, buts, and ands out of that system.

Mr. OTTINGER. The time of the gentleman from New Jersey has expired.

The gentleman from Nevada, Mr. Santini.

Mr. SANTINI. Thank you, Mr. Chairman.

My chairman, Mr. Florio, who is very much dedicated with his companion from New Jersey to the substantial problems, has enlisted my participation here this morning. It has been quite educational, and I realize that there are complex points here, some at odds and some in conformance.

It is fascinating, when you look at it from a perspective, by and large, of rural waste disposal, and we do not have a shortage of that kind of problem either, I guess, and to try and make sense in the complex of national policy as to how we proceed on it is also very difficult.

I was intrigued, Mr. Hughes, by your assertion that the Government does not need to put in any more money. I think that this is something close to a quote. I would appreciate your elaboration on that.

Mr. HUGHES. Yes; I think that the technologies exist. I think that the economics will stand on their own. I don't mean to imply that the removal of institutional barriers will cost nothing, but I think that that, really, is where the focus should be.

I think that it just requires some leadership. I could not tell you how many communities we sat down with and started to work out a system. Everybody literally wants to install and operate a resource recovery system. I have never been to a community recently that that was not the general feeling.

However, when we do that, are we taking an abnormal risk? Are we going to put in a facility, and be faced with the same problem we were faced with when we put in our \$7 million incinerator, and operated it for 2 years, and then EPA came and shut it down?

Those are the kinds of problems that really stop the thing cold in its tracks. Then you have consultants in studying it to death. The Federal money is spent time and time again, over and over, on studies. Local money is spent on studies. Consultants must love it, but at the same time it is not getting many facilities installed.

Mr. SANTINI. Mr. Hughes, if I understand what you are saying, essentially you are suggesting, at least with respect to the experience, that if the Government would simply remove the uncertainties from future regulatory activities, you have a machine that is primed and ready to roll?

Mr. HUGHES. That is right.

It is the uncertainties that are the overall concern. Also, the energy prices, when you are making the contract, as I pointed out in several of my slides, there are facilities that have purchased our system, and they only do it when the economics say that this is

going to save money compared to purchasing oil, and they have to make some sort of forward projections.

Simply to deregulate oil could do more than everything else that we are talking about. That would just suddenly make them all economically viable. As I said, the difference between 30-cent oil, and 75-cent oil is so dramatic as to make it an entirely different ballgame.

Mr. SANTINI. I heard Mr. Schwartz say something different. I heard him say that if we don't provide some sort of economic incentive basis to initiate the resource recovery and conversion concept we are talking about here, it will not get done in New Jersey, for example; and endorsing a pilot project such as that proposed by Congressman Roe is necessary.

I would appreciate your thoughts on that.

Mr. SCHWARTZ. My comments on the establishment of a plant to produce gasohol also obviate some of the marketing problems that some of the other gentlemen have because ethanol is relatively salable. There is no problem. They are having tremendous problems now getting enough alcohol just to mix it with unleaded gasoline to provide fuel. If we had more alcohol, it would help.

Mr. OTTINGER. That is not the whole answer. That is the market answer.

Mr. SCHWARTZ. No.

Mr. OTTINGER. The technology for the conversion of cellulose waste to alcohol is not available there on an economic basis.

Mr. SCHWARTZ. The point is that the marketing problem has been one of the greatest stumbling blocks in the refuse-derived fuel area, along with the securing of refuse up front. These gentlemen have said that you cannot even begin to develop a facility unless you have a secured stream of solid waste, which you know is going to be there day in and day out, and it cannot go any place else.

The other side of the problem is making sure that you have an energy market to consume the steam and the electrical power. New York State, for instance, you become subject to Public Service Commission the minute you generate over 50 megawatts of electricity. You are subject to hearings before the PSC, and you have got your hands full. The franchise problem is one of the tough legal problems to get around.

There was one company that I worked with that did get around that. They said, "We are going to produce 49 megawatts of electricity, and tell the Public Service Commission that we will see them tomorrow."

In many States you do have that public utilities problem of getting into the power business. The easiest applications that I have seen have been where you can contract with a large manufacturer, be it a pharmaceutical firm, or a General Electric, where you know that they will be there because they are a substantial company, and they will buy the steam from you. You know that you have the market, and you are right next door.

A lot of problems with the refuse to energy systems are site specific, where you just cannot locate one of these plants anywhere in the world. It has to be near a marketing area. If you are going to produce electricity, you are going to have to be a power grid.

One gentleman testified the other day from the Port Authority about the industrial parks, and the question that I raised with the port authority, "That sounds great, but how are you going to guarantee those companies that you attract to the industrial park that they are going to continually, on a 20-year basis, buy electricity power from you."

It is very difficult. The best way to do it, in my opinion, is to work an arrangement out with the power company, and that is where I think Congress can be very effective in saying to the utilities of this country: "We can provide you with electricity, and you will have to buy it." Just like we can tell the oil companies that we are going to produce alcohol, and when you produce unleaded fuel, you are going to put 5- or 10-percent alcohol in with it to make gasohol, or whatever you want to call it. You automatically generate and create the market overnight. That is the institutional problem.

Mr. SANTINI. Perhaps as part of your consideration of the President's proposal, for example, when he says to utility companies, "You will convert 50 percent of your present fuel reliance to coal," you would suggest, as an alternative, "You will convert in the next 10 years 50 percent of your fuel reliance to solid waste."

Mr. SCHWARTZ. As a lawyer, that is one of the biggest problems that I have run into, securing that end use commitment. It is very hard, unless you are going to go on with a stable operation. All our utilities around the country are subject to public service commissions. You cannot abandon a powerplant, and if you forced them to buy the energy from you, in a friendly persuasive way, I think that that is our best bet.

The argument is going to be, it is cheaper. We can produce electricity cheaper by using oil or coal, and we don't want to pay the price that you need for capitalizing the plant.

Mr. SANTINI. We would have to offer some kind of additional economic incentive to provide the inducement for that utility company to make that commitment?

Mr. SCHWARTZ. That is a consideration. I also think there could be a tax inducement to private industry that if they take on steam or electrical power from refuse facilities, there will be some tax consideration for that activity.

In other words, we have to stimulate and make the market a lot easier to absorb the steam and the electrical power. In my opinion, with the alcohol, there is no problem.

Mr. CATELL. I have not said very much, and I will just say a few words here.

Brooklyn Union Gas is a gas distribution utility, but since there are no other utility members here on the panel, I think that I have to make one comment in the context of forcing the utility to purchase the electricity from the powerplant.

Remember who is going to bear that cost in the end. It is not going to be the utility. It is going to be the consumer. So if you force the utility to buy that electricity at a higher rate, if they can do it another way, the person who is going to bear that cost in the longrun is going to be the consumer.

This is not to say that the utility should not be doing these kinds of things. Brooklyn Union is a gas utility that is looking into

projects. We were going to build a powerplant fueled by municipal solid waste to generate steam and electricity to support an industrial complex. The problem that we ran into is the one that Mr. Schwartz mentioned, we then get regulated in that activity because it was over 49 megawatts.

Again, the things that we have been involved in, we are willing as a utility to purchase the gas from the processors. It can go into our system. We don't get locked in to the specific end-user as you do with some of these other projects, where you have to worry the user being there for 20 years. Our consumers are going to be there for 20 years, and so are we.

If the economics makes sense, we are going to purchase that energy source from either the MSW plant, or from the landfills, or the biogas process.

You have to remember that if you force the utilities to buy it, the consumer pays it in the end.

Mr. SANTINI. Thank you, Mr. Chairman.

Mr. SPRENKEL. I would suggest to you, in regard to your comment, that you look very closely at the Connecticut Resource Recovery assembling of this. During my tenure, one of the things that we did was enter into an agreement with an investor-owned utility, wherein \$250 million of State funds that were authorized for the statewide system, some of these funds were utilized in our agreement with the utility to bring about the cost of conversion of the boilers to handle refuse derived fuel.

What this did, it allowed the conversion to be undertaken at an interest cost lesser than would be borne by the utility, and it did not tie up large commitments of capital in operations by that utility involved. This was part of the turnkey operation and this is how some of those costs were carried without being directly passed on to the consumer up-front, or without causing problems for that utility. That is the one up in Hartford.

Mr. BOARDMAN. I just wanted to address for 1 second the question of grants, and I hope that when your subcommittees are done with all of this testimony, one of the conclusions is that we ought not throw money at the problem. I think that we throw money at too many problems, and that is not the solution to the problem.

In the case of grant money, it encourages in this situation an award to municipalities that have not done things on their own to deal with their solid waste disposal problems. It encourages those who are in the worst shape as far as tipping fees and the quality of their landfill sites. I don't think that this is the way to get these facilities built.

I think that we have been addressing a lot of the problems that these facilities face in terms of enforcement of laws that are currently on the books. Maybe it takes some money to get enough people on the staff to do the enforcing over at EPA. That is one area.

Concurrently with your hearings, DOE has been conducting hearings over these past couple of days on an amendment to the entitlements program which would include petroleum substitutes, including municipal solid waste and methanol in the entitlements program for the 2-year period until decontrol comes into effect.

We have a problem now that our oil price controls are subsidizing imported oils, which are used principally in the areas where municipal waste can act as an alternative, that is, mainly the northeast. They are getting \$2 per barrel equivalent subsidy through the entitlements mechanism that we have a very difficult time competing with.

We have a 15-year contract with our energy customer, General Electric, in the Boston area. We began negotiating with them in 1972, when there was no entitlements program. At that time, PURPA was not in effect. The most that we could get from our energy customer was fuel replacement cost, and we sold at a discount to that.

The way that whole system works, we take their invoice price of oil, which is reduced because it is imported oil, because of the entitlements benefits. So we are competing directly against the subsidized program for imports. That is another area. If DOE would move and do something substantive along the lines that they have proposed, in the short term you would get the incentives to have these plants built.

By throwing money at the problem through grants, you don't change the economics. If the economics are there, the plants are going to be built. With the grant program that we now have in wastewater treatment, 422 waste water treatment plants have been built under this program. Last year, EPA contracted with an outfit over in Virginia to take the five plants that they thought operated the best and give them a model plant.

The outfit came back to them, and said: "Look, you don't have any plant that works out there out of the 422 you have built." That goes into what happens in a grant program that is federally funded and operated along those lines.

You have sophisticated technologies here that the companies that have been testifying today, and other companies, have expended a lot of money to develop.

We can build a plant in the Boston area where you are talking \$12 to \$15 a ton tipping fee. You are not going to have plants built in New Jersey until the tipping fees in New Jersey get a little bit closer to that, through one mechanism or another. The ways that you can encourage these projects, without rewarding States and municipalities that have not complied with the legislation that is on the books, is to give a production credit along the lines of shale oil, which has been talked about, on a barrel equivalency. Put the benefit into the project. Don't give the benefit to the municipalities in terms of reducing their cost when they have not faced up to them.

Mr. OTTINGER. Let me ask just a couple of questions.

Two of the witnesses said that one of the major institutional barriers was local governments requiring competitive bidding. Are you suggesting that there is something that we can do about that?

Mr. BOARDMAN. It is very difficult. We recognize. Competitive bidding, perhaps, is not the right term. It is low bid. If the municipalities were moving toward negotiated bid, it is still a competitive bid, but it is done on a negotiated basis. The guideline criteria for looking at the project that offers the best alternative is different under a negotiated bid process.

Mr. OTTINGER. What can we do about that, except educate? Congress cannot pass a law saying that the local communities cannot require competitive bidding.

Mr. BOARDMAN. That is right. All of the answers to these problems are not going to come from the Federal Government.

Mr. OTTINGER. So there is no solution.

Mr. BOARDMAN. At this stage, everybody is a first time purchaser, so the knowledgeable purchaser does not exist. You don't sell communities twice. They don't really know how to evaluate competing alternatives. In the competitive bid, as it is called, what happens is that the low bid prevails, and that affects what kind of system you can supply.

The decision ends up being made on what is the low bid. We are hardly ever in a position where we are the low bidder, but there are other things that you can do.

Mr. OTTINGER. Is there anything that we can do to resolve that?

Mr. HUGHES. There is one way that you can address it indirectly. I don't think that there is any way to hit it directly. The way that EPA in its proposed hazardous waste regulations, it has handled the whole hazardous waste treatment problem is one way to go, where there are permitting criteria for facilities of given technologies. If you establish that permitting criteria, at least you set a base level, and all facilities have to meet that level.

Mr. WARE. I would like to endorse the comments of the folks on the panel insofar as we don't look for Government grant subsidies. We don't see that as making a project anymore or less viable. We believe that wherever resource recovery is applicable, it will stand on its own feet. Until recently we had anticipated that most of this country would be in that situation in about 5 to 7 years, and as every day goes by that time comes closer.

You asked, most specifically, what can the Congress do about it. I don't think that regulatory measures are going to make a whole lot of difference. Research in the specific technologies that exist already has been done by private industry. There has not been very much derived from Government-sponsored research, and I say that authoritatively because I built a facility for EPA in San Diego, and spent \$4 or \$5 million of the Government's money, and not one word has ever been printed in official reports about that project.

I see very little coming out of Government-sponsored research. What I would suggest most strenuously is the Government apply its efforts toward education. You mentioned that point earlier, and it sounded very loudly in my head when you said that.

Most authorities in local governments are inhibited from proceeding with resource recovery facilities at the moment because they have a cheaper alternative today. They don't look 5 to 7 years down the road in most cases, and it is very disappointing. Consequently, they will not make the commitment to direct their flow to a facility which will charge far higher costs. It is political suicide in most cities to do something like that. So they are waiting until the last minute.

I really believe that sooner or later resource recovery will become a reality throughout this country. Perhaps by Government-sponsored education that time could be brought forward just a little.

Mr. OTTINGER. A second impediment that you, Mr. Boardman, indicated in your testimony was utilities offering unusually low rates for power purchase from waste. Do you have any specific examples?

Mr. BOARDMAN. I think that I went on to say that the situation with PURPA and with the provisions of that act, which are quite general and will require work to put the meat on the bones there, are very encouraging. Basically what we are talking about is fuel replacement cost, or at least we were until PURPA came into existence. The capital and operating portion was never figured into the computation, so we were competing in those areas that were using oil, and we were competing directly with what they were paying on a per barrel basis for oil.

Now with PURPA, we can begin to do our computations with a capacity charge included in our pricing. Indeed, under PURPA there is a mandate that the utilities purchase the power generated by these facilities. In this situation, we are talking about a facility generating its own electricity rather than shipping the steam out as process steam. We put on a turbine and pump the electricity right into the utility's grid.

In our Boston facility, that would have been viable. Unfortunately, General Electric was willing to pay us more than the utility.

At that time, as Mr. Schwartz indicated, and I think that it is still true in Massachusetts, the State Public Utility Commissions have not moved to allow these kinds of sales without the distributor becoming a public utility itself. The way that the State public utility legislation ties in with the Federal Government, we feel that it is moving in the right direction, and that a few States, Maine being one, have made some very definite moves to change its legislation to come into compliance with PURPA.

Mr. OTTINGER. Mr. Spensley, you said that you had a question. Then we will wrap up.

Mr. SPENSLEY. I am still a little confused about some of the testimony that you have presented.

For example, Mr. Sprenkel said in his testimony that what we needed are feasibility studies, and a much closer look at the potential for implementing waste-to-energy systems before we do that.

In contrast to that, several of you have stated that we don't need to, or we should not, give grants to municipalities, that we should not give them any advantage, in terms of doing a study, before they decide what system to implement.

Is there any way that we can reconcile those two views?

Mr. BOARDMAN. I think that I was the one addressing the grant situation. I did not mean to imply that the grant should not be given to study the feasibility. I am talking about outright grants of the nature of the waste water treatment program, where 75 percent of the cost of the facility is borne by the Federal Government.

In terms of feasibility, in some areas, that is absolutely necessary as part of the education process. In other areas, it is not. These feasibility grants have been going out for quite some time now as EPA's major effort to implement resource recovery. We have some municipalities that we have been dealing with for 4 years now which get a grant every year, whether they need it or not, to study

this problem. In all of these municipalities, the problem is still being studied.

As long as there is a flow of funds that goes out to study the problem, it will continue to be studied.

Mr. SCHWARTZ. The lure of the grant is part of the delay process, too. The initial reaction is, obviously there is some Federal money somewhere, and we will start looking. That generally adds a year to the process.

Mr. SPRENKEL. In my comments regarding the feasibility studies in my testimony I tried to cover some of the more sophisticated areas that I felt should be considered, not just the amount of garbage, so on and so forth. I went to planning, zoning, and things like this.

My feeling is, sir, that each area or region has its demographic concerns and exogenous considerations. Various types of industries may generate more refuse than others. The reason I say this is because I am always reminded that earlier in my career, when all of us were doing 701 studies, and I opened a 701 study that was to be done for the municipality of East Overshoe, there were the pages stuck in for the town of West Overshoe, which indicated that they stereotyped it. You cannot stereotype refuse-derived fuel characteristics.

Mr. SPENSLEY. Another question that I would like to comment on regards the statement that several of you have made, that the technology exists today, and it is principally a problem of economic and institutional barriers.

Would it make sense to have a Federal demonstration program which demonstrates that you can, in fact, build these plants and solve some of the institutional and legal problems?

Mr. BOARDMAN. I don't think that it is necessary. There are plants that are up and operating today that have done that.

You were talking with the panel that preceded us about what is being done in Europe. The technology that we employ in Boston is the largest of the Von Roll type ever built in the world. They have been building refuse-to-energy plants since 1954 all over Europe, Japan, Canada. The largest one in existence is here in the United States. I think that speaks for itself.

As for the demonstration of economics, we can sit down with the committee whenever you suggest and discuss economics. I don't think that it has to be demonstrated by allotting Federal dollars to do it.

Mr. HUGHES. I think that this is rapidly changing the need for a demonstration, because facilities are in fact in the field, and functioning, we had to establish a sales office in our Little Rock facility because that many people were coming to view the facility.

So I think that the feedback from the Saugus facility, and what finally happened in Nashville, and in some of our facilities, is in fact now plugging that gap. But it is just now happening. Just in the last 6 months, we have seen a tremendous change in the number of facilities that are moving to completion, and my feeling is that within the next 60 to 90 days we will probably receive orders for more business than we have had since the inception of our company. But it is just now beginning to happen.

Mr. OTTINGER. One last thing that I might include today is the matter of synthetic fuels; I know that alcohol is included, but I don't know whether waste-derived energy is. Would it be helpful to have the Government purchase waste-derived energy on the same basis that synthetic fuels are, which is guaranteeing the difference between the fuel market price, at the time the actual product is sold, and the cost of producing that product. Is refuse-derived fuel included in that purchase?

Mr. BOARDMAN. You are referring to the Moorhead bill?

Mr. OTTINGER. Yes.

Mr. BOARDMAN. I assume that the way this will finally shake out and become operational will be to tie it in some way with this mobilization board that is proposed which was talked about by the President.

If that happens, then what I think you are talking about is establishing sort of a central clearinghouse for synthetics. Obviously, with the steam or the electricity that comes out of a plant in Boston, it is very difficult for the Government to make that kind of purchase. They may do it through a clearinghouse approach, where they control one aspect of the synthetic fuels.

Mr. OTTINGER. What Moorhead is talking about is guaranteeing the price. What he is saying is, we want to get some of this stuff going, so we will pay the difference between the market price for oil, at the time of delivery, and the price of the product.

Mr. BOARDMAN. I would support that approach and a number of the technologies that it is being applied to.

Mr. OTTINGER. Waste ought to be included in that, don't you agree?

Mr. BOARDMAN. Absolutely. The economics of waste biomass, and solvent refined coal—none of those today compare with oil. They may in a few years.

Mr. SCHWARTZ. Mr. Chairman, I think that you have hit the nail on the head. The transition in the public's mind, going from sanitary landfilling to mechanical facilities to handle waste, there has been some testimony that costs for sanitary landfill disposal is \$3 to \$4 a ton, and then you talk to the average citizen, and you say: "Now you are going to pay \$14 or \$15 a ton." The transition is where the problem is, going from that low, low number up to the higher number.

I think that if there was some way that we could bridge that gap, I think that it would be very helpful because today, and I can speak only for New Jersey, we have municipal funding that has a 5 percent per year increase. You take the mayor, a town council, or the county government, they look at the costs, and say, "We are going to have to go up \$5 or \$10." They look at the budget, and the budget is beyond 5 percent, and they are not going to move.

So if there were some way, for lack of a better word, of greasing the transition to the higher technology, which would make the securing of the refuse steam a lot simpler, and also with some incentive on the back end to make the markets for this energy more palatable, I think we would have something going.

Mr. OTTINGER. I want to thank you for your time and your patience, and your very significant contribution to the enlightenment of the subcommittees.

The subcommittees stand adjourned, subject to call.

[Whereupon, at 1:20 p.m., the subcommittees adjourned, subject to call of the Chair.]

# WASTE TO ENERGY

THURSDAY, SEPTEMBER 20, 1979

HOUSE OF REPRESENTATIVES, SUBCOMMITTEE ON TRANSPORTATION AND COMMERCE, COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, AND THE SUBCOMMITTEE ON ENERGY DEVELOPMENT AND APPLICATIONS, COMMITTEE ON SCIENCE AND TECHNOLOGY,

*Washington, D.C.*

The joint subcommittees met, pursuant to notice, at 9:30 a.m., in room 2318, Rayburn House Office Building, Hon. James J. Florio (chairman of the Subcommittee on Transportation and Commerce) presiding. [Hon. Richard L. Ottinger, chairman, Subcommittee on Energy Development and Applications.]

Mr. FLORIO. The subcommittee will come to order.

I would like to welcome the public, and particularly, our distinguished witnesses here today for the third and final day of joint hearings between the Subcommittee on Transportation and Commerce and the Subcommittee on Energy Development and Applications.

The President recently spelled out his intentions in a number of messages to the Congress to develop alternative sources of energy. I believe that the sense of priority the President has exhibited is fully compatible with our efforts to advance the state of resource recovery in this country.

It is clear from the evidence we have had before this committee in previous hearings that there are positive energy consequences to be derived from the recovery of energy materials from waste stream. Moreover, a recent OTA study clearly stated that the technology is available for the development of commercial resource recovery.

It is also clear, just from reading the newspapers, that the economic conditions for the development of resource recovery are becoming increasingly attractive. To give a specific example, I had occasion to become involved with resource recovery in my own State. Public electricity and gas is now tapping into a landfill I visited in New Jersey and extracting methane gas, that is being pumped with an adjacent firm. The cost to the gas firm is \$2.20 per thousand cubic feet, which is very compatible to the the current cost of natural gas.

When I came to Congress 5 years ago, the cost of natural gas was 50 cents per thousand cubic feet. It is, therefore, obvious that that project would not be taking place if the same economic conditions still existed with regard to the price of natural gas.

The economic equation is changing and things that were not feasible a few years ago are now becoming so. The Federal Govern-

ment can and should play a key role in expediting the growth of private industry in this field. At the very least, we can identify and remove some of the economic and institutional obstacles that hinder the development of this industry's growth.

One such obstacle is the availability of markets for energy produced by resource recovery facilities. In July of this year I urged the New Jersey Board of Public Utilities to consider requiring New Jersey utilities to compare the costs of using fuel or energy derived from solid waste against the cost of using traditional fuels to generate electricity. The motivation of course is to provide an opportunity for solid waste derived fuel or energy to capitalize on a captive market, if it could be cost competitive. Those energy company costs are excessive.

I am pleased to report that the Board has communicated with me and has a program underway which is designed to achieve what we felt the Public Utilities Commission should be achieving.

A comprehensive and coordinated effort to launch development of waste energy program is needed. To this end, the subcommittee of which I am chairman, is proposing a modest package that we will publicly announce in a short time. We are working very closely with Mr. Ottinger's subcommittee and I feel certain we can assist the development of this industry through strengthening existing energy and solid waste disposal programs and perhaps expand on a few of them.

I would, therefore, like to commence these hearings and to welcome our witnesses.

To introduce our first panel, which is made up of Mr. Russell Brenneman, president, Connecticut Resource Recovery Authority; Mr. Melvin A. Greenberg, of Miami, Fla.; Mr. Robert A. Aldrich, senior vice president, Paine, Webber, Jackson & Curtis; and Mr. James Barker, president of CSI Resource Systems. It is my understanding that Mr. Sigal is not going to be with us this morning.

Before asking the panel to commence I would like to recognize the presence of Mr. Ottinger, cochairman for this morning's hearing, and ask him if he has comments to make.

Mr. OTTINGER. Well, I just want to second what my good friend from New Jersey had to say. There is tremendous potential in solid waste conversion, municipal waste in particular. We are not making nearly the use of that resource that other countries around the world are. I think it is important for us to look at what the impediments have been. We are proceeding along those lines.

This resource can make a substantial contribution to resolving our energy problem and we ought to utilize it. We will welcome whatever help our witnesses can give us, suggesting what this country can do to vastly accelerate the use of this potential source of energy.

Of course, it solves two problems at once. Many of our municipalities are having grave problems with disposal of their solid waste. We in the New York area, and I am sure many other communities, are facing a ban on the dumping of sewage sludge. I think the two or related codisposal potential is desirable and very important.

We welcome your testimony and enjoy indeed the opportunity to join with the Transportation and Commerce Subcommittee of the

Interstate and Foreign Commerce Committee on which I also serve, in exploring these possibilities.

Thank you, Mr. Chairman.

Mr. FLORIO. Thank you very much.

At this point, without objection, we will insert Mr. Roe's and Mr. Wydler's opening statements into the record as though read.

Mr. ROE. I would like to commend both Mr. Ottinger and Mr. Florio for the fine job they have done in bringing this vitally important subject before us today.

There is probably no more pressing problem facing our Nation's urban centers than what to do with the continually growing mountains of municipal wastes that must be disposed of on a daily basis.

Landfills are quickly filling up and there is always the omnipresent danger of some hazardous waste material seeping into our precious water supplies.

Our States, particularly those in the northeastern sections of the Nation, are being inundated with municipal wastes to the point that a crisis situation is at hand.

In my own State of New Jersey, the most densely populated State in the Nation, we face a very unique problem. The U.S. Supreme Court ruled last year that New Jersey, because of interstate commerce laws, could not bar either New York or Pennsylvania from dumping garbage in its landfills. It is still hard for me to believe that the Nation's highest court could hand down such a blatantly unfair decision that was so detrimental to the interests of my State.

The heaviest concentrations of landfill activity in New Jersey takes place in an area known as the Hackensack Meadowlands. There are well in excess of 50,000 tons a week of solid waste being dumped there every week. The heavily populated northern New Jersey counties of Bergen, Hudson, Passaic, Essex, and Union have depended heavily on the Meadowlands area for solid waste disposal.

But the Hackensack Meadowlands Development Commission, in its recently proposed solid waste management plan, has ordered that all landfilling there, except for one small area, be discontinued by the end of this year. Many other States are facing similar situations because of court ordered and local decisions adversely affecting solid waste disposal.

But, be that as it may, there is an old expression that every cloud has a silver lining. And in this case, that lining may be more golden than silver. What was once a burden can now become the salvation of our efforts to accomplish energy self-sufficiency from the blackmailing oil cartel known as OPEC.

I have introduced legislation to have the Federal Department of Energy spend \$30 million to establish a unique solid waste to alcohol energy conversion demonstration plant in my State.

The project would serve as a model for other areas of the Nation facing similar municipal waste disposal problems. The measure has received wide-ranging support from my fellow lawmakers from all parts of the country. The potential of such a program is enormous. It has been estimated that solid waste energy plants could convert the total 15 million tons of garbage dumped in New Jersey into 105 million gallons of ethanol. It is clear that solid waste conversion

plants of this type could turn municipal waste dumps into the energy gold mines of the eighties.

An EPA report has determined that about 70 to 80 percent of residential and commercial wastes were combustible and had an energy content of about 9 million British thermal units (Btu's) per ton. Those materials could contribute approximately 3 percent of total U.S. energy consumption.

Once again I congratulate my colleagues for their fine efforts in bringing attention to this urgent matter and they can be assured of my continued cooperation in the future.

Mr. WYDLER. Mr. Chairman, if we've learned one thing this year in our many energy oversight hearings, it is that we do not have time to reinvent the wheel. We are faced with an energy problem of major proportions and we must begin applying new commercial and near commercial technologies to that problem with dispatch. In the municipal waste-to-energy area the problem of course is even more pressing since we are rapidly running out of places to store the waste that serves as the fuel for these processes.

It is becoming clear to me that we as a Congress have two major tasks facing us in the waste-to-energy area. We must push promising waste-to-energy technologies that have not been demonstrated at large scale through the last stages of technology development so that they are ready for the private sector to pick up and use in the very near future. We cannot afford the time to begin with basic research on new exotic waste-to-energy technologies and ignore the substantial body of work that has already been done.

We also must begin to look at why already existing technologies have not made a wider impact on the problem. It is puzzling to me that when the solution to our solid waste problem helps solve part of our energy problems as well, why large numbers of communities are not trying out the technologies that have already been developed. We should look in two areas for the answers. We need to have a clear idea of what incentives will cause municipalities and other government units to opt for waste-to-energy systems. We should have a variety of incentives in place so that we can meet the needs of all types of communities which are large enough to sustain a waste-to-energy system.

In closing I would like to say a few words about the waste-to-energy situation in New York. The EPA has set a moratorium on ocean dumping of sewage sludge in the New York Bight for December 1981. It is probable that several ocean dumping permittees will not be able to meet that deadline, including the city of New York. I feel that the encouragement of a rapid deployment of waste-to-energy plants might alleviate the ocean dumping problem in the early eighties. In the long run it would be a most meaningful conservation program to extract energy from this waste on a significant scale.

Mr. Chairman, I hope we are going to hear positive news this morning that the private sector and the Government intend to move this option ahead. Thank you.

Mr. FLORIO. Mr. Russell Brenneman.

STATEMENTS OF RUSSELL L. BRENNEMAN, PRESIDENT, CONNECTICUT RESOURCE RECOVERY AUTHORITY; MELVIN N. GREENBERG, ATTORNEY, MIAMI, FLA.; ROBERT H. ALDRICH, SENIOR VICE PRESIDENT, PAINE, WEBBER, JACKSON & CURTIS, AND JAMES L. BARKER, PRESIDENT, CSI RESOURCE SYSTEMS, INC.

Mr. BRENNEMAN. Thank you, Mr. Chairman, and good morning.

I am Russell Brenneman, president of the Connecticut Resource Recovery Authority. I think it is important to place in a context of real world experience what the Federal Government might do in this area of resource recovery, so I would like to tell you a little bit about the authority, a little bit about the projects that we are involved in and then make some specific suggestions for your further thought.

The Authority is a quasi-public development corporation. We were established in 1973 as the first organization of its kind in the Nation. Our job is to implement a statewide solid waste management plan also developed by Connecticut in 1973, and also the first plan of its kind in the Nation.

The primary component of this statewide plan in our State is to move toward a waste disposal system which is centered primarily on resource recovery. The plan was adopted primarily for environmental reasons, because of the impact of practices that existed in 1973, on our air, water, and land resource.

The authority is authorized to capitalize projects only through the issuance of special revenue bonding. In order to issue those bonds it is necessary for us to make a finding that a project will be self-sufficient on its own revenues. That is, self-sufficient from the dollars that we can recover from what we get out of the waste stream together with the tipping fees that we get from participating communities.

We are also enabled to enter into long term service arrangements with municipalities, and thus in a sense we are a broker creating these transactions, utilizing the private sector almost exclusively to carry out the service responsibilities that we contract to perform.

We are not in the public works business nor do we operate facilities. We are in the business of enabling them to happen.

We are presently in the startup phase of our first project, the Greater Bridgeport system. The processing facility which is the heart of this system will produce a refuse derived fuel which is proprietary product of Combustion Equipment Associates. The fuel will be purchased and used by an electric generating station owned and operated by the United Illuminating Co., a utility in our State.

The plant is designed to handle 1,800 tons of waste every day, which is coming from nine municipalities and others expected to join the system later on. From that 1,800 tons of solid waste, we anticipate manufacturing 900 tons of fuel. At design capacities and yields and expected heat content from this fuel could replace as much as 650,000 barrels of oil a year, which would otherwise have to be purchased by the utility.

I might mention that the utility is entirely dependent on fossil fuels at the present time.

I would remind you that this is happening in New England, which is the region of our country most heavily dependent upon imported foreign oil. This plant was capitalized by means of a \$53 million special revenue bond issue of the Authority.

Our philosophy in putting this project together has been to minimize risk to the public and to maximize the responsibility imposed upon the private sector contractors.

We have a design, build and operate contract, with the joint venture composed of Combustion Equipment Associates and Occidental Petroleum, which has contracted to provide services and operate the plant over the life of the bond issue, which is a little more than 20 years.

The reason we turned to the private sector to do this was that there is very little public sector expertise even today, and there was even less in 1973. We felt that the private sector should be doing this work and we continue to feel that way.

The complexities of this undertaking are reflected in the fact that it has taken 6 years to get this project to its present stage. Only experience in startup will tell us how much longer it will take to get to full commercial operation.

There is nothing in our experience that suggests that other projects are going to take any less time, as the experience of our counterparts in Rhode Island and Delaware has demonstrated. But we do feel that the learning which has been accumulated will enable some acceleration. Because it bears on the latter part of my testimony, I should remind you that such long lead time carries extreme economic costs in an inflationary economy. A significant cost of a project is incurred in the development stage. Whether this is accomplished by a public organization or a private corporation, it is not unreasonable to expect development costs in the range of \$3 to \$5 million.

This is particularly significant in the field of resource recovery where a great deal of up front money can be spent on a project which aborts in the very late planning stages; the money then goes down the drain.

The authority is presently participating in the development of another project to serve central Connecticut, in partnership with the Metropolitan District Commission. The project will include the codisposal of municipal solid waste and sewage sludge. We received from the U.S. Department of Energy a development grant in the amount of \$500,000 to assist in the development of this project, and I might note that those are the first dollars of taxpayers funds that the Authority has ever received.

Our markets appear likely to be utilities supplying electricity and environmental steam. We shall seek the support of the Environmental Protection Agency in the planning and development of the sludge element of this project.

We are proceeding with the development of a third project to serve south central Connecticut, centering on New Haven. We received a grant commitment in excess of \$350,000 from the Environmental Protection Agency under the urban grants program for the first phase of this project. I mention these Federal grants for a reason. They are very important to us. In a very real sense, the

availability of these development grants has accelerated the development of these projects.

Our working relationship with both Federal agencies has been good. We found a lot of assistance from both EPA and the DOE, but getting from where we were in 1975 to where we are today has been an incredibly, complex, and difficult process.

I would like the record to be very clear that Connecticut feels that the judgment which we made in 1973 was a sound one, and, as the chairman has pointed out, the escalation in the cost of energy and, therefore, the price that we can sell energy for has made resources recovery an even more attractive option today than it was in 1973.

What should the Federal role be in this process? I think that I can suggest four things for your consideration:

First, there should be a program to provide funding for front-end development costs for projects.

Second, there should be some kind of program protecting projects from unpredictable events and risks.

Third, we should have in place Federal policies providing incentives for private investment in these facilities; and,

Fourth, as the Chairman has pointed out, it is important in certain regions of the country to support the energy markets for these projects.

Now, in addressing these recommendations the authority wishes to stress its primary philosophy.

First, Federal and other governmental actions intended to accelerate project development should do just that and not get in the way of private initiative. It should not in any event cause unintended delay. It is possible for well meaning Federal programs to have the countereffect of actually delaying the goal that is sought.

We don't feel that either the Federal Government or any other Government agency should get in the business of subsidizing resource recovery facilities on a permanent basis. It may sound strange for a possible beneficiary of a Federal program to say that, but I am here to speak in what I regard as the public interest and not from a parochial perspective.

Where economic supports to projects are provided, either at the front end or at any other time in the history of the project, we feel these supports should come in the form of loans rather than grants, and that provision for repayment of the loan should be contracted into the program financing.

I think that I have dealt adequately with the need for front-end development expenses. These can be very substantial. I can truthfully say that we would not be proceeding with our second and third projects without the assistance that we have received from both the Department of Energy and EPA.

We have spent significant sums in the past on projects which were aborted for economic reasons, and I think that the Federal Government, if it supports the development of resource recovery as a policy matter, should be in the business of providing these front-end expenses. However, I think that where a project goes forward and a grant has been awarded for development costs, that grant should be converted into a loan and be repaid when the project is capitalized. If the project does not go forward, I think the Adminis-

trator should have authority under appropriate safeguards to forgive the loan.

Second, providing shelter of the project from unforeseeable or unpredictable events. We are entering a startup phase for the Bridgeport project. That may go very well. It may not go well. We may need further funding to fix problems that we encounter along the way. We think that there should be some kind of program for us to borrow from the Federal Government under appropriate safeguards additional funding for projects that have difficulty in startup. Remember that as far as this country is concerned this industry is about 8 years old, and every day is a learning experience.

There are other kinds of unforeseeable and unpredictable events which perhaps some of the other panelists will address.

Third, I think there should be provision for private incentives for investment in resource recovery projects. I think these incentives can be provided primarily through adjustment of rather technical provisions in the Internal Revenue Code having to do with tax-exempt financing, investment credits, and the like. And again I suspect that some of the other panelists will address that quite technical area more than I am prepared to do so.

Fourth, I mentioned price support for the energy market. The key to these projects is that energy market. It is no accident that our first project has a market in electric utility which is absolutely relying right now on imported foreign oil. Waste-to-energy for a utility that is dependent upon oil looks very good.

However, in many parts of this country you have a very different mix of fuels, and in order to provide resource recovery in those other parts of the country, we think that the committee should give consideration to some kind of price support mechanism for that energy market. However, again I think that price support should be short term rather than long term, and I think it should be in the form of a loan which could be repaid from later revenues from the project.

These steps are not grandiose. I don't think we need a Manhattan project for resource recovery, even if we could afford it. I think the industry is very nearly there, and what the Federal Government should do is provide a little bit of a push, a little bit of assistance right now in order to bring projects into the development phase so that when we need them we will have them 4, 5, or 6 years down the road.

The authority would be very happy to accept the invitation of the chairman and the committee to work with you to refine some of these ideas, to react to your ideas, if that would be helpful to you.

Thank you, Mr. Chairman.

[Testimony resumes on p. 220.]

[Mr. Brenneman's prepared statement follows:]

STATEMENT OF RUSSELL L. BRENNEMAN, PRESIDENT  
CONNECTICUT RESOURCE RECOVERY AUTHORITY

I am Russell L. Brenneman, President of Connecticut Resources Recovery Authority.

The Authority is a quasi-public development corporation. Established by state law in 1973, it was the first organization of its kind. Our mission is to implement Connecticut's State Solid Waste Management Plan.

The Plan was adopted in 1973. It calls for the development of a municipal solid waste disposal system having as a primary component resource recovery facilities which recover energy and recyclable materials from the waste stream. The Plan was adopted primarily for environmental reasons because of the impact of then existing land disposal and incineration upon our air, water and land resources. This was the first Plan of this type adopted by any state.

In deciding how to implement this Plan, the legislature had a number of options.

It could have left implementation to the municipalities, which under our law have responsibility for the disposition of waste generated within their borders. The problem with this option was that none of our towns and cities possessed the understanding and experience which are essential components in applying these technologies to solid waste management. Nor did any of our cities and towns individually generate volumes of municipal solid waste sufficient to support resource recovery facilities of the type then known to exist.

The state could have gone into the resource recovery business itself by designing, constructing and operating these facilities through a state agency as a vast municipal public works and service project. Capitalizing such an effort would have required issuing hundreds of millions of dollars of general obligation bonds by a state whose annual borrowing rate is now not in excess of \$100,000,000

and at a time when management of the state's capital budget was of primary concern to both the legislative and executive departments.

The state could have subsidized the program through a vast construction grants allocation to private, municipal or regional recipients with the same awesome financial commitments. But such a public subsidy runs counter to our belief that whenever and wherever possible things which can be done in the private sector should be done there and that the beneficiaries of services should pay for them whenever they are able to do so.

The result of this reasoning was the creation of the Authority. We have a very small staff and are directed to conduct our activities under contract with the private sector, including consultants, financial advisors and contractors who build and operate these systems.

We are authorized to issue special revenue bonds, with the approval of the State Treasurer, only for projects which exhaustive feasibility studies establish will be economically self-sufficient; that is, the revenues derived from the project must be sufficient to pay the operating and capital costs involved. The source of these revenues is, of course, the tipping fees paid by participating municipalities and receipts from the sale of recovered energy and materials.

We are enabled by statute to enter into long-term service contracts with communities and contract with the private sector to carry out those service responsibilities. Thus, we are not in the public works or service business ourselves, but are in the business of developing opportunities for resource recovery projects and waste management services; structuring and managing the contractual relationships for the design, construction and operation of resource recovery systems; and producing the capital necessary to fund projects.

We are presently in the start-up phase of our first project, the Greater Bridgeport System. The processing facility which is the heart of this system will produce a powdered refuse-derived fuel which is a proprietary product of Combustion Equipment Associates, Inc. The fuel will be purchased and used at an electrical generating station owned and operated by the United Illuminating Company, a public utility.

The plant is designed to handle 1800 tons per day of municipal solid waste coming from nine municipalities which are presently participating in the system and others expected to join later. From the 1800 tons of solid waste we expect a yield of approximately 900 tons of fuel. At design capacities and yields and expected heat content, this fuel could replace as much as 650,000 barrels of oil a year which would otherwise be purchased by the utility. I would remind you that this is happening in New England, which is the region of our country which is most grossly dependent upon imported foreign oil.

The plant was capitalized by means of \$53,000,000 of special revenue bonds issued by the Authority. The Authority has entered into municipal service agreements with the participating towns and has, in turn, contracted for the design, construction and operation of the plant over the life of the bond issue with a joint venture composed of Combustion Equipment Associates and Occidental Petroleum. Tipping fees to the municipalities are guaranteed by the joint venture over the life of the bond issue, and at certain levels of volume revenues will be returned to the municipalities to reduce the net tipping fee.

The philosophy of the Authority in making these arrangements has been to minimize public risk and to maximize the responsibility imposed upon our private sector contractors. Given the state of the technology, the lack of real public sector expertise in the construction and operation of these facilities,

and our statutory directive to maximize private sector participation, it is our judgment that the decision to impose design, construction and operating responsibilities solely on the private sector was a reasonable one, although we recognize that under other circumstances other arrangements might be appropriate.

The complexity of this undertaking is reflected in the fact that it has taken six years to get this project to its present stage, and only the experiences in start-up which lie ahead will tell us how much longer it will take to get into full commercial operation. There is nothing in the experience of the Authority to suggest that this long period of development is necessarily atypical, as experiences of our counterpart agencies in Delaware and Rhode Island bear out. However, we do feel that the learning which has been accumulated and advances within the industry itself can lead to some acceleration. Because it bears on the latter part of my testimony, I should remind you that such long lead times carry an economic cost, particularly at a period of unprecedented inflation. A significant cost is that of developing the project itself. Whether this is accomplished by a public organization or a private corporation, it is quite reasonable to expect development costs in the range of three to five million dollars. This is particularly significant in the field of resource recovery where a great deal of "up front" money can be spent on projects which for one reason or another abort and do not proceed to completion.

The Authority is presently participating in the development of a project to serve central Connecticut in partnership with the Metropolitan District Commission, a regional organization providing sewer and water services to a number of municipalities. This project will include the co-disposal of municipal solid waste and sewage sludge. We have received from the U. S. Department of Energy a development grant in the amount of \$500,000 to assist in the development of the

waste-to-energy system. Our markets appear likely to be utilities supplying electricity and environmental steam. We shall seek the support of the Environmental Protection Agency in the planning and development of a regional co-disposal strategy as part of this project.

We are proceeding with the early planning of a project to serve south/central Connecticut, centered on New Haven, with the assistance of a grant in excess of \$600,000 from the Environmental Protection Agency under its Urban Grants Program. I mention these federal grants for project development because they are important to us. In a very real sense they have accelerated the development of both of these projects. Our working relationship with both of the federal agencies has been good. We have benefitted from the advice and the technical assistance available from the Environmental Protection Agency, and we have found within the Department of Energy individuals who are very able and very sensitive to the peculiar circumstances of resource recovery development.

While getting from where we were in 1973 to where we are has involved an incredibly complex and difficult process, I would like the record to be clear that Connecticut feels that the judgment which our legislature made to proceed toward the development of resource recovery as a primary alternate disposal option for municipal solid wastes was sound then and remains sound today. While we embarked upon this course largely for environmental reasons prior to the deep national concern over energy shortfalls, certainly the need for waste-to-energy systems has been reinforced by recent events. Whereas six years ago in Connecticut there were many citizens who had fundamental questions about the desirability of resource recovery, today the Authority is more likely to encounter the question: "Why can't you make it happen faster?" I would like to conclude this testimony by suggesting some problem areas and some specific federal initiatives which might

be considered by the Congress. The problem areas I would stress are:

- (1) Providing for "front end" development costs;
- (2) Protecting projects from unpredictable events and risks;
- (3) Providing incentives for investment in facilities; and
- (4) Supporting the energy market in instances requiring that.

There is no simple solution to any of these problems, and the solution to none of them can be found solely through federal or other governmental action. However, federal initiatives perhaps can be helpful.

In addressing these problems, the Authority would urge upon you two cardinal aspects of our own philosophy. First, federal and other governmental action intended to accelerate project development should not get in the way of private initiative and should in any event not cause unintended delay. Secondly, neither the federal government nor any other governmental organization should get into the business of subsidizing the capital or operating expenses of resource recovery projects. It may sound strange for a possible beneficiary of a federal grant program to say that, but we feel that grant subsidies tend to hide the economics of projects and perhaps relax procurement disciplines which should apply in the hard world of the marketplace. Where economic supports to projects are provided, either at the "front end" or at any other time in the history of the project, we feel those supports should come in the form of loans, rather than grants, and that provision for repayment of the loan should be cranked in to the project economics.

I would like now to address each of the individual initiatives which I have raised.

- (1) Making provision for "front end" development expenses.

It is necessary for the federal government to have a program somewhere

to assist public agencies in the development costs of projects. These costs can be substantial. They must be incurred in many instances even before a project is found to be viable. For example, the key to the economics of any waste-to-energy system is the energy market. Finding the appropriate energy markets in a region and interesting them in participation, to say nothing of negotiating an attractive contract price, can be an arduous and time consuming task, with no assurance of success until agreement has in fact been reached. Until the energy price is known, the project economics remain unknown, and the developing agency does not know whether there will result a tipping fee low enough to attract municipal participation. The point is that a great deal of work can be done on a project which has every appearance of viability which breaks down because of a failure in negotiations. Because of this well-known fact, private industry and public organizations such as mine may be reluctant to invest the monies necessary to conduct these activities.

We believe that the provision for front end expenses should be made in the form of a loan, rather than a grant, program. If the project in fact becomes viable, the loan should be repaid to the federal government as part of the project capitalization. This, of course, is not the case with the existing Department of Energy and Environmental Protection Agency grant programs, so you will observe that I am talking not from the perspective of self-interest but from what I regard as sound public policy. We believe, however, that if a project, having received the benefit of this support, proves not to be feasible for any of the dozens of reasons which can cause such a project to abort, there should be provision for the lending agency to forgive the loan.

A caution must necessarily be added. Grants for "planning" can result in delay rather than acceleration in that communities which might otherwise be disposed to go ahead may wait until they receive expected grant support. It is also the case

that an enormous amount of money can be, and certainly has been, spent on "planning which has not resulted in implementation. As the head of an implementing agency, I am not interested in that kind of program. Safeguards, then, must be provided to assure that federal economic support goes only to those projects most likely to be implemented and that the program does not result in the opposite effect of the one intended -- further delay.

- (2) Providing shelter for the project from unforeseeable or unpredictable events.

There are significant risks to the development of resource recovery projects primarily caused by the lack of sufficient experience with them. In the absence of information gained through operation over a long period of time, a potential project developer may hang back or, at the very least, investors may seek protection by requiring the creation of substantial capital reserve funds, thus increasing the cost of implementing the project. Certainly nothing the federal government can do can eliminate these risks entirely, but three forms of assistance might be helpful.

First, a loan program could be made available to provide financial assistance to projects which have completed construction but have been unable to complete start-up over some reasonable period of time. The best and most reasonable of plans and designs may fail when put to the test and projects in which enormous investments have been made may require substantial revision as a result of the start-up experience. If a program were available in the form of a loan at an interest rate less than that available in the marketplace and subject to appropriate safeguards such as the requirement that the amount of the loan be matched by a certain percentage of other monies, incentive to go forward with the project which finds itself in difficulty would be provided.

Second, some protection of these projects from changes in environmental or other regulations within a certain period of time after their initial financing would protect the project and its investors from unforeseeable changes in regulations. A plant designed and financed pursuant to a given set of environmental standards may find itself confronted with a change in those standards which could be substantial enough to require abandonment or refinancing of the project. We feel that for some period of time -- perhaps ten years -- the project should be protected from ex post facto regulations unless there is a clear and imminent threat to human health.

Third, consideration should be given to a federal reinsurance program whereby if a project is required to invest substantial further monies at any time as a result of changes in federal laws or regulations enacted or adopted after construction, the additional cost could be recaptured, at least within specified limits. The rationale behind such a program would be the federal policy to encourage development of these projects coupled with a federal responsibility for laws and regulations adopted after the project is under way. Funding to support such a program could be derived from a premium on projects desiring such protection which would be a percentage of the total capital cost of the project. Whether or not to take advantage of the program would be an election on the part of the project developer.

There is nothing very grandiose about any of the federal options which I have described. No "Manhattan Project" is needed to get waste-to-energy systems on line. Indeed, developing technology and inexorable economics will cause systems to come into being without the intervention of public law and policy. However, I am convinced that without such intervention it is going to take a very long time indeed. At a time when our nation should be developing every alternative source

of energy, our ability to utilize solid waste will lag because of the uncertainties and risks which I have described. The principal risk to the nation is that potential developers of these projects will simply stop to wait and see at the very time when the national interest requires them to press forward.

(3) Provision for investor incentives through revision of the Internal Revenue Code

A case can be made that tax policies presently in effect unduly complicate project financing arrangements and fail to contain proper incentives to attract private investment. If there is a national interest in developing waste as an alternative energy source, the tax law should be adjusted to reflect that policy bias.

To be more specific:

The period during which an energy tax credit can be claimed for investment in a resource recovery facility should be extended until December 31, 1990, which takes into account the long lead time necessary for the development of these facilities.

The definition of the type of equipment for which the energy tax credit may be taken should be expanded to reach beyond the present definition of recycling equipment. Eligibility should be extended to equipment used in the transport, storage and utilization of solid waste, including its conversion into fuel and useful energy, and all equipment which is adjunctive to the conversion of waste to energy, including that relating to processing, storage, loading and transportation.

The definition of "alternative energy property" should be changed by deleting the requirement in present law that an alternative substance comprise at least 25% of the feed stock when combined with oil or gas in the boiler in order for the equipment modification to be eligible for tax credit treatment.

I am sure that one who is more expert in the intricacies of the tax law

than I am could come up with other specific modifications to increase the incentives for private investment in resource recovery projects, but the point I would leave with the Subcommittee is that there is work which can and should be done in this area.

(4) Provide price supports for energy market, where appropriate.

The energy market is the key to a successful waste-to-energy system. The price the system receives for energy is the primary determinant of the cost to the user. If the tipping fee is low enough, waste will flow toward the system. Local fuel markets, at least over the short term, may be lower than national market prices, and the price which can be obtained for energy derived from waste commensurately low. This can result in the delay of the implementation of the project until local energy costs catch up, even though from every other point of view the project may be viable and necessary.

Again, I am speaking from the context of what I think would be sound federal policy rather than from self-interest because I do not believe a price support program is necessary in the Northeast. High energy costs in New England coupled with the scarcity of energy sources probably makes resource recovery systems more viable in our region than any other part of the country.

Such price support systems should provide for a standard support price equivalent on a BTU basis to the world market price of oil. The assistance should be in the form of a loan and should be related to the difference between the actual cost of fuel to the energy purchaser and the standard support price. It is also my belief that the price support should be temporary -- certainly for a period of no more than ten years -- and thus would be applicable only to projects which are viable in terms of long-term life cycle economics.

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The suggestions which I have made are a modest step to assist this needed industry. I am sure there are other equally valid suggestions, and the Authority looks forward to continued dialogue with the Subcommittee and others who have an interest in a responsible federal posture. It seems to be a characteristic of this industry that not many of us agree on a great many things, whether we come from the public or the private sector, but one view which we do share is that there are steps which the federal government can take to move the process along a little faster and that it is in the national interest that these steps be taken.

Mr. FLORIO. Thank you very much.  
Mr. Greenberg.

#### STATEMENT OF MELVIN N. GREENBERG

Mr. GREENBERG. Good morning, Mr. Chairman, ladies and gentlemen.

My name is Melvin N. Greenberg. I am a practicing attorney in Miami, Fla. My introduction to resource recovery occurred when Dade County Fla., requested that our law firm represent them in connection with a resource recovery project which was being contemplated by the county. At the present time, that plant has been contracted for and is under construction, but it has taken 7 years from its initial conceptualization. That was the route in Dade County to get to the construction stage and it takes an additional 2 years to construct a resource recovery plant.

We have also been involved in negotiating and conceptualizing resource recovery projects in Montgomery County, Ohio—in the city of Dayton—and in the city of Detroit, Mich. Each of these projects have been going on for many years. I believe the Dayton-Montgomery County project has been going on for 8 years.

At the present time, Montgomery County has put the project in limbo because it has taken so long and they have not made very much progress. The county has therefore set the project aside and is considering alternate means of disposing of its solid waste.

The city of Detroit project has been in existence for approximately 4 years and that project has just begun commitment to the contractual phase. The question here then is why do such projects take so long? Why are communities having so much difficulty in putting together a resource recovery project?

First, resource recovery is considerably different than the typical municipal or county kind of function. It is actually going into business. It is a proprietary function. I think that the first thing that has to be understood, is that although the disposal of solid waste has traditionally been a municipal function, resource recovery asks the municipality to add an energy component. This takes on certain complexities municipalities are not fully capable of dealing with and provides a tremendous amount of risk because the municipalities are in a business. They are in effect manufacturing

a product and selling it and are required to do so for a substantial number of years. A great number of predictions go into that and a lot of assumptions which, if incorrect, could have a serious effect on both the economic and environmental well-being of the community.

In going into a resource recovery project, there are at least four major problems that have to be addressed. First does the municipality have an energy and products market for the resource recovery project? Since every resource recovery project needs someone or some entity to sell the recovered energy to, this is a critical inquiry which must be resolved. My personal opinion is that the best market for a governmental body is a utility company. The reason we think that is the best is because the risk is the least.

For example, in Montgomery County it was perceived initially that the best market was an industrial manufacturer who manufactured or converted corn into corn starch and used the steam to cook the corn. It happened that the steam levels that could be produced by the solid waste plant in Montgomery County were compatible with the full commitment of steam needed by this industrial manufacturer.

The problem here, however, was that if the county failed to produce this steam the industrial manufacturer would suffer substantially since it would no longer be able to cook its corn to convert it into the derived end product. The county was therefore being asked to say to private industry that in 3 years or in 2 years it would have in place a resource recovery plant which could accept solid waste and convert it into some form of fuel and further that the county would manufacture steam and sell it to the manufacturer at a price and guarantee the pounds of steam and pressure for 15 or 20 years. Public entities typically cannot do that, and Montgomery County was not able to do that, since the technology wasn't available to assure the risks of such guarantees. Further, public entities should not have to take such risks. So there are considerable problems with the industrial type of buyer who really needs the steam.

Now, obviously if the institutional-type purchase needs the steam he will pay the higher price, but the higher price means that there is going to be greater risk on the part of the public entity. On the other hand, a utility company is like a sink. It really does not need this energy in the true sense of the word. As we all know, utilities have reserves. They have alternative generating capacity, and so they are in a constant state of having more electricity than they really need. This reserve capacity is in fact required by Federal law. In the event that the municipal plant is down, because it is not functioning, because there is a strike, because the technology did not come up to snuff, or for any other reason the damages are relatively minimal under the appropriate type of contract with a public utility. What the public entity is saying to the utilities in that context: "If we produce the stated electricity you will pay us for it and if we do not you will not, but there are not major damages as a result of our failure to produce."

Now, the problem with dealing with utility companies in Dade County is a classic example of utility companies not being interested in resource recovery since they do not view it as anything that will

give them any substantial economic benefit. For example, the scenario is as follows: "Here comes Dade County with its 78-megawatt generation capabilities. We are very large. In effect our plant is 3,000 tons a day, the largest plant under construction in the country at this time, and that is only 3,000 out of 5,000 tons of solid waste that Dade County actually produces." The county is really saying to Florida Power & Light, who is now constructing 500- and 600-megawatt plants, "We want you to construct a 78-megawatt plant in Dade County." Well, 78 megawatts to them is just not interesting. It is just not worthwhile. How can we get them to contract with us?

It is very difficult to negotiate a contract with a market who is not interested, in which there is no economic thrust to say "Look, we will sell this to you at the same price or a little cheaper," because that is not the point. The point is it is not significant. As a matter of fact, it took 2 years to negotiate that contract with FPL.

As it turned out, we think Dade County got a good contract, but the pressure that we had was not economic, it was moral, public pressure, it was "hollering and screaming," it was threatening to go into the electric business ourselves.

Now, if somehow either greater incentives could be developed—tax incentives being a possibility which is suggested in the text of our written statement—or a requirement that a public utility has to buy from a resource recovery plant as long as the other users are not discriminated against, then we really would have a meaningful impetus to resource recovery development. I think that together with the subsidy such a program would make resource recovery take off from its present position.

For example in Montgomery County, Dayton Power & Light was just not interested. Detroit Edison it turns out is, and the reason is they have a particular problem with their steam line that goes through the city of Detroit where the resource recovery plant would produce about enough steam to take care of that particular need. So in that case, they were interested in cooperating. But across the country this is a very serious problem.

Now, the second part of this, and it really is a corollary, is a state of the art problem. The reality here is that technology has not been established, there is a high risk to constructing a resource recovery plant, and you really do not know what you have got until after the plant is built. At that time you have incurred an incredible amount of front end capital costs.

Certainly the Federal Government has a key role in the development of resource recovery projects. In effect, the Federal Government created resource recovery by its environmental standards. To give you some relative numbers in Dade County, it used to cost \$3 a ton to landfill solid waste. Today, in a conforming landfill it is \$14 and rising very rapidly. So, in effect environmental standards, environmental controls, have created resource recovery together with the rising energy costs. The two of those together, I think, now makes resource recovery a viable proposition. But the technology is still new.

Now, it is new in the sense of environmental standards. It is new in the sense of utilizing it as a primary method of reducing the costs as opposed to Europe, which has had numerous plants for

many years but because of high energy needs these plants are an incidental benefit rather than main economic reason to build the plant.

In Dade County, our contract permits us to resource recovery our solid waste at about \$13 a ton, which right from day one is very competitive with other disposal methods; but that is because of our high water table. In most areas that would not be so.

What happens in the city of Detroit, where the capital carrying costs per ton, because of the high interest rates today and inflation, will be about \$20 a ton. The city is committing the \$20 a ton for let's say a 2,000-ton plant; you are talking about a major commitment of city funds to a structure and for a technology which may or may not work.

Now, it is true, to a certain extent, the city would get some guarantees from the private sector but those guarantees, except on a very rare occasion are limited guarantees, and are not really the kind of assurances that a public entity should have.

I submit the possibility of the Federal Government in some way interjecting a program which would eliminate that portion of the risk which makes the cost of the disposal of solid waste greater—for example, where the plant does not operate at expected levels. That is another major reason that—resource recovery has not taken off, since public entities are not prepared to take that risk. They are not prepared to have a major capital expenditure sitting there and then having to landfill in any event because the resource recovery plant has not worked or it has not done the job that it has been claimed to do.

The third, key problem is financing. There is a financial problem and incumbent upon that is the demand by bondholders for the kind of guarantees which become part of the performance promises and, therefore, part of the risk. I will list some of these risks in a few minutes.

The fourth key problem is control of the waste stream. I do not know whether the subcommittees can address that problem but it is a problem in many areas. Dade County, has no such problem, however, since it is a metropolitan form of government which controls all of its waste. The city of Detroit holds all of the waste within the city limits, so it also has no such problem, but other areas do. In many, cities, a private hauler could go to an alternative landfill site. Therefore, we have to make landfilling not competitive with resource recovery because we know the private sector will go to the cheapest place to get rid of their solid waste, and if resource recovery is not competitive, they will go elsewhere.

If they go elsewhere, the community has a very serious problem on its hands because it promises the vendor, who will operate the plant, that it will deliver a certain number of tons of solid waste for a long time—for example 20 years—and at a certain quality which will have a certain BTU content for 20 years. That is a very major prediction, because if that doesn't occur, and the solid waste does not go through the plant, the per ton cost goes up. If the BTU content is not there and energy recovery is not there, the revenue stream is limited and the disposal cost per ton goes way up. We have to make sure that if those events occur that the public entity will not incur any real negative impact.

One of the ways to do that, for example, occurred in the City of Akron which attempted to pass legislation which required local haulers to bring their solid waste to the city plant. That is being attacked in Federal Court as a violation of the Sherman Act, as being a monopoly. This matter is still in litigation and is a major case in the resource recovery field concerning whether a community can require its waste to be delivered to its plant. If it cannot, then it cannot have a resource recovery plant, the question here is whether it would be competitive with landfill, and right now resource recovery is largely not competitive.

There is a discussion of possible solutions to these problems in my written testimony, and I think the other panelists will discuss most of them. I would like to make mention of one potential addition, and that is a Federal loan assistance program. This is a method by which the Federal Government would loan money to a community, where a community planning resource recovery is prepared to put up a substantial number of dollars itself, and where private industry is prepared to put up its share. What those shares are of course, is subject to discussion.

The Federal Government would make the loan to the project, by evaluating it, much as the FHA does or any other Federal loan program, in effect through a form of subordinated capital, if one were to call it that. This would reduce the risk factor, which is attributable to the energy portion of resource recovery. In the event the project does not progress as predicted, then the negative impact to the public entity would be ameliorated.

We think that resource recovery is going to be significant and the question is what can we do to get more plants built and in operation? Once that happens, once this technology is established, most of the problems we are raising will disappear because people will have confidence and will be willing to take the risks associated with resource recovery.

Thank you.

[Testimony resumes on p. 249.]

[Mr. Greenberg's prepared statement follow:]

STATEMENT OF MELVIN N. GREENBERG, ATTORNEY,  
MIAMI, FLORIDA, BEFORE THE SUBCOMMITTEE ON  
TRANSPORTATION AND COMMERCE, COMMITTEE ON  
INTERSTATE AND FOREIGN COMMERCE, AND THE  
SUBCOMMITTEE ON ENERGY DEVELOPMENT AND  
APPLICATIONS, COMMITTEE ON SCIENCE AND  
TECHNOLOGY

SEPTEMBER 20, 1979

Mr. Chairman, Honorable Members of the Subcommittee, Staff, Ladies and Gentlemen, I am Melvin N. Greenberg, a practicing attorney in Miami, Florida. Over the past seven years, I have been involved with Resource Recovery projects. It is an honor for me to have been asked to testify before you today.

The principal issue before this Subcommittee is whether Resource Recovery can provide a viable alternate fuel source which would be acceptable both from an economic and environmental perspective. For purposes of my presentation, it is assumed that there exists or will exist within the near future a technology which will convert solid waste to energy in an economically feasible manner, understanding that the present "state of the art" of Resource Recovery technology is in flux. In this regard, we must examine what can be done to accelerate the use of Resource Recovery as a waste disposal and energy recovery process.

What role should the federal government play in what has traditionally been a local public entity function? Solid waste regulation has been in the federal domain for many years. The Environmental Protection Agency has addressed itself to solving environmental problems involving the disposal of solid waste. This has resulted in EPA regulations and orders that have added significantly to the cost of disposal of solid waste.

For example, in Dade County, Florida, where a 3000 ton per day Resource Recovery facility is presently under construction, landfill costs for nonconforming landfills have historically been about \$3.00 a ton. New environmental regulations have impacted on the cost of disposal of solid waste by the County by raising the cost of conforming landfill disposal to \$14.00 a ton. In Montgomery County Ohio, where a 1200 ton per day Resource Recovery facility is being considered, EPA required modifications to the County's two main incinerators have resulted in their partial shutdown. As a result, the County has had to transport significant quantities of its waste by truck approximately forty miles to conforming landfills located outside of the County. The disposal cost resulting from the EPA required modifications has gone from \$8.00 per ton to \$12.00 per ton with the

County still being required to pay the debt service on the incinerators as additional waste disposal costs. In Detroit, Michigan, where a 2000 ton per day facility is being negotiated, the limited remaining life of available conforming landfills has caused the City to consider Resource Recovery.

The increase in cost of solid waste disposal has left public entities to grapple with the major task of finding alternative solutions to disposal of solid waste. At the same time, our nation has been experiencing a severe energy crisis which has significantly raised the cost of oil, natural gas, and other fossil fuels. These two significant economic events may have made Resource Recovery an attractive alternative fuel possibility.

Most public entities have adopted a "dump now pay later" philosophy in struggling with the increasing costs of solid waste disposal. This philosophy results from the need of such entities to solve their waste disposal problems in an environmentally acceptable manner but at the lowest possible cost and least risk. Resource Recovery has a high initial cost but an overall economically positive life cycle compared to landfill. Notwithstanding this, few public entities have elected Resource Recovery as of the present

date but have opted instead to go the landfill route. Such a "dump now pay later" philosophy has illusory positive economic results over the short term, and only postpones the long term environmental and economic difficulties of the public entity in disposing of its solid waste. The issue here is how to reduce the impact of the high front end capital carrying costs and disposal costs of Resource Recovery.

If our initial premise is correct that solid waste is a viable alternate source of energy, we must analyze the specific means which are available to encourage public entities to elect Resource Recovery. Critical to this inquiry is who should bear the risk of implementing the energy side of Resource Recovery.

That part of the risk which concerns energy recovery should be a federal concern. It should be understood that Resource Recovery is a proprietary type function, a business that involves the conversion of raw materials into a saleable product. Although public entities have engaged in proprietary functions, the trend is for them to eliminate their participation in such activities. In contrast, Resource Recovery requires a public entity to engage in a proprietary function with an untested technology which has a

potentially critical negative impact to the well being of the local community.

In formulating proposed solutions to the dilemma presented to public entities in selecting a method of solid waste disposal, it is necessary to examine both the key problems and risks inherent in Resource Recovery.

Four of the key problems in Resource Recovery are the control of the solid waste stream by the municipality, the need for a viable energy market, the ability to obtain and service financing, and the current "state of the art" of applicable technology.

Control of the solid waste stream is obviously crucial to public entity Resource Recovery projects. In that this issue has been or will be discussed in detail elsewhere, we do not address it here beyond suggesting an antitrust exemption for solid waste disposal requirements. This may facilitate the control of solid waste which is so critical to public implementation of Resource Recovery projects.

The second key problem presented is the need for a viable energy market. The generally available energy markets are the industrial manufacturer and the public utility. The industrial manufacturer market is generally more compatible with the energy production levels of a

Resource Recovery project and will usually justify a higher price for energy. It, however, frequently involves considerably higher risks to the project participants. This results from the this market being dependent upon energy produced by the Resource Recovery facility. In the event that the facility does not meet minimum performance guarantees, substantial damages result. In view of the significant capital and other up front costs of the typical Resource Recovery project, the additional prospects of such penalties often preclude the public entity from entering into such contracts. For example, in the Montgomery County, Ohio, project, negotiations were undertaken with a large local industrial manufacturer which insisted on substantial penalties in the event of failure of performance by the Resource Recovery facility or the County. This was so notwithstanding that the apparent energy needs of the company were compatible with the proposed production levels of the planned Resource Recovery facility.

In contrast to the industrial manufacturer market, the public utility presents a substantially lower risk. However ever, public utilities will generally pay considerably less for such energy. Most utilities perceive that they have no need for such energy and gain no substantial economic

benefit from it. They therefore present very difficult negotiations for the public entity. Further, a public utility has the flexibility to move from energy derived from solid waste to other energy to serve its needs. This ameliorates the risk of non-performance by the facility. In this sense, the public utility acts as a sink while other existing generating capacity becomes reserve capacity.

In Dade County, Florida Power & Light Company ("FPL"), the energy market, is now constructing 500 to 600 megawatt generators, while the Dade County solid waste resource recovery facility will provide enough steam only to drive a 78 megawatt energy generation capability. This is less than one (1%) percent of the overall energy needs of Florida Power & Light. In the ordinary course of business, FPL would not consider purchase of such a 78 megawatt unit. Therefore, it was extremely difficult to convince the public utility to become a project participant. Frankly, the strongest negotiating tool that Dade County possessed was public opinion rather than economic argument. The negotiation with FPL took Dade County almost two years to complete.

The potential economic risks posed by the industrial manufacturer for failure of performance and the insufficient economic incentives to the public utility must therefore be

dealt with if Resource Recovery projects are to become more readily established.

The third key problem proposed is the need to obtain and service financing for the Resource Recovery project. The success of most financings is dependent upon the "credit" of the community. In the Resource Recovery area there are additional considerations of greater importance which result from the proprietary role which the public entity must assume in such a project. For example, in the Detroit, Michigan, project, critical questions have arisen whether the City has the capability to assume "force majeure" which when costed out would appear to be included in the debt limit of the City. Further, state law prohibits the City from entering into a "put or pay" contract -- i.e. the City is permitted only to contract for services actually rendered or to be rendered. In the event of a failure to deliver solid waste to the proposed facility, for example, the City might incur impermissible debt.

A fourth key problem area here is the "state of the art" of Resource Recovery technology. This technology is currently experiencing rapid advances but remains uncertain. Unlike a coal or oil burning boiler, which can in effect be bought off of the shelf, Resource Recovery technology is

currently in a developmental state. This inability to predict the result of such technology poses a major impediment to involvement in Resource Recovery by public entities.

The foregoing key problems can be further amplified by looking at the key risk areas intrinsic to structuring a Resource Recovery project. The following is an outline of the types of risks which must be considered by a community contemplating a Resource Recovery project:

A. Construction Phase Risks

1. Increases in the cost of the Facility after the construction price is established.
2. Construction Financing Risks.
  - (a) Difficulty in satisfying requirements for financing.
  - (b) Interest costs.
    - (1) Unanticipated interest costs.
    - (2) Factors causing fluctuation of interest.
  - (c) Adverse federal and state income tax considerations.
3. Delays in time for Construction.
  - (a) Construction of facility takes longer than anticipated, resulting in facility not being

able to process solid waste at time of initial need.

- (b) Limitation on the public entity's ability to use existing waste disposal facilities due to scheduling of their shutdown at time of intended beginning of operation of the Resource Recovery facility.
  - (c) Inability of project budget to meet increased construction expenditures resulting from delay beyond agreed to construction period.
  - (d) Inability to locate a project site.
4. Changes in laws and regulations.
5. Force Majeure Risks.
- (a) Defining the sope of Force Majeure - Act of God, or acts of God and other enumerated causes such as strikes, labor disturbances, and failure of suppliers, or both of the previous catagories and any other act or circumstance which is beyond a party's control and which delays or substantially impairs performance.
  - (b) Effect on construction time requirements.
  - (c) Effect on construction price.

## 6. Escalation

- (a) Pursuant to agreed to formula, what if formula yields costs higher than actual escalated cost?
- (b) Who assumes risk of escalation and for what portion of the pertinent phase?

## B. Operation Phase Risks

## 1. Control of waste stream.

- (a) Difficulty with apparent statutory authority of the public entity to control the waste stream in the given area.
- (b) Alternatives of commercial waste haulers to go to private disposal sites for disposal of portions of the waste stream.
- (c) The landfill alternative.
- (d) Effect of front end separation at source.

## 2. Impact of competing facilities.

- (a) Geographic location of proposed facility site.
- (b) Environmental and other federal regulatory requirements.
- (c) Prices of neighboring, competing facilities, municipal or private.

3. Delivery of agreed upon quantity/quality of waste.

(a) Quality of Waste.

- (1) Failure of a guarantee of quality of waste.
- (2) Anticipated energy production levels-how to measure?
- (3) Changes in composition of the waste stream.

(b) Quantity of Waste.

- (1) Failure of the public entity to deliver guaranteed minimal annual waste tonnage.
- (2) Delivery of guaranteed minimum annual tonnage by the public entity but failure of the facility to process minimum waste tonnage due to (i) Force Majeure; (ii) technical project problems; or (iii) other causes.
- (3) Impact of delivery of solid waste beyond the maximum quantity and related processing problems.
- (4) Failure of the facility to produce minimum energy levels notwithstanding delivery of the minimum guaranteed quantity of waste.

- (5) Failure of acceptance of waste for processing by the contractor.
- 4. Failure of the facility to produce product.
  - (a) Technical failure resulting in decreased revenue levels.
  - (b) Resulting difficulties in payment of project debt service.
- 5. Failure of the facility to process waste.
  - (a) Resultant failure to reach minimum energy levels.
  - (b) Resultant insufficiency of and loss of revenues from anticipated project income.
  - (c) Resultant insufficiency of revenues over a given period resulting in a right of the operator to terminate operations or delay operation of the facility until minimum revenue levels are reached.
- 6. Force Majeure Risks.
  - (See Item 5 under Construction Phase Risks).
- 7. Escalation.
  - (See Item 6 under Construction Phase Risks).
- C. Energy Market Risks
  - 1. Obtaining permits.

2. Failure to produce quantity/quality of energy product.
  - (a) Technological inability to produce minimum energy amount revenue loss.
  - (b) Penalties to operator for failure to produce minimum energy amount.
  - (c) Dependence of minimum energy level on BTU content of waste.
  - (d) Agreement of contractor to maximize energy production.
3. Force Majeure Risks.  
(See Item 5 under Construction Phase Risks).
4. Escalation.  
(See Item 6 under Construction Phase Risks).

Proposed solutions to the above stated problems and means of dealing with the above stated risks have been developed by industry representatives and other interested parties and in proposed legislation. Among such specific proposals are the following:

1. Tax Incentives.

Tax proposals contained in proposed legislation as set forth below are intended to simplify Resource Recovery financing arrangements and thereby

eliminate additional costs caused by unnecessary distinctions in current tax policy. These proposals are designed to stimulate private investment through specific tax credits. These include:

(a) Provision for a tax credit of ten percent of expenditures for the purchase of recovered materials where the purchaser uses such materials in the manufacture of intermediate and finished goods.

(b) Extension to December 31, 1990, of the period during which an energy tax credit can be claimed for an investment in a Resource Recovery facility.

(c) Removal of current treasury restrictions on the use of taxes and financing for certain equipment.

(d) Removal of the restrictions on taxes and financing where the Federal Government is the energy buyer.

(e) Amendment of alternative energy definition by removal of the requirement that such an alternative comprise at least 25% of feedstock to be eligible for tax credits, and clarification of the current definition of recycling equipment which would be eligible for tax credits.

Given the lack of economic incentives and resultant low purchase price offered by public utilities as markets for Resource Recovery products, additional tax incentives should be developed. Alternatively, related requirements should be developed to provide public entities with more leverage in Resource Recovery negotiations with public utilities.

## 2. Economic Price Supports for Energy.

Sale of recovered energy must be made at a market price sufficient to make a Resource Recovery project viable. This is critical to achieving the necessary project revenues to offset operating and maintenance costs (debt service) and disposal (tipping) fees. Further, minimum energy revenues must be produced in order to make Resource Recovery more competitive at its initial stages with alternative waste disposal mechanisms such as landfill. Energy price supports must be considered in order to reduce the apparent level of the project tipping fee and thereby encourage local decision-makers to elect Resource Recovery over the relatively low first cost but overall less desirable life cycle economics of landfill.

Recent legislative type proposals have sought to encourage displacement of dwindling fossil fuels by accelerating development of alternative energy sources

through local markets. Such a price support program should be linked to minimum production and sale of recovered energy in order to encourage viable projects and provide disincentives to those projects which would not support long term acceptable contractual relationships with an energy market. Such proposals include the following:

(a) The standard support price equivalent is based on the BTU basis relative to the world's market price of oil which sets a maximum level for the life of the support based on an amount of financial support in terms of unit value that a project can receive.

(b) The support is in the form of a loan repayable from project revenues, which loan amount is determined from the difference between actual fuel cost to the buyer and the standard support price.

(c) Once set, the support would not escalate, which would remove incentives to delay a project based on the escalation of the price of oil.

Such a price support program should help to relieve the burden placed on the local tipping fee as the main source of Resource Recovery Project revenues.

3. Coordination of EPA, DOE and Department of Commerce ("DOC") Regulatory Efforts.

The present regulatory framework contains a myriad of programs stemming from three federal agencies, with resultant overlapping and duplication of effort which has at times confused the purpose, timing, and importance of federal financial assistance to Resource Recovery projects.

Proposals in this area must cut down on one of the key inhibitors of a Resource Recovery project, delay. Delay in obtaining financing, delay in construction time, delay in production of energy and recovered materials are inherent to Resource Recovery due to its size and complexity. The proposed federal program must ensure that incentives are given to public entities, private contractors, and prospective markets to elect Resource Recovery as an energy alternative.

The period required to move from initial project formulation through proposal to final negotiations is frequently more than five years. In Dade County, Florida, this period ran seven full years. Montgomery County, Ohio, has been involved in Resource Recovery for approximately six

years with little progress. Detroit, Michigan, has been involved for four years and has finally arrived at the contract drafting stage. The complex management, legal, engineering, and financial aspects of Resource Recovery require federal coordination.

In this regard, the legislative proposals have also called for (1) a human resource development program which would provide funding for training programs to expand and improve the capabilities of practitioners and public officials in Resource Recovery, (2) an information program which would ensure rapid dissemination of technical studies thereby encouraging movement from "state of the art" technology and (3) a research development and demonstration program which would provide financial assistance to non-commercial projects as an encouragement to pilot and demonstration efforts. Such a development program should not apply to commercial projects, however, so as to eliminate government financing of projects which have not been proven to be viable.

#### 4. Changes in Federal and Local Laws.

Closely related to the need to coordinate federal regulatory policy in the Resource Recovery area is the responsibility of the federal government to assume some of

the risks for "ex post facto" regulatory changes. Such changes often require substantial additional investments in environmental control technology. If required of an industrial manufacturer market, such a situation could undermine the foundation of the financing arrangement. If required of a public entity, Resource Recovery projects would be discouraged from reaching the developmental stage. At the same time, tightening of environmental controls on non-conforming landfills and other less desirable means of solid waste disposal will help to eliminate the illusory positive economics of such alternatives in favor of the good life cycle economics of Resource Recovery. The previously noted rise in landfill costs from \$3.00 to \$14.00 a ton in Dade County due to new environmental standards underscores this point.

The federal government should also provide incentives to public entities in this area by underwriting the risks of increased investments often needed to comply with new federal and state laws. This can be undertaken by charging project participants a set limited premium which can be factored into project costs. Further, proposals have also provided for pollution offsets and a grandfathering of existing facilities in the form of a ten year moratorium as

to compliance with changes in law unless there exists an imminent threat to public safety.

Such a weighing of energy needs versus environmental requirements must be undertaken by the federal government if solid waste is to become the "achievable, economical and available" alternate energy source which it has the potential to be.

5. Federal Loan Assistance.

Another means of dealing with key problems and risks faced by Resource Recovery participants is direct loan assistance to offset high project costs. These front-end forms of assistance should focus on a small number of viable projects in order to maximize development of Resource Recovery technology. Among the programs which have been proposed are the following:

1. Planning assistance which would provide direct federal assistance to project sponsors to support non-capital implementation costs with continuing assistance once feasibility of the project is shown.

2. Extended startup assistance which would alleviate problems caused by projects which are mechanically complete but which have been unable to meet performance guaranties over a given defined period. One

such legislative proposal calls for 50% matching funds by project participants in order to encourage only viable projects to receive such loans. Such a loan must be at an interest rate below the cost of capital in the marketplace in order to provide the necessary financial incentives, and should be used only in limited circumstances so as not to act as "free financing" for failing projects. It should be repaid over a reasonably short period out of project revenues.

An additional loan program should also be considered to address the intense initial capital costs of Resource Recovery Projects, the risk of a public entity assuming force majeure, and the failure to otherwise complete the project on a timely basis. Under this program, a public entity would be responsible for financing a given percentage of project costs, the private contractor would finance a smaller but significant portion of project costs, and the federal government would directly finance the remainder of such project costs once a contractor had been obtained. Such federal grants would be repayable out of the excess cash flow of the project when the project cost curve became positive. As part of such a program, the federal government would guarantee these loans and absorb the first

economic project losses, which would provide both public entities and public contractors with additional incentives needed to undertake such projects. In theory, debt service on such projects would be repaid (assuming that the project were economically feasible) on an amortized basis. Under such a program, only failure of the project to meet performance standards would result in economic loss to the federal government.

Such a loan program would seek to encourage the viability of the project by making its overall economics more attractive during its initial years. Further, it would aid in mobilizing the financing necessary to get such projects from the planning stage to the construction stage.

Examples of the type of successful financing in Resource Recovery projects include Dade County, Florida, where financing was undertaken through state guaranteed general obligation bonds secured by a pledge of the County's tipping fee and Hempstead Long Island, an operating 2000 ton per day capacity project, where the private contractor was able to arrange a group of insurance company lenders to finance the project through a private industrial type of bond financing. In each of these cases, the financing

entity would be encouraged by the presence of a federal loan program which would in effect "take the heat off" of dependence on project tipping fees.

\* \* \*

As in the area of nuclear energy and solar energy, a relatively small federal investment in Resource Recovery could yield a high return in a relatively short time. The return in Resource Recovery would in contrast, however, flow from relatively low environmental risks. Although Resource Recovery would provide only a relatively small percentage of the fuel necessary to meet our national needs, it could still yield an "impact of measured significance" in furtherance of federal energy policies. Federal legislative and other programs such as those proposed in combination with the additional financial incentives suggested should act to accelerate this process of converting solid waste into energy without reducing compliance with minimum necessary environmental concerns.

Thank you very much for your consideration of my remarks. I would be pleased to answer any questions you may have concerning the approach to Resource Recovery which has been presented.

\* \* \*

Mr. FLORIO. Thank you very much.

Mr. Aldrich, before we proceed with you, we must vote. The committee will stand in recess for approximately 5 or 10 minutes.

[Brief recess.]

Mr. OTTINGER. [presiding]. The joint hearings of the two subcommittees will resume. We are trying to keep things going as best we can.

We will hear next Mr. Robert Aldrich, senior vice president, Paine, Webber, Jackson & Curtis, from the great State of New York.

#### STATEMENT OF ROBERT H. ALDRICH

Mr. ALDRICH. Thank you very much.

This subject is very appropriate to your State, New York State, Mr. Ottinger. Over the next few years in New York State you will see probably 12 or 13 of these facilities constructed, hopefully, and providing a major input of energy, reliable energy, to the State of New York, its industries, and its utilities.

At Paine, Webber, Jackson & Curtis I am responsible for developing financing programs for alternative energy systems, and we look to resource recovery and solid waste energy as one of the primary areas of new energy development that can be done reasonably fast and is reasonably attractive economically.

However, there are impediments to the commercial development of resource recovery, particularly in the area of recovery of energy, and I would like to discuss very briefly today some policies and financing solutions to some of these impediments which have been mentioned by the other speakers.

Generally we find resistance to resource recovery projects at various levels. Our investors, those people that buy tax exempt bonds, municipal bonds for resource recovery to energy projects, are becoming wary of these projects and are concerned about the technology and about the involvement and development needed to provide, as Mr. Greenberg indicated, additional security for the investors.

Corporations that are looking into resource recovery to energy projects are not finding this business one providing them an attractive return on investment for the types of risk that they must undertake.

This is another area of concern to us.

The energy consumer is concerned about the reliability and availability of this type of energy, and of course, the future cost projections of such energy. Basically, one of the impediments to our business, is that we've little respect in the area of solid waste. Solid waste collection and disposal has been a municipal function which has gone relatively unnoticed, and it has gone unnoticed almost on purpose.

Our landfills are hopefully well defined and kept out of sight and out of mind as far as the community goes. And people prefer that. The cost of collection and disposal of solid waste has been relatively minor to the community, and it has not had a significant impact upon their tax base in recent years.

There is great urgency in finding alternatives of disposal. That is really what solid waste is, primarily a disposal problem. The urgen-

cy of finding alternative disposal techniques has gone unheeded. In New York City, and in the surrounding areas we now have a monumental problem, I call it the brick wall problem. There are no more landfills. The only thing we can do is throw it over the brick wall and hope nobody is there to see us do it.

This is an area of concern to but a few professionals, sanitation directors and municipalities, et cetera. Sporadically, as attempts are being made to cite new landfills throughout the United States, the public is becoming very aware, not because of economics but because now the unnoticed and unheeded garbage problem is coming to their back steps and they don't like it, so we have growing development, positive development on the part of the community leaders and communities in general to find an alternative solution to solid waste disposal.

Another problem we have had in terms of a lack of respect for the total energy yield from solid waste is that this energy yield is considered small and diminutive compared to the total problem in the United States.

The combustion of solid waste in the past was absorbed by open dump fires, with TP burners along the Jersey Turnpike. You will recall the TP burners that not only burned the garbage but finally burned down themselves as well as the inefficient and polluting incinerators that we constructed in the 1950's and 1960's throughout the United States. But this is all changing, albeit slowly, but it is changing.

As landfill costs rise, due to environmental needs and new citing requirements, the citing becomes more difficult. Communities and citizens are searching for economical means of disposing of solid waste. An awakening has occurred. Energy projects are being constructed and operating successfully throughout the country, demonstrating that thermal recovery is possible from solid waste and is an attractive energy source. We have examples of successes. Providing steam to General Electric in Massachusetts, in Ames, Iowa, small communities turning out electricity from solid waste.

In Pittsfield, Mass., a very small community of only 44,000 tons of garbage a year, providing 70 percent of the steam requirements to Crane Paper Co. who, interestingly enough, produces the paper for the paper dollar.

In Nashville, a nonprofit corporation taking solid waste as a very low tipping fee and turning out steam for the downtown areas.

In Madison, Wis., a new facility going onstream to provide a fuel for a local utility. Today 5,800 tons of garbage per day are being processed into energy. This is equivalent to 2½ million barrels of oil a year being converted, being replaced as a result of solid waste conversion. Another 6,200 tons per day are being brought onstream.

Although this amount sounds large and, in fact these two figures if you add them up, come to about 12,000 tons, which represents about 40 percent of what New York City alone turns out. This is only about 3 percent of the total potential for energy recovery that is being done in the country today.

We anticipate that of the 220 million barrels per year of oil equivalent contained in solid waste, we will over the 10 years, if given the proper incentive and direction by the Federal Govern-

ment, recover 50 to 60 percent or in excess of 100 million barrels equivalent of oil. Literally hundreds of communities throughout the whole United States are in one stage of development or another, mostly on their own, and Mr. Brenneman, I hope that was a 500,000 figure versus 500 million figure, otherwise, the State of Connecticut is doing very well—but mostly the projects are being self-financed, either done through the municipalities themselves, in planning stages, all the way through engineering, or done by corporations coming in and working with the municipalities to develop a project.

Important to remember and extremely important to your committee is that the capital costs and operating costs of energy recovery from solid waste is significantly less expensive than the other alternative energy sources which are being discussed in Congress and supported by Congress and the Federal Government today. The cost of recovery, secondary and tertiary recovery of oil, cost of pipelines, cost of discovery of new oil, the cost both environmentally and economically of recovery of oil and converting it to gas or oil, the cost of solar energy, the cost of geothermal energy, all exceed basically the capital and operating costs of taking a known substance that is in our communities today, garbage, and converting it into energy.

This is an important point to remember in terms of Federal policy from our standpoint.

Now, why have we had the difficulties in developing this marketplace? I think Melvin Greenberg referred to the risk associated with these kinds of projects. For municipalities resource recovery from solid waste is basically a municipal function. The risk associated and capital costs of such facilities are extremely high, and too much for a community to undertake themselves. They can get through the development stage but they haven't got the management or the funds to carry this on into a full scale plant, to take full advantage of resource recovery, in both materials as well as energy.

The technology and knowhow does exist or is being developed by the industry, but as I pointed out earlier, the returns on investment to industry for construction and operation of these facilities, and the production of energy from such facilities, is significantly lower than the manufacturing industries would anticipate, roughly running in the order of magnitude of 3- to 4-percent return on investment. When you compare that with the risk associated in terms of capital overruns and operating maintenance overruns of new business, and we are a new business, this is too high a risk with too low a return on investment.

Hence, we need to use all the economic and financing tools available within the power of the Federal Government and local governments, to provide incentive to industries to participate. We need to continue and expand the tax exempt financing capabilities of resource recovery facilities, whether it be owned and operated by municipalities, or owned and operated on behalf of municipalities, by a private corporation.

We have seen an erosion, or attempted erosion, of the use of municipal financing in this area by Treasury. I think Congress needs to recognize that solid waste disposal has been and will

continue to be a municipal function and that tax exempt financing of solid waste disposal facilities has been going on since the tax exempt financing began. This is the constitutional right of municipalities. In 1968, Congress recognized the special use of industrial revenue bond financial for solid waste facilities where the products are going to private industry, or private industry is assuming the responsibility of ownership and/or operation. This recognition of the need for public and private sector joint program should be continued, and the use of tax-exempt burry in this area expanded, not eroded. We propose to include not only the primary processing of the unwanted waste, but the conversion of that waste into steam and into electrical energy. We need to see increased investment tax credit provided for industries, and expanded for industries going into resource recovery and should be comparable to that which other alternative energy users get.

And depreciation: We have an 8- to 10-year depreciation on such a facility. We would like to see that continued, but we would also like to see the other alternative energy systems get this type of support.

In terms of price support, there are areas of the country, not in the northeast particularly, but in other areas that are more coal oriented, where today resource recovery cannot compete with coal prices. Hence, we may need temporarily for a period of time, a price support system to let solid waste economically compete with coal in an area and thus achieve the national objective of reducing our reliance upon imported oil.

The impact of these types of programs, the continuation of tax exempt financing and solid waste facilities and the expansion is worth roughly \$5 to \$6 per ton for a community of processed tons, what we call a tipping fee, in terms of solid waste. Continuation of this is important. Remembering today the cost of landfill in the Midwest area can range anywhere between \$5 and \$9 and, in our area of the country in the Northeast, can range anywhere between \$7.80 up to \$18 a ton. So \$5 to \$6 a ton incentive by the tax-exempt-financing technique is a major economic requirement for these types of facilities.

Investment tax credit and depression adds another \$4 a ton. So these two tax incentives are worth roughly \$9 to \$10 a ton to a community.

Investors, which are key to project financing, need additional security features built into the financing of such facilities, such as Government support which was suggested earlier standing behind projects developed for control of solid waste, or as price supports for industries purchasing the energy.

Initial planning costs, as discussed, is one of the critical areas in that communities are having trouble coming up with the funds necessary to carry these projects forward to a design and procurement stage. There are a number of factors that go into the front end costs that are impediments, namely the environmental permits that are required, permanent financing and engineering requirements, the need to be able to work with a large number of corporations to assess the technology that would be best suited to a community and, of course, the entering into procurement of such facilities.

We in the investment community are enthusiastic about the opportunities in solid waste energy recovery systems and feel we need the support from the Federal Government to help this emerging industry grow.

Thank you.

Mr. OTTINGER. Thank you very much.

We will hear next from Mr. James L. Barker, president, CSI Resources Systems, Inc., Boston, Mass.

#### STATEMENT OF JAMES L. BARKER

Mr. BARKER. Thank you, Mr. Chairman.

I guess it was predictable that Russ, Mel, and Bob would not leave very much for me to say. So I will try to say some of the things that they have communicated maybe a little bit differently.

First of all, just a brief thing about who we are at CSI. We are consultants and consulting engineers who specialize entirely in resource recovery and have worked on, I guess, about 30 projects across the country. Currently we have responsibility in Bridgeport to the Connecticut Resources Recovery Authority and to the bond trustee as their consulting engineer; we are starting up a project in Puerto Rico; we are about to start a second project in the State of Delaware in Kent and Sussex Counties. We are attempting with some superb people in the city of New York to get the first project going there, a 3,000-ton-a-day project.

We are also experimenting with a fast-tracking approach to all of this front-end planning and procurement activity that has typically taken 5 years. In New York City we are going to try to do it in 2 years. I hope a year from today we can report back we are able to accomplish that.

In St. Louis, we are organizing a project which started, based on the first demonstration project which was to produce refuse-derived fuel for firing in an existing utility boiler as supplemental fuel, but has transitioned from that concept to the concept of producing steam for industry.

We are also working with the city and county of San Francisco, and the city of Seattle and King County to organize their first projects. In addition to these direct project activities, we are one of EPA's technical assistance contractors—for the Southeast—and we have been working through Argonne National Laboratory with the Department of Energy on technology assessments and program formulation activities.

I have provided the written testimony and I do not want to go into all of it. It is organized into four sections in which we try to lay a base of what this industry is about in as few pages as possible, what are some of the impediments we face, and what might we think about doing in a sense of overcoming some of those impediments.

The few points I would like to make probably were covered by the other speakers, but I guess I would like to add my own comments.

First of all, we do see a transition in attitude toward resource recovery from seeing it as a disposal technique primarily to seeing it as an energy production technique with very, very superb side environmental benefits in the sense of solving the disposal problem

much better than any other alternative we know of. This is a very important transition.

However, I think the transition is occurring mostly in the minds of those who are worrying about national policy in resource recovery and not so much by the people who have the problem at the local level.

As has been said by other speakers, the local official wants to get rid of his garbage. He has less concern about the production of energy. Here in Washington I think we are very concerned about both, and I think there is an opportunity for some leadership from those of us and from those in the Congress in that aspect of resource recovery.

There is a substantial amount of energy resting there. Unfortunately, most of it is getting buried. Once buried, it is pretty difficult to get it back again. Each family in the country produces anywhere from 1 to 2 tons per year of solid waste, and if we can get that 100 or 150 or maybe even 200 million barrels a year of oil equivalent out of that solid waste, I think we will have done quite a bit to demonstrate our seriousness about alternative energy forms.

There are some interesting characteristics of this industry I am sure from testimony in your earlier hearings you can see that it is eclectic, that not everyone agrees, and certainly that everybody has their own thing that they want or do not want or do. But there are some things that have been developed in both hardware and software. They show us interesting characteristics the industry could have in the future.

First, the most important thing—this has been addressed in sundry ways by the other three speakers—resource recovery is indeed a partnership. It is a partnership among the public, the municipality, or county, or group of municipalities and counties, a member of private industry who is there to perform, an energy user, and the investment community.

Projects have been structured with, as Russ said, preferred reliance on private industry to perform, and therefore wish technical risks being transferred from the public to the private sector. This is important because we are building manufacturing plants, not disposal plants. This kind of structure teaches us something about a new way of organizing a public purpose project and drawing upon the skills, financial strengths and the confidences of private industry to help solve some of our public health problems and produce energy at the same time.

I would like to just address a few of the things that we have seen as serious problems in getting resource recovery going in the country.

First of all, we cannot reiterate too much how taxing it is to get a project from the initial concept to the point where you are actually digging a hole to put a facility in the ground. It has taken 3, 4, 5, 6, in some cases 10 years—Saugus took 10 years—to get to that point. It costs a lot of money, it is very demanding of technical resources, and that money is very difficult to get at the local level. It is hard to go to the city council and say "I want \$2 million to see if resource recovery is going to make it." Furthermore, our human resource base is incredibly low in this field. I do not believe there is

an expert in the field. Thus (a) it is difficult for a municipality to afford the front end process and (b) the resources available to the municipality to help them get through the front end process are extremely limited.

The second important impediment to the field is the problem of insufficient early year energy revenues on certain projects that when viewed over a 20-year period—the life cycle period of a project—with energy prices increasing, the project's economics look excellent, particularly compared to what the cost of landfilling might be in the future.

In the first 2, 3, 4, 8 years, the project cannot compete with landfilling because you are selling energy at such a low price. You have a coal user where you are displacing his coal, or natural gas user, or what have you.

Mr. FLORIO. The time frames we have been discussing range from 6 to about 10 years. Yet it is clear that the problems you have mentioned, such as landfills, are changing very, very rapidly in favor of resource recovery.

Is it therefore inevitable that there be a great length of time involved? Or is it the result of past experience under conditions that no longer exist and that these time frames will be shortened? Or is it so complex that it will inevitably take the time periods we have been talking about in the past?

Mr. BARKER. Mr. Chairman, I am glad you mentioned that because it is one of my pet peeves; it does not have to take that long. And I think perhaps before you came in I had mentioned that in New York City we are going to try to do it in 2, not 5 years. I hope we are successful at that.

I think one of our responsibilities is not to institutionalize 5 years. There are certain things I have problems with where we say it must take 5 years, we even document the process one goes through to prove that it takes 5 years. No. There are models that I think are adequate at this point in time on how you organize projects. Those models must be looked at. The Connecticut models, Dade County models, are protocols for doing business in resource recovery. We should look at them and figure out from those learning experiences how not to have it be 5 years.

So I would hope the answer to your question is, it is going to change, it is changing today, let's make it change faster in the future so this energy is not 10 years away from us, it is 5 years away or so, the energy itself.

I want to also address the competition from landfills because indeed in some cases, to be financible, in other cases to be politically viable, a project must show economics that are competitive with the alternative disposal costs, which primarily is landfilling.

We have a very severe problem across the country, State-to-State, and even within States, of underpriced landfilling. It is underpriced because the true cost of landfilling has yet to be internalized, particularly the true long-term costs from an environmental impact point of view have yet to be internalized.

RCRA was a step in the right direction in its requirement to set Federal guidelines for landfilling. However, an economic sanction or administrative sanction is the only teeth that RCRA has to cause those guidelines to be enforced at the local level or at the

State level. Indeed, the greatest problem in landfill regulation by the States is that they do not have money to enforce whatever regulations they do have through inspection or monitoring, or through appropriate enforcement of design standards.

I feel very strongly that although I know it is a very sensitive issue, if we are serious about resource recovery we also have to be serious about tightening up landfill regulations. We must put as much teeth into that process as we can without taking away the rights of the States and local communities to do it in their way.

I will not cover the problem of tax policies. It has been adequately addressed. Tax-exempt financing is incredibly important to the economics of a project. The complexities introduced by IRS are also incredible, and the need to go for rulings, to be sure you have a tax exempt financing again give us another 6 or 12 months delay in getting a project going.

We also have a problem in that we remember the incinerators and we remember making the investment, and 5 years later having them closed down because of new air pollution regulations. This is a major issue on most resource recovery projects. What is going to happen 5 years from today when new air regulations are in place? This uncertain environment of environmental regulation should be dealt with in some way, so that projects and people who are financing those projects can feel better about the ability of that project to live through its 20-year financing period without being shut down for reasons other than threat to public health.

Finally, probably one of the most major impediments of all, which has been addressed by others, again is the perception of risk, the reality of risk, in resource recovery as people enter into agreements for accomplishing the building of a plant, the operation of a plant. There are certain risks clearly outside of everyone's control. One is that change in Federal regulation. Others are things like force majeure and changes in the waste stream quantities or composition.

I think there are areas of project risk where it would behoove us to see if there can be some support given without interfering in the quality of the organization of a project. It is a very, very important area.

As we consider the Federal role in resource recovery, I think we should be very concerned about a couple of things and should be very clear about what is to be accomplished. The first very important thing is that we not inadvertently cause delay by expanding the Federal role. We have seen delays because of Federal involvement in resource recovery already. We would hope that any, particularly financial, assistance that is projected for the projects does not cost the projects more than they get.

Secondly, although I think the people of the industry may disagree on this point on specifics, but I think we agree on the philosophy, the Federal Government should stimulate the industry, should give it a kick, but should not take the industry over. We do not need construction grants. We can very much use economic incentives. I think that is a very important thing, particularly as we see the private side of the industry developing very responsibly.

Finally, I think there has to be a clarity of the Federal role which is not here today. Is this an energy program? Is this an

environmental program? Is this an economic program? What is it we want to do? How do we organize to accomplish that as efficiently as possible?

Certainly there is confusion in the marketplace today about who is doing what to whom at the Federal level. There are certainly inefficiencies in the delivery of Federal support to the field because of those confusions.

I fully agree with the other three speakers on the types of program areas, program opportunities that we have in the sense of Federal intervention in the field. But I would like to reiterate that while front end assistance is very important, I think as part of that, we need to have a program to develop our human resources.

Price supports are also very important and potentially can be very useful. I would like to add to the propositions made this morning that I believe there should be a special incentive to anybody who displaces oil. He is directly serving our purpose of reducing our dependence on foreign oil. There should be a special incentive to him. I also agree, no matter what support is given, it should be paid back. We need to improve the early years of the project. Let the money be paid back out of the very good latter years of the project.

Landfilling regulations I have mentioned. I think we need improvement of our tax policies. Obviously we need to address the problem of risks outside the control of private industry or the municipal participant in a project. We need sensible environmental regulations so that for resource recovery plants you can take a total environmental view of the project. We need to look to the specific media-oriented regulations and see if the need to live up to an air regulation could cause a project to not go ahead even though overall it is an environmentally-sound project.

I think we need to make a review of regulations in effect or proposed to see what they do to resource recovery, and what they may inadvertently do to resource recovery.

Finally, I think we need to consider our Federal organization and do something about it so that we can, at the Federal level, deliver better to the needs of our very important marketplace.

Thank you very much.

[Testimony resumes on p. 274.]

[Mr. Barker's prepared statement follows:]

STATEMENT OF JAMES L. BARKER, PRESIDENT,  
CSI RESOURCE SYSTEMS, INC.

Messrs. Chairmen, Honorable Members of the Subcommittees, Staff, Ladies and Gentlemen, I am James L. Barker, President of CSI Resource Systems, Inc. headquartered at Boston, Massachusetts. It is an honor for me to have the pleasure of testifying before you today.

I have been working in solid waste resource recovery since 1971. Much of this work has been focused on improving solid waste management systems, and especially on reducing unnecessary barriers to resource recovery. My work has included:

- Delivery of consulting services to several public organizations which are implementing resource recovery projects.
- Development of an EPA-published guide for municipal officials dealing with resource recovery risks and their allocation via legal agreements.
- Assistance to various Federal agencies in formulating programs for encouraging the implementation of resource recovery.
- Development of policy positions for the six New England governors in which resource recovery strategies were linked to regional and state energy management strategies.

In addition, I have provided private industry with advice on how to implement and manage resource recovery systems. This work has included projects for recovering valuable materials from industrial waste streams.

Our company is solely devoted to provision of consulting and engineering services in the field of resource recovery. Our staff is multi-disciplinary, and includes experienced professionals in five major areas: engineering, resource management, legal/institutional analysis, economic and financial analysis, and the management and marketing sciences.

We have been involved in several different capacities in over thirty resource recovery projects in the United States. Currently, we have prime management and technical consultant responsibilities for the following projects:

- Greater Bridgeport Resource Recovery Project (Connecticut Resources Recovery Authority)
- Caguas, Puerto Rico
- Delaware Solid Waste Authority—Kent and Sussex Counties Project
- City of New York—Brooklyn Navy Yard Project
- St Louis—Bi-State Development Agency Project
- City and County of San Francisco
- King County/City of Seattle

In addition, we are responsible for the delivery of technical assistance under U.S. Environmental Protection Agency sponsorship to several communities in the Southeast. Finally, through Argonne National Laboratory, we are providing the U.S. Department of Energy with services in support of its Urban Waste Programs. These services range from technology assessments to assistance in formulating strategies for the most effective use of their funds.

I hope that the comments I make today will prove helpful to you as you address the important issue of Federal support of resource recovery. Further, I hope that you will feel free to call upon me and the staff of my company for any information you may need as your deliberations raise additional questions.

## INTRODUCTION

Today's hearing could not be more timely. We are grappling with the reformulation of an energy policy which responds to the dislocations induced by OPEC price increases. A cornerstone of that policy must be development of our alternative energy resources and today we can point to energy recovery from municipal solid waste as a policy option which is achievable, economical and available in the near term. As Federal policy is shaped to capitalize on this opportunity, we must act on the premise that resource recovery is first and foremost an energy production program. In doing so we mark a turning point in the perception of resource recovery as, primarily, a means of waste reduction and disposal. Instead, we must focus on the ability of energy from municipal waste to displace scarce and expensive fossil fuels.

Accelerated exploitation of municipal wastes as sources of energy and of energy-intensive materials conserves scarce fossil fuels through more efficient use of the raw materials whose life need not end in a landfill. In fact, by recovering energy and materials from municipal wastes, the word "waste" becomes a misnomer...garbage, refuse, certain sludges, and certain solids and liquids which are discarded by households, institutions, and businesses are more aptly defined as "urban byproducts" which are awaiting conversion to a useful form.

Development of these heretofore neglected resources reinforces several areas of national policy, including policies on energy, resource conservation, and the environment. For example, a typical 1000 ton per day energy and materials recovery plant:

- Produces upwards of two trillion Btu's of low-sulfur fuel per year...the equivalent of roughly 300,000 barrels of oil.
- Produces in a year as much as 20,000 tons of ferrous, 1200 tons of aluminum and other non-ferrous metals, and 15,000 tons of glass for use by industry in various manufacturing processes.
- Reduces the amount of material for land disposal from over 300,000 tons per year of mixed wastes (including organic wastes and metals) to about 60,000 tons per year of relatively inert material.

The use of energy and materials recovery technologies conserves fossil fuels directly by replacing them as sources of energy for combustion, and indirectly by replacing virgin materials with intermediate products which require less energy to reconvert into a final form.

Recent estimates place the amount of municipal solid wastes generated in the United States each year at about 200 million tons. These wastes, plus approximately 14 million tons of sewage solids, are potentially

available as energy resources. The total potentially available raw energy content is about two quads. Materials recovery and reuse as replacements for virgin materials could conserve an additional quad of energy. It is further estimated that about 65 percent of these potential energy savings can be achieved. Thus, widespread energy and materials recovery from municipal waste could result in the conservation of upwards of two quads of energy per year (the equivalent of 320 million barrels of oil).

Rapid development of the resource potential of municipal solid waste can be stimulated by the Federal Government if the Federal Program has a clarity of purpose and is sensitive to the problems and opportunities which are peculiar to the resource recovery field. The current Federal Program, which stems from a series of both environmental and energy legislation, falls short of representing a national commitment to developing municipal waste as an alternative energy source. Before I make suggestions concerning the special problems of the resource recovery field, and the role the Federal Government might play in helping to overcome these problems, it might be helpful to review some of the legislative history of the Federal commitment in this field.

## EVOLUTION OF FEDERAL LEGISLATION

Over the past fifteen years Congress enacted a series of laws which affect solid waste management and resource recovery systems. This legislative history provides insights into evolving national policies affecting resource recovery.

The Solid Waste Disposal Act of 1965 responded to the rapidly increasing amount of waste produced in local areas. It recognized the need to develop new solid waste disposal plans and technologies in order to avoid serious threats to the public health and welfare and the environment. The 1965 Act emphasized the necessity for state and local development of effective disposal methods. At the time of passage, it was presumed that the state-of-the-art of resource recovery was not sufficiently advanced to rely upon such technology as an immediate solution to our disposal problems. Although resource recovery was not emphasized, it was clearly cited as a highly desirable future objective warranting Federal encouragement and support.

Five years later the Solid Waste Disposal Act was amended by the Resource Recovery Act of 1970. Despite progress in collection and disposal techniques, it was recognized that these were no longer sufficient to combat the increasing volume of solid waste. The Resource Recovery Act, therefore, aimed at developing technologies to reclaim and recycle usable materials and energy from solid waste in order to reduce the amount of waste for disposal in the land.

The Resource Recovery Act of 1970 moved beyond solid waste and resource recovery research and development to consider the practical barriers to the implementation of the new technologies. It was envisioned that the technology of resource recovery, if it were unencumbered by financial barriers, could provide a solution to the solid waste disposal problem by actually deriving useful and necessary by-products from such waste. While the primary motivation for the legislation was the elimination of the public health and environmental threats of improper solid waste disposal methods, consideration had shifted from mere improvement of disposal techniques to developing technological capacities to utilize the resources imbedded in solid waste for the benefit of the nation and the public.

In 1974 Congress responded to the energy crisis by passing the Federal NonNuclear Energy Research and Development Act "to develop on an urgent basis the technological capabilities to support the broadest range of energy policy options through conservation and use of domestic resources by socially and environmentally acceptable means." Among its governing principles, the Act specified that "heavy emphasis shall be given to those technologies which utilize renewable or essentially inexhaustible energy sources." It provided for research, development and demonstration programs to advance energy conservation technologies, including productive use of waste and reuse and recycling of materials and consumer products. Thus, resource

recovery was envisioned as a desirable method for reducing the United States' dependence on foreign energy sources through development of an alternative and replenishable domestic source of energy.

The Federal NonNuclear Act expressed concern over the development of environmentally acceptable commercial projects. However, the financial barriers that environmental regulations might impose were also acknowledged by authorizing price supports to cover increases in costs due to environmental safeguards. This provision underlines a dual concern with protecting public health and the environment while developing essential new energy sources, and an apparent willingness to subsidize additional costs imposed by environmental regulation if these costs restrain development.

The Resource Conservation and Recovery Act of 1976 (RCRA) represents a heightened concern over the solid waste disposal problem. RCRA goes beyond the provisions of previous solid waste management legislation by adding: a prohibition on and conversion requirement for open dumps; promulgation of Federal guidelines for land disposal of municipal solid wastes; regulation of the treatment, storage, transportation and disposal of hazardous wastes; and the establishment of a cooperative effort among Federal, State and local governments and private enterprises to recover valuable materials and energy from solid waste.

RCRA stands as a public health and environmental protection Act with energy development implications. It specifically regulates hazardous waste disposal, and establishes guidelines for assistance to states to plan for the disposal of non-hazardous solid waste and to close open dumps. While the Act emphasizes public health and environmental protection, inclusion of the resource recovery provisions indicates recognition and concern for simultaneous development of improved disposal systems and the technology to derive energy from solid waste.

The FY 1978 Department of Energy Authorization included two provisions which responded directly to the concerns echoed in the Federal NonNuclear Act and the RCRA oversight hearings that the funding levels for the development of alternative energy resources and resource recovery systems have been insufficient.

Public Law 95-238 amended the Federal NonNuclear Act by adding two new sections to increase funds for the development of resource recovery and municipal waste reprocessing facilities. Section 207 of the Act adds a new Section 19 authorizing the use of loan guarantees for alternative energy demonstration facilities. Subsection (y) of the new section authorized DOE, in consultation with EPA and State or regional solid waste planning agencies, to issue loan guarantees for demonstration facilities to generate desirable forms of energy from municipal or industrial wastes. The inclusion of a separate loan guarantee subsection for municipal waste facilities seems to underscore the importance attached to the development of energy-producing solid waste reprocessing demonstration plants.

Title IV of PL 95-238 added a new section which specifically authorized grants, contracts, price supports, and cooperative agreements for municipal waste reprocessing demonstration facilities designed to recover energy or energy-intensive products.

In his address to a Joint Session of Congress outlining the National Energy Plan, President Carter included among the National Energy Principles protection of the environment by reduction of the wasteful use of resources and the development of new unconventional sources of energy for the next century. Among his major strategies, the President listed a vigorous research and development program to provide renewable and essentially inexhaustible resources to meet the long-term goals. The goals of the National Energy Plan and the concern for the simultaneous protection of the environment and the development of inexhaustible energy resources is reminiscent of the goals stated in both the Federal NonNuclear and Resource Conservation and Recovery Acts.

While the majority of the public laws that compose the National Energy Plan are oriented towards the conservation of and future restrictions on the use of nonrenewable resources, the Energy Tax Act of 1979 is specifically aimed at stimulating development and commercialization of the technologies necessary to meet the President's long-term energy goals, thus enabling the conservation and restriction standards to become effective. In its Report to accompany the Bill, the Senate Committee on Finance emphasized the "urgency of the energy problem" and found that it "requires a powerful measure designed specifically to reduce the consumption of oil and natural gas by industrial, utility and institutional users." "Powerful measures" took the form of additional "tax incentives to stimulate a rapid transition from heavy reliance on oil and gas." The Act provides an additional investment tax credit for alternative property above that already available under the Internal Revenue Code of 1954.

To summarize, the Resource Recovery Act of 1970 somewhat broadened the scope of the Solid Waste Disposal Act of 1965 by introducing the goal of recovering energy from solid wastes. The Federal NonNuclear Energy Research and Development Act emphasized our concern by authorizing the use of financial tools to promote demonstration and eventual commercialization of the technologies. The Resource Conservation and Recovery Act further developed the simultaneous emphasis on improved solid waste management programs and technology development for energy from solid waste. In the past year we have placed further emphasis on the importance of developing waste-to-energy systems by providing for specific municipal waste facility funding and loan guarantees in the DOE FY 1978 Authorization. And finally, the Energy Tax Act of 1979 provided additional business tax credits and incentives for investment in recycling equipment that produces energy.

Thus, since the Solid Waste Disposal Act was passed fifteen years ago, emphasis has progressively shifted from simply improving solid waste management methods and protecting the public health and environment, to development of technologies for converting solid waste into useful and much-needed energy. This shift recognizes the dual purpose resource recovery technologies perform...the original goals of environmental and public health protection and the current goals of energy conservation and development of alternative energy sources. This may be described as shifting from "municipal waste as a disposal problem" to "municipal waste as an under-utilized resource."

## STATE-OF-THE-ART

The state-of-the-art in resource recovery in the United States has changed dramatically over the last decade. We have simultaneously gained experience with recovery technologies and with methods for organizing and financing resource recovery projects in several local settings. Perhaps the most important characteristic of the field's development is the strong trend toward private assumption of project responsibilities (including operation of the resource recovery plant and marketing of recovered products). This trend is in part indicative of the manufacturing and business nature of a resource recovery project, and of the consequent inappropriateness of the traditional public works approach to the design, construction, and operation of facilities which serve municipalities. The trend also reflects both the public's unwillingness to assume the risks associated with constructing and operating complex recovery technologies, and private industry's capacity and interest in guaranteeing technical and economic performance of projects if they have a reasonable latitude of control and can foresee reasonable profits from their efforts.

Resource recovery technology runs the gamut from incineration with heat recovery to gasification or liquification processes which produce gaseous or liquid fuels or feedstocks for production of petrochemicals. In general, resource recovery technologies can be classified as available for commercial application or as experimental or highly developmental. Some members of the resource recovery industry will guarantee the performance of certain technologies, such as massburning waterwall combustion units and limited beneficiation systems which produce a solid refuse-derived fuel (RDF) and various qualities and quantities of reusable metals and glass. Gasification and liquification systems are still developmental and have not yet been demonstrated at commercial scale. Consequently, private industry is not yet willing to underwrite their performance.

The concept of using urban byproducts as energy resources is not new. In the early 1900's both the City of Frankfurt, Germany, and New York City installed incinerators equipped with waste heat boilers to provide steam to municipal building complexes. These early units had problems, and their use was discontinued as fossil fuels became more readily available. The 1950's saw a resurgence of waste to energy technology in Europe where the land available for waste disposal is substantially more limited than in the United States. European communities began development of waterwall incinerators to recover high pressure, high temperature steam for use in existing power plants, or for producing electricity and using the resultant waste steam to heat buildings.

These European advances led the U.S. Navy in 1967 to install a waterwall incinerator at Norfolk. Since its startup, the plant has been successfully supplying a portion of the steam for the shipyard. The next two U.S. waterwalls were designed strictly as efficient incinerators, although attempts are now being made to market the recovered steam. In the past

three years there has been a flurry of interest in the procurement of water-wall incinerators for the production of steam and electrical power.

Recently, the American innovation of recovering heat from small, modular controlled-air incinerators has resulted in the construction of several energy recovery plants in the 100 ton per day size range. The result of this successful technological advance has been the expansion of energy recovery opportunities to communities with less than 100,000 population.

The development of beneficiation technology began almost in parallel with the American incinerator/boiler technology expansion. The concept of removing the combustible portion of the mixed urban waste stream and converting it into a fuel which is suitable for use as a supplement to fossil fuels in existing steam generators, was seen as attractive because the need to design and construct new boilers could be eliminated. In addition, valuable materials could be separated and reintroduced into the manufacturing system. The Federal government, in cooperation with the Union Electric Company of St. Louis, developed a supplemental solid fuel system for existing utility boilers using urban waste as a feedstock. The St. Louis system design is also amenable to the recovery of ferrous and nonferrous metals and glass for sale to manufacturers.

To summarize, waterwall and controlled-air incinerator/boiler technology is in use world-wide and has been applied in the United States. Similarly, production of a coarse RDF (coarse-shredded, magnetically cleaned combustible fraction of urban waste) which is fired in dedicated boilers has been practiced in Canada and forms the basis of three American plants, one of which is approaching startup. Fluff RDF (fine-shredded and cleaned combustibles) is being produced as a supplemental boiler fuel in Ames and Milwaukee, and forms the processing basis for several other American plants in various stages of design and construction. Similarly, at least one landfill is being successfully tapped for methane, and other systems are being planned.

On the non-technological side of energy and materials recovery there has been considerable experimentation with methods for implementing projects. Several different approaches have been used to bring together municipalities (the generators of waste), private industry (the suppliers of recovery technologies), and the energy and materials market (the buyers of recovered resources) as partners in joint efforts to accomplish the combined public purpose of energy production and waste disposal.

The risks inherent in the successful installation and operation of recovery facilities, plus the lack of public expertise in operating and managing a manufacturing business, have caused most municipalities to seek recovery systems vendors who are able to design, construct, operate, and sometimes own the energy and materials recovery operation. These "full-service" contracting techniques require demanding procurement processes, including complicated contracts and intense negotiation sessions. Experience to date has produced several innovative methods for allocating risks and responsibilities among participants in the projects.

Similarly, the substantial amounts of capital required to construct an energy recovery facility, plus inherent project risks, have resulted in several innovative approaches to project financing. In response to local hesitance, or inability, to issue general obligation bonds for recovery plants, various forms of revenue bond financing have been developed. These financing approaches have been extremely beneficial because they have forced project sponsors to thoroughly investigate the anticipated performance of proposed recovery systems, and to assure that project revenues are both secured and sufficient to cover all operating and debt service costs.

Innovation has also occurred in the development of institutional arrangements to accomplish energy and materials recovery. These innovations range from the creation of state-wide authorities (such as those in Connecticut and Delaware), which are charged with developing and implementing high priority projects, to formation of not-for-profit public corporations (such as the Nashville Thermal Transfer Corporation), which operate much like utilities. These state-wide and local bodies have facilitated the organization of recovery facilities by reducing some of the complexities normally encountered in arriving at agreements between the public and private sectors.

Despite the existence of several recovery technologies, some of which have been operated at commercial scale, and despite considerable progress in organizing for, and managing, project implementation, very few successful full-scale resource recovery projects have been implemented in the United States. Interest is high, but progress is slow. Several impediments have, and are, restraining progress toward rapid proliferation of promising energy recovery technologies at a commercial scale in a variety of institutional settings.

Many of these impediments will be reduced considerably once adequate experience is gained in implementing and operating recovery systems under a representative cross-section of local conditions. However, implementation will occur at a slow pace unless some of the impediments outside the control of systems vendors are reduced.

## IMPEDIMENTS TO RESOURCE RECOVERY

Several resource recovery technologies have crossed the threshold of technological and economic feasibility. Some of the systems in place today demonstrate that both small and large scale systems can provide effective, reliable, and affordable means for recovering useful energy from waste while simultaneously solving the serious waste disposal problems of local government by accomplishing a ten-fold reduction in the waste to be disposed of in landfills. So, too, have several private corporations demonstrated their commitment to accomplishing the challenging task of installing and operating sophisticated recovery technologies and assuming the risks of system performance.

Yet the potential for resource recovery to make a significant contribution to the nation's energy goals by substituting recovered energy products for increasingly scarce and expensive fossil fuels has barely been tapped. The capacity in place today will process less than three percent of the nation's waste stream in 1980. The nation continues to discard the energy equivalent of 200 million barrels of oil annually by landfilling solid waste.

The reasons why resource recovery has not been exploited as an alternative energy resource are complex and diverse. The significant problems that impede rapid wide-scale development of resource recovery include:

- The process of implementing a resource recovery project is expensive, time consuming, and demanding.—It strains the human and financial resources of participants, particularly local governments. It is an enterprise beyond the usual scope of governmental activity. A number of diverse participants are involved, in addition to complex technical, economic, and environmental considerations. It is analogous to organizing a new business venture. Successful project implementation requires securing a reliable and sufficient supply of solid waste as a feedstock; obtaining the long-term contractual commitment of an energy buyer who is suitably located and whose energy requirements can be technically satisfied at an economically attractive price; and selecting a technology which can reliably produce a product to the buyer's specification, reduce the volume of waste for ultimate land disposal to stipulated levels, and operate in conformance with various federal and state environmental regulations. The implementation process is frequently complicated by existing laws which constrain the ability of a public sponsor to procure a recovery system, or a full-service partner, in a manner which is consistent with the desired structure of the project.

Experience to date suggests that the time period required to move a project from concept to full-scale operations often exceeds five years, and expenditures of local government for management, engineering, legal, and financial support services during initial

feasibility, procurement planning, procurement, construction, startup, and system acceptance can be several million dollars for large projects (1000 tons-per-day or more). These funds are very difficult to secure from local sources. Furthermore, the resource recovery field is relatively new. Consequently, our supply of experienced human resources is very limited.

Thus, we must continue to address the problem of expanding the human, institutional, and financial capacities of the sponsors of projects to achieve the necessary acceleration in the number and pace of resource recovery project implementations.

- Economic conditions in local energy markets can often deter the implementation of a project.—The sale of a recovered energy product in a local market drives the economics of a resource recovery project. It is a crucial ingredient in determining commercial feasibility. The capital operating and maintenance costs of a project must be balanced by energy revenues and disposal (tip) fees. Energy revenue must be sufficient so that local policy makers can find disposal fees competitive with the alternative of landfill disposal. Revenues for recovered energy products are typically based on the cost of the conventional fossil fuel which they displace. Local fuel markets are often characterized by prices substantially below national market levels. Although this gap will narrow over time, the immediate consequence is often a projected high disposal fee in the early years of project operation. Such a situation causes local decision makers, especially where land disposal costs are low, to stop or delay implementation of a project, even though the overall life cycle economics of a project are favorable.

We should encourage displacement/conservation of higher quality fossil fuels wherever possible by accelerating development of alternative energy resources, even where local energy market conditions pose barriers. The need is to shift forward to the early years of a project energy revenues which would normally not be realized until later years through the effects of fuel escalation. This would enable a project to show a lower "tip" fee in early years, and appear more attractive to local decision makers.

- Competition from artificially low-priced disposal alternatives often deters resource recovery projects.—The judgment of local government decision makers on the feasibility of a resource recovery project is heavily influenced by whether the "tip" fee imposes significant incremental costs on local residents and businesses for disposal services. It is not uncommon for a project to be stopped or deferred because the tip fee is not competitive with landfilling of solid waste. Regrettably, this often happens in a situation where government has resisted or

avoided internalizing the true cost of landfilling. As a consequence, resource recovery must compete with an artificially low-priced disposal option.

The landscape of the nation is replete with examples of landfills which are improperly designed, constructed, and operated. This failure to adequately control pollutant emissions into our land and water resources trades off a short-run economic benefit against the potential for a long-run environmental disaster. Recent experience in coping with the consequences of inadequate hazardous waste management policies argues that the nation can ill afford to risk the possibility of widescale degradation of its groundwater and land resources. The economic impacts of environmentally unsound landfilling impose a form of double jeopardy. The environmental clean-up bill will ultimately come due and in the interim the opportunity to utilize resource recovery as an economically productive and environmentally sound disposal option will have been ignored.

National policies have begun to grapple with this problem. Under the legislative mandate contained in Subtitle D of the Resource Conservation and Recovery Act, the Environmental Protection Agency has promulgated guidelines for landfill design, construction, and operation. EPA has indicated that administrative sanctions will be invoked against states which fail to establish landfill standards which are at least as rigorous as the EPA guidelines. Yet the results of this policy fall short of the intent. EPA's guidelines do not have force of law and the response of states has been slow and uneven. Financial constraints on states themselves often mean that there is no effective enforcement of their standards.

There is a national interest in establishing a more effective system for assuring environmentally sound landfilling of solid waste. The intent evidenced in RCRA has not been realized. An effective enforcement program and adequate regulations will facilitate the contribution that resource recovery can make toward resolving both our energy and solid waste management problems. Only the Federal government has the capability to establish and support a program that assures uniform compliance with minimally sound environmental standards.

- Current tax policy unduly complicates project financing arrangements, thus needlessly increasing the expense of a project, and does not provide sufficient stimulus to attract the private investment required to meet energy development goals.—These difficulties arise in part because tax policy tends to make very fine distinctions between private and public purpose, reflecting an historical orientation to resource recovery as a pollution abatement rather than an energy development program. It is

also the case that the general principal followed in tax policy of limiting the use of tax exempt financing is rigorously applied to the detriment of attracting the private capital needed to exploit this resource.

Tax policy can play a role in stimulating development of recovered energy which directly or indirectly displaces the use of imported or scarce fuels. This creates favorable balance of payment impacts which are consistent with monetary and fiscal goals. Resource recovery, by providing a less expensive and more reliable source of fuel for industry, has positive economic development impacts which effect an increase in tax revenues. On balance, tax policy should be made consistent with the national interest in developing this alternative energy resource.

- An uncertain and rigid regulatory climate can discourage implementation of resource recovery projects.—Implementation of resource recovery projects occurs in an historical setting where many municipalities recollect that imposition of air quality regulations forced the closing of municipal incinerators, many of which were relatively new. Resource recovery projects also confront the prospect of *ex post facto* regulations which can require a substantial incremental investment in environmental control technology at some future date. Such a situation could undermine the integrity of financing arrangements and certainly lead investors in recovery projects to often require unduly burdensome financial coverage to protect against such possibilities.

Of immediate concern are environmental regulations which may have the effect of requiring the treatment of and handling of the residuals from a plant as hazardous waste. However, the urban wastes in their raw state are exempted as hazardous under proposed regulations. These regulations would cause the net tipping fee of resource recovery plants to increase from \$5 to \$15 per ton. For local governments, such increases are likely to make recovery of energy from urban wastes unattractive. The effect is a form of economic discrimination against resource recovery.

There is a powerful argument that resource recovery is a net environmental plus, yet environmental regulations do not admit to trade offs in the impacts of pollutants on different media where a net benefit will result. This rigidity is at cross purposes with the contribution that resource recovery can make to both energy and environmental goals.

Since the possibility that new environmental standards requiring substantial incremental investment is a risk caused by changes in Federal policy, the Federal government has a responsibility to help manage it.

- The sponsors of resource recovery projects face inherent risks that can discourage ventures which should go forward.—A major source of risk is the fact that resource recovery is still "state-of-the-art" and there is insufficient operating experience with most of the systems now under consideration by municipalities. Thus, an accurate assessment of long-term system performance and reliability is unavailable to prospective buyers and users of recovery technologies. In the absence of these data, project sponsors must rely on vendor representations and guarantees as to the amount of time required for plant shakedown to the point of steady-state operations, system availability, performance and maintainability, annual operating and maintenance cost, and capital costs. Investors, to guard against these unknowns, insist that substantial financial reserves be included in the project financing, thereby increasing the cost of implementation. Experience to date indicates that the first commercial installation of an otherwise proven resource recovery technology requires considerable effort and extra investment to make the technology work properly.

There is national interest in avoiding correctible failures that will otherwise discourage others from risk-taking with new projects, particularly if these failures create severe financial and disposal problems for the affected municipalities. Furthermore, there is a continued need for the development and dissemination of engineering data on existing and improved recovery systems and subsystems for use in the design of future projects.

In summary, if we wish to stimulate the pace and magnitude of resource recovery project implementation, we should consider focusing our efforts on the most constraining impediments facing the partners in a project... the municipalities, systems vendors, users of recovered products, and investors. A comprehensive program might include:

1. Front-end (pre-construction) project planning and management assistance, and development of our human resource base.
2. Temporary support of the price of recovered energy so that a project which shows acceptable life-cycle economics can proceed.
3. A national system of reasonable, consistent, and enforceable land disposal regulations.
4. Federal tax policies which reflect our goals of developing alternative sources of energy by stimulating private investment in viable projects.
5. Environmental regulations which are sensitive to the net environmental consequences of resource recovery considering all of the media affected and which do not inadvertently stop an environmentally desirable project.
6. Protection of project sponsors from risks which are beyond their control, and development of better information for system designers.

## CONSIDERATIONS FOR THE FEDERAL ROLE

Resource recovery is an approach to the production of energy and energy-intensive materials from a replenishing source which is available today. Its implementation typically involves a mutually beneficial partnership among municipalities (who supply the feedstock...solid waste), a private corporation (who designs, constructs, and operates the system, and markets the recovered products), an energy buyer, and the financial community. It is an energy production technology which also helps solve the serious environmental problem of safe solid waste disposal. It can proceed rapidly if we can relieve some of the impediments to implementation without interfering with the orderly, efficient, and responsible development of the industry.

I have suggested several areas where Federal support of resource recovery could accelerate progress in the field. These suggestions presume a national commitment to the development of solid waste as an energy source as quickly as possible. They also presume that private industry and private capital markets have the wherewithal and capacity to put the needed facilities in place in a timely manner, and that one main challenge is to help stimulate and mobilize these resources.

As some of these suggestions are considered, I would hope that certain principles regarding the Federal role in resource recovery are also considered:

- *The Federal role should not foster delay.*—At present, three federal agencies, DOE, EPA, and DOC, provide various forms of financial assistance to resource recovery. Overlap and duplication create uncertainties about the source, purpose, timing, and magnitude of assistance that a sponsor can expect from a particular agency.

The process of obtaining assistance can be time consuming and divert resources that should be directed at implementing a project. Delay is very costly. In a typical large project, it can increase construction and equipment costs at the rate of \$1 million per month. Given the potential for an expanded scope of Federal assistance, and the possibility that the development of energy from waste could be considered as a priority target in the nation's energy program, it is imperative that the need for the administrative capacity to implement the Federal Program coherently, expeditiously, and efficiently be addressed as well.

- *The Federal role should be strategically focused.*—Economic pressures and requirements of the financial community currently provide strong incentives for sound organization and management of a resource recovery project. Partnership arrangements among the project sponsor, waste supplier, energy buyer, vendor and investor

that equitably allocate project risks and responsibilities should not be relaxed or usurped by the Federal presence.

- *The Federal role should have clarity of purpose.*—The suggestions for an expanded Federal Program are premised on the primacy of the energy development goal for resource recovery. They suggest a transition point in the Federal resource recovery program, since it was first perceived in the Solid Waste Act of 1965 as a waste disposal program. The evolution of Federal legislative policy towards promoting utilization of waste as an energy resource has been gradual. Under the Resource Conservation and Recovery Act of 1976, the Environmental Protection Agency is charged with both a regulatory and energy development role. Under the DOE Authorization of 1978, DOE is charged with certain responsibilities relating to the demonstration of energy recovery systems. The ambiguity of the roles of these two agencies, and the resultant and unavoidable conflicts which arise, serves simply to cause confusion in the marketplace and dilution of the Federal contribution to the field.

Mr. FLORIO. Thank you very much.

First of all, I would like to apologize for the somewhat disjointed nature of the hearings. We have had a series of votes, and we have one now.

I would like to note that I share your thought that we do not need construction grants. However, there are an awful lot of people who do not share that idea. In previous hearings we have had individuals who are associated with specific projects saying that they are not going to work unless the Federal Government comes up with the money to assist rather substantially.

When you talk about front-end assistance, that is what they are talking about, in a sense attempting to duplicate the sewerage program under the Clean Water Act. I do not think that approach is appropriate. We have to do something in lieu of that to provide some assistance.

I will adjourn, come back in a few moments, and then continue with the questioning.

Mr. OTTINGER. I am sorry for the disruptive nature of the hearings this morning, but the full House is getting in our way.

I wonder whether any of you have had experience and can advise us as to what you think of the potential of producing methanol from solid waste as opposed to burning it directly; the availability of alcohol would help to meet the most critical problem that we have at the present time with respect to imported oil, which is improving the supply of transportation fuels. Alcohol also can be used for electric peaking turbines, which is a major problem for utilities. So that if that was economically viable, it would be attractive as another possibility for the use of solid wastes.

Can any of you address that problem?

Mr. BARKER. I would like to make a comment on it.

There are probably better sources of cellulose for methanol production than solid wastes, which would require fairly substantial processing to get to the point where then you could go into a process stream for methanol production. These may be a lot less expensive than using solid waste as the source. It may be more advantageous to us to have our solid waste offset natural gas or oil

and free that up for feedstock. I think we can do that a lot faster as well.

As far as the specific economics of alcohol production from solid waste, we have never done that.

Mr. OTTINGER. In your various experiences I know there are a number of different processes for use of waste as a fuel. Is there any technology that appears more advantageous than the rest? Do you foresee technological improvements as being a major factor; the viability of this as an energy source?

Mr. ALDRICH. I will take a crack at that.

I think what we need to see is improvement, to answer your last question first, improvement in the existing technology in terms of materials, construction, experience, and operations as well as through modest modifications. There will be new developments, as there are in any technology, but the new developments are not as imperative to solving our problem as the upgrading of the existing systems, making them more reliable and more economical.

Of the processes that are in existence, a community must look to the concentration of their waste, where their energy market is, and frequently you can go with direct firing if you have a steam customer in the supply of waste within a general particular area; but in other areas of the country refuse-derived fuel provides a better mechanism of delivery of energy to the customer. So it has to be designed to the particular needs. So no single process or technique stands out as more economically viable unless you totally take into account the environment in which you are working.

Mr. GREENBERG. The perception of most public entities is that there are no really successful Resource Recovery projects in the true sense of the word.

What this industry needs is a number of successful projects. The question of whether the existing technology will do it or not is still open. The fact that there are not a lot of successful projects would seem to indicate that substantial improvement has to be made in the existing technology.

Mr. OTTINGER. It is my recollection that in Europe there are some of these projects that have been running for considerable periods of time.

Mr. GREENBERG. Yes; but the efficiency of those plants is seriously in question. Those plants were built primarily incidental to the problem as opposed to the reason for constructing them being the economic of Resource Recovery. If it is not efficient here, then the economics change dramatically.

Mr. OTTINGER. Are any projects presently under way operating on a basis of satisfactory return and reliability?

Mr. GREENBERG. It depends who you ask.

Mr. OTTINGER. I had the impression that the operation in Hempstead was a successful one. There is one in Connecticut I think.

Mr. BRENNEMAN. The operation in Hempstead I believe is in a shakedown period. I think the jury is out on that project.

In Bridgeport we are just in the very early stages of operation, so we would not claim to have successfully demonstrated that process.

Mr. OTTINGER. Is the Bridgeport operation the one which produces a fuel?

Mr. BRENNEMAN. Yes, sir. We manufacture or will be manufacturing a powder refuse-derived fuel which is the only process doing that.

Mr. OTTINGER. I think that is very attractive because that enables you to transport your fuel, and if the demand at the utility that happens to be nearest does not work out, it means you still have a viable operation.

Mr. BRENNEMAN. I think the product has wonderful properties. It is a superior product. The problem will be producing it.

Mr. BARKER. Garbage is not like something else that you put through a manufacturing plant. It is lousy stuff to work with. The composition, moisture content, all kinds of things, change hourly, daily, monthly, and so on. It creates very special processing and materials handling problems within a plant.

I think it is true that the more you try to refine the solid waste, the more trouble you are likely to have. That is the conservative engineering view. Thus if somebody were to ask what are the most proven and efficient technologies or, if not most efficient, least risky technologies, they would tend to be mass burning type systems, which are the type developed 25 years ago in Europe, where there is no processing of the waste, before it is combusted.

Second, there has been significant American experience in small starved-air modular systems which are also mass burners and fairly well-proven.

Then finally, systems in which there is a minimal amount of front-end processing to produce RDF for firing in a boiler which is especially designed to burn that fuel, seem to be less technically risky than those which produce a highly refined fuel for firing in an existing boiler.

Mr. OTTINGER. Under the Resource Recovery Act and the Federal Nonnuclear Energy Research and Development Act, there is an array of financial tools that have been provided to the Government to encourage these plants. They include everything from demonstrations to grants, to loan guarantees, price supports, tax incentives.

I wonder whether we can get your view as to whether the incentives already provided are adequate; if not, what else might be needed?

Mr. ALDRICH. The incentives provided, if they were provided, would probably adequately serve the industry as well as the municipalities. The concern is that these incentives have not been—appropriations have not been made. The staff within the Department of Energy and EPA is not adequate to oversee the development of these particular incentives for municipalities and industries. The need of any particular project in any particular area differs from the economic need in another area; whereas grant money may be required for a certain project, it would not be required in another project because of the economic viability. Yet we would need further security in terms of price supports, things like that.

Yes, there is a number of things on the books today but there is little access to these by the communities. There is not an understanding on how we can derive benefit from them and the immediacy in terms of planning in developing a project today. Hence we

are suggesting a sound program from one end to the other, in terms of development all the way through financing, which provides Federal assistance but does not, as in the water program, interfere with the rapid development of the industry which we think can be done with municipalities and industries on their own with assistance from the Government, but not this type of strong support such as you have in the water program. So we do not favor the grant program in our area.

Mr. GREENBERG. I think we should ask why have the projects that have gone forward have actually gone forward without these incentives? Why are there areas where the economics are sound but resource recovery has not gone forth?

In Dade County, the economics were there without incentives. Landfilling cost is now \$14 a ton; landfill has been nonconforming, and the county had to go out of that business. The county controls the solid waste. The project is well-financed and the county was able to raise its own money. Detroit, on the other hand, has the same set of facts, but its transaction is having serious difficulty. The main difference between those two was the risk taking.

If you ask how good is the technology, the best person I suppose to ask is the manufacturer of the technology, find out what he is willing to promise, because if he has confidence in his own technology he will be willing to take the risks. The fact is, very few companies are willing to, and even if they were such as in Hempstead and Dade County, there is a limit to the amount of risk a company will take.

So when we talk about 40 or 60 or 100 transactions, the fact in, reality is who is going to build such plants and take all that risk? The first step here, with the few companies interested in resource recovery, is to get some projects up and see if they work and hopefully they will take off from there. Risk, in my opinion, is the most serious problem.

Mr. OTTINGER. Where does the existing legislation break down? Do we need more legislation? Do we need just more appropriations? Is the problem with the people who administer these programs? Because we have the tools here for minimizing, reducing the risk. Apparently they are not being used efficaciously enough to see a really meaningful expansion of the technology into use. Where do we need to concentrate our efforts?

Mr. BARKER. A comment on that.

The DOE authorization contains provisions in title IV, I believe, for most of those things. Three have not been, as Bob said, appropriations.

Second, title IV is for so-called demonstration projects. I think mostly what we are talking about now is not demonstration projects, they are commercial projects and at this point in time DOE has no capability to support so-called commercial projects under this legislation. This is one of the constraints.

Mr. OTTINGER. The question of appropriations, have you gentlemen been in touch with the Appropriations Committee seeking to see those appropriations increase? We can use some help in our efforts.

Have any of you written? I would strongly suggest you do that. We will do what we can on our end of the stick, but unless there is

a real constituency, unless the people who are really interested and concerned, the municipalities, bring their views to bear on the Appropriations Committee and on the Congressmen from those areas—they in turn speak to the Appropriations Committee,

You talked about the manpower devoted to this in EPA. What is that situation, Mr. Aldrich?

Mr. ALDRICH. In terms of manpower, both at the Department of Energy and the EPA, considering activity in this country, I think we can put together a list of 200-odd projects. The manpower at DOE for following projects is extremely limited, two or three individuals. At EPA those directly concerned with assistance to municipalities is four or five. So you have a total Federal involvement in the order of magnitude of six or seven individuals.

As hard-working and knowledgeable as these individuals are, it is very difficult to keep track of an industry of this size and scope developing across the country at such a rapid pace. So it is just absolutely undermanned.

Mr. OTTINGER. When the application goes in for assistance, how long and what kind of complications are you experiencing in getting action on that application?

Mr. ALDRICH. Can you answer that?

Mr. BARKER. I have been through the frustrations, yes.

Let's say there is a formal procurement which should be able to happen, once the document is on the street, fairly quickly. Typically you have to allow 6 months or so before you know whether you have been successful, and then 6 months or more before you are actually in receipt of the formal commitment. That does not seem like a long period of time, but that tends in resource recovery to be money that is critical money and unfortunately we do experience that phenomenon where people sit back and wait until that money actually arrives before they restart their work.

In one case that I know of specifically, that waiting, because there was no local money to fill the gap, actually cost the project more money in inflation of equipment costs than that project got from the Federal Government. We really cannot stand that kind of inefficiency.

Mr. ALDRICH. For example, in Norfolk, Va., on a \$180 million project, providing steam and electricity to the naval facility down there, going for \$150,000, EPA began to maintain the operation of the staff, it looks like it is going to cost them perhaps 4 to 6 months in terms of delay. On a \$180 million facility, 4 to 6 months delay is in the order of magnitude of—I cannot even guess—probably \$10 to \$12 million in terms of capital outlay by the community.

Mr. OTTINGER. Is that attributable to the inadequacy of the personnel?

The experience we had in Westchester, the delay has not been due to EPA, which has been pushing the project. The delay has been in getting the municipalities onboard. They are concerned it is going to cost more to go to the central system than it would to have some of the larger municipalities go on their own. Is the delay really attributable to EPA delays, or are the problems the local problems that we experienced?

Mr. ALDRICH. Both, I would guess.

Mr. BRENNEMAN. I would say my own opinion on that would be that the Westchester-type delays are the predominant cause of this problem and not delays of the Federal bureaucracy.

I would like to say for the authority that in the case of both the EPA and Department of Energy grants, they were handled very efficiently and we have no complaint whatsoever.

Mr. GREENBERG. Dade County financed their plant completely on their own and it still took 7 years. So that was not a factor in that project.

Mr. OTTINGER. I think many of these things are complex political questions on the local scene. I think to the extent we can provide assurances against loss of municipality support—the municipality is in a tough position dealing with less than fully proven technology. If the thing does not work, they have a tremendous problem as to what their alternative method of disposal is.

Is there no way of stopping it? I just wonder about the degree to which EPA is an impediment or even the funds have been an impediment. I suppose these things all fit kind of hand-in-glove; if there were more money there you might get more applications, you might get better flow.

Mr. BARKER. I think something as simple as the ability for either EPA or DOE to cover moneys expended from the point of commitment to the point of actual receipt of the grant document or contract document or funds would be just enormously helpful. It is a relatively simple thing to do. But I do believe—and I do not want to overstate this problem, I happen to agree with Russ that a lot of the delays in resource recovery are not because of the Federal Establishment—we do not want to add another source of delay or delay inadvertently.

One of the problems in both agencies is that the resource recovery program is relatively minor compared to the other programs of the agency, and priorities are set accordingly.

Mr. OTTINGER. A couple of you mentioned permit problems. We have fast-track legislation going through which has been targeted, particularly to the synthetic fuels plants, that we are going to try to bring on line. Is the permit problem a major factor in delay and would it help significantly to be able to have Energy Mobilization Board set time limits on the permits for these kinds of projects?

Mr. GREENBERG. Our experience has been that that has not been a problem, that the EPA has been extremely cooperative and, where they perceive the solution as being both energy and environmental, they have fast-tracked such approvals on their own.

Mr. OTTINGER. What about State and local?

Mr. BRENNEMAN. We have had a similar experience. Also, I think it is important that neither the resource recovery industry nor organizations such as mine make any claim to override normal good environmental regulatory management. We want to fit in with keeping people healthy and not try to override those rules.

Mr. OTTINGER. Thank you very much, Mr. Chairman.

Mr. FLORIO. Mr. Ertel.

Mr. ERTEL. Thank you, Mr. Chairman.

I have no questions.

Mr. FLORIO. I would like to ask a couple of questions of the panel, beginning with Mr. Brenneman.

Could you explain in more detail exactly what the nature of your authority makeup is, who appoints the members of the authority? Is that gubernatorial appointment?

Mr. BRENNEMAN. The authority can be thought of as a quasi-public development corporation. We are free-standing. We are not part of the executive branch. However, our board of directors is composed primarily of public officials of one kind or another, most of whom are appointed by the Governor.

I, myself, am employed by that board of directors and am not a political appointee.

Mr. FLORIO. I assume the approval for the authority was a State statute, State law?

Mr. BRENNEMAN. Yes.

Mr. FLORIO. The key significant point is that you have bonding capability. I assume it is tax free.

Mr. BRENNEMAN. Yes, sir.

There are other characteristics we have that clear up difficulties that I know they have encountered in other places. We can enter into, for example, long-term service contracts and that type of thing without running into constitutional problems or statutory problems such as they have had in other places.

Our procurement policies or authorizations are broader than those of a normal public agency so we can contract with the private sector for, for example, a full service resource recovery project without going out to bid on every piece and parcel of that project. I know that has been a problem in some places.

Mr. FLORIO. And you have done that?

Mr. BRENNEMAN. Yes, sir.

Mr. FLORIO. Who is going to be operating the facility?

Mr. BRENNEMAN. A joint venture composed of Combustion Equipment Associates and Occidental Petroleum Corp. will operate the system.

Mr. FLORIO. To what degree does your authority have control over this field in your State?

For example, can you effectively control the operation of facilities in the different counties of the State?

Mr. BRENNEMAN. We have no regulatory control over that happening. We are encouraging our State legislature to enable our commissioner of environmental protection to have that regulatory power. It does not exist right now.

Mr. FLORIO. I believe you mentioned, with regard to the Bridgeport project, that you have contracts with the local utility to provide refuse-derived power; is that correct?

Mr. BRENNEMAN. Yes, sir.

Mr. FLORIO. Was there any discussion or consideration given to the conversion costs? This is an ongoing utility?

Mr. BRENNEMAN. They certainly intend to be, yes.

Mr. FLORIO. The utility is operating; you are not constructing a facility to accept this refuse?

Mr. BRENNEMAN. They have been in existence.

Mr. FLORIO. When we talk to the utilities, one of the problems they present to us regarding the reason why they cannot change is the cost of converting their boilers from coal, oil, or whatever to refuse-derived fuel. Was this a point raised as a consideration?

Mr. BRENNEMAN. It was raised as a point to the extent that the authority paid for the cost of that conversion.

Mr. FLORIO. What was the amount, do you recall? Was it a big number?

Mr. BRENNEMAN. Well, it is a big number to me, yes. I would hesitate to guess at that number, but I would say between \$2 and \$4 million. I can be corrected by Mr. Barker on that.

Mr. FLORIO. So the authority has agreed to pay for the utility's conversion costs?

Mr. BRENNEMAN. Yes, sir.

Mr. FLORIO. Is that easily reconverted? If anyone knows, are you locked in once one converts? Is there not the technology available whereby one can have multiuse boilers?

I see Mr. Aldrich shaking his head yes.

Mr. BRENNEMAN. The United Illuminating Co. could easily go back to burning oil if our fuel did not work out. They could go back to oil rather easily without any significant expense.

Mr. FLORIO. With the same boiler, or because they have different boilers?

Mr. BRENNEMAN. No; with the same boiler.

Mr. BARKER. I think we should point out that in that case the Eco-Fuel II is a supplemental fuel to oil and the primary conversion requirement in that situation is to get the fuel into the boiler, to handle additional ash from the boiler. This requires onsite storage, feeding systems, and so on and so forth. They could put no refuse-derived fuel at all into the boiler and it would operate more or less just the way it did.

Mr. FLORIO. The Public Utilities Regulatory Policy Act is now being implemented through a rulemaking proceeding. One of the rules provides a requirement, if I recall, that all utilities be required to accept energy from solid waste facilities when the amount of energy generated is less than 80 megawatts.

Are you gentlemen familiar with that rulemaking proceeding?

Mr. BRENNEMAN. Yes.

Mr. FLORIO. With that rule going into operation, particularly Mr. Greenberg might be the appropriate person to respond to it, would that have facilitated what you have been doing?

Mr. GREENBERG. Absolutely. That would have cut a year to a year and a half off of the Dade County project.

Mr. FLORIO. In terms of economics, that rule being absolute in a sense, the utility is going to be required to accept energy recovered from waste.

Mr. GREENBERG. Not really. In Dade County, we built a generator as well. So the new generator was built right along our resource recovery facility and the electricity is merely fed in.

Mr. FLORIO. Under this new rulemaking proceeding that would not be required, the burden is shifted to the utility. The utility has to accept this energy. I am supportive of the concept. I am just attempting to look at it from a different perspective, from the utility's perspective. In this instance, there does not seem to be any outside line on the liability of the utilities, they are going to have to accept this regardless of whether their utility is next to or 50 miles from the point of generation of energy from waste. I am

concerned about the inequities that you are imposing upon the utility.

Mr. GREENBERG. I am not sure I understand that. In the sense that if in Dade County we are producing steam which is driving steam-driven generators and so—

Mr. FLORIO. What if you were talking about a refuse derived fuel?

Mr. GREENBERG. That is a wholly different thing. Then they would have to deliver the fuel.

Mr. FLORIO. It has been brought to my attention that the actual language of the rule talks about not discriminating. I suppose that is substantially different because then you can roll in the cost of transporting across a State and if the costs were substantially higher than that would be a legitimate reason to make a distinction between the two types of energy. So the assumption being if the costs are comparable, the utility would then have the discretion to turn down energy from such a small facility.

With regard to your project, Mr. Greenberg, I was at Pompano Beach—that is not part of Dade County?

Mr. GREENBERG. No.

Mr. FLORIO. It is immediately adjacent to, if I recall.

Mr. GREENBERG. Yes, sir.

Mr. FLORIO. The facility there is being funded in part by a DOE grant. How is the existence of that facility, how is that taken into account with regard to your own facility, to the degree that you are drawing on the solid waste receivers from the area? Is that going to impede your ability to go forward?

Mr. GREENBERG. No. We are only dealing with Dade County waste and only 3,000 tons a day out of 5,000 tons of actual generated waste, so that is not significant at all.

Mr. FLORIO. I see.

Mr. GREENBERG. Actually just in terms of financing the State of Florida has a financing plan for resource recovery facilities. There is State legislation which enables the State of Florida to sell general obligation bonds and loan the money through a State agency to cities or counties with the appropriate pledges of their waste collection fees to finance it. That is the way the Dade County project was financed, with a general obligation bond of the State of Florida which sold at 5.6 percent. The resultant reduced cost made our project very competitive in the marketplace.

Mr. FLORIO. What restrictions are on that? Apparently Connecticut does the same thing but they have some centralized control. I am just wondering if the State of Florida attempts to enact any regulations to have some degree of control over the nature of the—

Mr. GREENBERG. Well, they have a State agency which reviews and approves the project.

Mr. FLORIO. Is the State agency specifically for solid waste.

Mr. GREENBERG. It has other functions, but there is a division dealing specifically with solid waste. I do not think the State of Connecticut has that. They financed their project through an industrial revenue type bond.

Mr. FLORIO. Who will operate the Dade County facility?

Mr. GREENBERG. Parsons-Whittemore, which is the same company that constructed the Hempstead plant.

Mr. FLORIO. In the instances in which we have private companies operating, are at all involved in the capital financing or are they just exclusively operators on a contract basis?

Mr. GREENBERG. It depends on the project. In Hempstead the contractor is undertaking it all in that they put together a consortium of insurance companies and all Hempstead Township does is deliver waste at a fixed fee. It has no other responsibilities. In Dade County, the county did all the financing. However, the technological guarantees are very strong. As long as the company stays financially viable, Dade county will be protected once the project is accepted. So in those two transactions the company took an extreme risk and that is why those two transactions have become viable or have taken place—because the company assumed the risks.

Mr. FLORIO. One of the points made, I believe in Mr. Barker's written testimony, was regarding your concern over material recovery also being part of the whole resource recovery equation. I wonder if that is not because we have had individuals, particularly the paper people, express their apprehensions to us that if we really emphasized energy generation on incineration or combustion, we will not be taking into account the energy savings that can be gained from extracting those recoverable materials from the solid waste stream.

To the degree that we do provide for extraction early on, aren't we in some ways jeopardizing the financial commitment that would be necessary to go ahead and construct something? If we commit on the basis of a flow of solid waste monies and then at a later point make some decision that it is desirable that we extract materials, could we jeopardize the physical balance?

How would you reconcile the need for stream stability, that is, the trash flow, and the public interest appreciation of the energy potential from extracting recoverable materials from the solid waste stream?

Mr. BARKER. It is a complicated problem. First of all, it is clear that today the economics of resource recovery are driven by energy revenues. I mean, it is the energy revenues that make or break the soundness of the economics of a project. The materials revenues add to that, sometimes very nicely, but the project feasibility starts with how much can you sell the energy for.

The materials contained in solid waste are more or less energy intensive. Certainly aluminum is a very energy-intensive material, and it is sometimes economically feasible to recover it. As you get down into some of the other materials, the arguments become less clear.

In many projects, the possible changes in public policy, particularly as regards source reduction or source separation or other forms of recycling, have been dealt with contractually.

The financial community or the vendor or whomever has the biggest interest in having the project succeed for the full 20-year period by and large has required guarantees that the waste will be at the door in the amounts stipulated day in and day out, year in and year out. In some instances, vendors have asked for represen-

tations on the part of the community that waste composition will not change dramatically from period to period.

So I guess to make a long story short, the participants who have an investment interest in a project, or in the case of vendors, sometimes just a risk interest in the project, are protecting themselves contractually against the very problem or, not if a problem, the potential opportunity that you are suggesting.

Our opinion is that except for breakthroughs in the recovery of paper and the economics of the recovery of paper from solid waste, you can accommodate changes in the future through careful design of the plant in the first place. Plant sizing, particularly sizing versus what you know is possible in the future in the sense of changes in generation rates or in potential composition, is the most important variable.

Mr. FLORIO. Before I call on Mr. Walker, let me express an observation concerning the actual capital grant approach. I do not think this approach is appropriate. Yet, assuming for a moment that it is appropriate, I am just concerned that those representatives we have had in the past are looking for absolute assurance to encourage private sector involvement.

We are talking about a combination of price supports and guaranteed contracts, which are tax credits. If the private sector will become involved, as they should, we will not be able to remove all risk, and my understanding from the testimony that we have received during the last number of hearings is that there will not be any great movement into the field unless we deal with just about each and every risk.

My observation of landfills is what is happening in my own State. The escalating requirements on landfills is no longer making them a viable means for disposal. The energy costs are going up.

So I am not sure what else we can do to make this risk-free, other than some of the things we have already discussed. I think we all have to be vigilant in expressing to the private sector that recovery from solid waste is not going to be risk-free. There will always be a certain amount of risk, but the potential in terms of return on investment is there, so that we will have, and already do, in my opinion, the opportunities for people to invest some money because the dividends will justify the risks.

Mr. ALDRICH. Industry has been willing to accept the risk involved, and the risk that industry is willing to accept is a construction risk, an operating risk, and the ability to convert waste into salable energy.

The other risks normally are taken care of by contractual obligations with the energy user and with the communities. So I do not think we need—personally, I do not think we need a grant program, but we need some economic support when, in spite of the assumption of the risk, the projects are not competitive with landfill, that there is an immediate rise in cost of disposal due to putting on a new system until the energy costs catch up with it, with the increase in energy versus catches up with the increase in landfill, and we have what we call a gap that occurs in the first 5 years of operations of these facilities, which puts a burden on the community in going into a resource recovery, because their landfill, historic landfill cost may be maybe \$7 and the immediate project

that they are going to undertake may cost them \$12 a ton, \$14 a ton, but in the long term will either come down or landfill costs would rise up to be in that level or landfill is not available.

Industry is willing to take the risk. The return on investment has been low for these risks, and as they develop the systems these risks will be reduced. Of course, the return on investment will become greater as their learning curve develops.

However, there are some factors in terms of financing, particularly in the area of the ability of the corporations to utilize tax-exempt financing, which has significant impact upon the economics of the project, and we are concerned about the Treasury's movement in this area, and there are uncertainties of the regulations, and their proposed change in regulation which would reduce the availability of tax-exempt financing for these facilities, which has been a major impetus, particularly in Connecticut and Delaware and elsewhere, to the development of these types of projects. But industry is willing to assume those risks which are manufacturing risks, and the community is willing in most cases to assume those risks that are community risks. That is delivery of solid waste and composition and energy consumers, of course, are mainly purchasers of material. We have a good mechanism without having to go into a grant program.

Mr. GREENBERG. I suppose if one disagrees we should express it. I do not believe that is the present state of the situation. I think what we are really looking at is that the public sector, in order to have a resource recovery transaction, has to assume more risk than it probably should based on its position in the energy field—in order to determine if it should be taking the risk and to see whether this is an advisable source.

Private industry cannot take this risk. They could take it, but the fact is they do not in view of the number of companies involved and the size of the transactions—for example, the Dade County transactions, a \$200 million plant, with a \$25 million-a-year, 20-year responsibility, to take our waste. That is a very large transaction for the company and they are not going to build another plant until those risks have been put aside, and that is years from now.

Mr. FLORIO. Does that mean you would support a construction grant?

Mr. GREENBERG. I think the difference between clean water and solid waste is that in solid waste it is a proprietary function and the ability to repay is there. If the transaction made sense economically in the first place, meaning that the solid waste was there, that the economics of the market were there, the only thing we are really concerned about is the technology and the future changes in the waste stream, I think your point is very well taken.

If you are talking about a 20-year financing and predicting what is going to be in the waste stream 10, 15, 20 years from now, that is a lot of guesswork.

There are a lot of things that have already occurred which have dramatically affected older resource recovery plants. Just in passing, by eliminating aluminum refuse, packaging of plastic packages which has a dramatic effect on the waste stream, and who knows what the future will be?

So what I am saying is if we had an economically viable transaction and the Government were willing to loan money to that transaction, where the community were willing to come up with its share, whatever that might be, where private industry were willing to assume a pro rata share of the risk and the Government were willing to loan the balance of the money to be repaid out of profits. If the technology is there, the repayment ability will be there. This can be done if the original economics were sound. I do not see where the Federal Government could not pass on that just as easily as it passes on any other loan, and maybe the State agency, if the State agency approves.

That is what happens in the State of Florida. They pass on the economic viability. They are very concerned, concerned about the State of Florida bonds getting repaid. The State is not going to repay them, they are looking to the county. They look at the economic viability of the transaction to see if the money can be repaid. If it is, they will loan the money.

Mr. FLORIO. Mr. Walker.

Mr. WALKER. Thank you, Mr. Chairman.

I have just one basic question here and I hope it will be brief. But I am interested in finding out where you think the Federal Government should place its emphasis. On the one hand, this can be viewed as an environmental plan, and I understand your testimony and previous discussion has gone into that. We are interested in it as an energy program. What I am particularly interested in is, what direction should the Federal Government pursue as it goes? Who should be the lead agency? Where should we put the authority for the running of the program, within the Federal Government? Should it be within the Department of Energy, should it be within EPA? I would like to get some idea from each of you where you think the responsibility for leading this program should be.

Mr. BARKER. I think that I have to make a philosophical statement, which I will apologize for. I think in the testimony earlier most of us have made a statement to the effect that what we are involved in is the production of energy with a very substantial environmental benefit, because at the same time we are producing energy we are also solving a serious disposal problem. Projects typically are driven by the energy production aspect of the project, particularly economically.

Many of us philosophically question the ability of an agency which is regulatory in nature to appropriately prioritize in a field which is becoming really developmental in nature, production oriented, not environmental control oriented. Consequently, I think if a decision had to be made, and I will just speak for myself, I think it would be most logical to have the Federal lead agency be DOE or some other energy-oriented agency.

Mr. WALKER. Thank you, Mr. Chairman.

Mr. FLORIO. If there are no other questions, I would like to express the subcommittees' appreciation for your contribution. It has been very, very helpful. We will feel no inhibitions about reaching out to you as we go forward for further clarification of points. We do thank you for being here this morning.

Thank you very much.

Our next panel we would now like to call is Mr. William J. Landman, Mr. Frank Kuchta, and Mr. Robert Schmidt, who I understand will be accompanied by Mr. Harold Wingler.

I would take the prerogative of the chair and ask that we hear Mr. Frank Kuchta, Director of Public Works of the city of Baltimore, first. We welcome you to the committee.

**STATEMENTS OF FRANCIS W. KUCHTA, DIRECTOR, DEPARTMENT OF PUBLIC WORKS, CITY OF BALTIMORE, MD.; WILLIAM J. LANDMAN, COMMISSIONER OF SANITATION, TOWN OF HEMPSTEAD, N.Y.; ROBERT D. SCHMIDT, PRESIDENT, SPM GROUP, ENGLEWOOD, COLO.; AND HAROLD WINGLER, COMMISSIONER, SIOUX FALLS, S. DAK.**

Mr. KUCHTA. Thank you, Mr. Chairman and members of the committee. I am Francis Kuchta, director of public works for the city of Baltimore. From my observation at the local level, I feel that the large cities and metropolitan areas of the United States have faced a serious solid waste handling and disposal crisis for approximately 10 years. Urban and suburban development, a diminished supply of landfill space, new environmental requirements, and aging incinerators have all contributed to our solid waste crisis.

Now America faces the beginning of a new crisis—the energy crisis—created by the depletion of our natural energy supplies and reserves. It is somewhat comforting to know that solving the solid waste disposal problems can make an important contribution to the solution of the energy problem. That is not just wishful thinking. Solving one will help solve the other. This is fact. But the facts are hard and the solutions are not cheap or easy.

We in Baltimore know this to be true because we have lived through the endless experiments, the painful failures, and the eventual success of a domestic solid waste-to-energy demonstration project. The project is a working reality today in Baltimore. It produces 1,900,000 pounds of steam a day for heating and air-conditioning much of our downtown area.

I will not ask you to listen to a detailed description of our hope, frustration, and agony. You have copies of the historical and background information on Baltimore's pyrolysis solid waste disposal plant [see p. 190].

Mr. KUCHTA. This report takes you, almost step by step, through the period from October 1972 when we signed a contract with Monsanto Enviro-Chem Systems, Inc., until the present, when we are operating a 600-ton-per-day facility 6 days a week. The report summarizes the initial and subsequent costs and the financial participation in the project by the Environmental Protection Agency, the State of Maryland Environmental Services, and the city of Baltimore. It describes the technical problems we encountered and the eventual solutions we found.

One of the clearest, most intuitive analysis of the project was made by staff members of one of your committees, the Committee on Science and Technology. This report was published in August 1978, and is probably one of the most useful reports that any city or county could have in considering various existing technologies to reduce solid waste volume and produce energy. I cite this particu-

lar report because I feel that there is a great need for the dissemination of this kind of factual information to jurisdictions that want to produce energy by waste. The lack of complete, central information bank of solid waste technology unfortunately delays our progress in this critically important area.

Our experience, the experience of other cities, and especially the successful experience of European operations should be skillfully analyzed in detail, published, and made available from a central source. Currently information on whatever technical progress has been made is now scattered, difficult to locate and retrieve. I believe that this is one reason why officials from a number of United States and foreign cities flock to our plant to tour the facilities and ask essentially the very same questions.

Sharing valid information in a systematic way will help this country solve the solid waste disposal problem and make significant inroads on the energy problem.

The economic realities present even greater stumbling blocks to the development and use of new or existing technology. Another Baltimore experience will serve as a example. We have been in the process of rehabilitating and upgrading our city incinerator. In the final phase of a two-phase rehabilitation plan, we had hoped to generate steam and electricity. The technology was proven. Experimentation would not be needed. We were stunned when the bids for the project ran approximately \$7 million more than we had anticipated. It was obvious that we could not include the generation of steam and electricity simply because it would be impossible for us to repay the bond funding for the project with the revenues from the sale of energy. Our bond counsel was quite skeptical of the salability of the projected bond issue, feeling that the technology could very likely change during the life of the bond issue, making our plant and its process obsolete. In short, a questionable investment.

For these reasons, Baltimore, with its record of daring innovation and experimentation, quietly designed and contracted for the construction of a very conventional incinerator. The city will purchase the electricity needed to run the precipitator. We will not produce it ourselves as we had hoped to do. We will not produce steam or electricity for resale to our local utility company.

I must reemphasize that the technology we were considering is not new. It has been proven in actual use. At the time, there were no Government programs to provide financial assistance for our solid waste disposal project as there are for waste water treatment plant improvements. This means that a city using existing technology must finance its own solid waste-to-energy projects. Unfortunately, prohibitive costs prevent most cities from using city funds or loan funds to build a technologically proven, waste-to-energy project such as the one we contemplated for our incinerator.

If it is important for the Nation to begin quickly to convert useless waste products into usable forms of energy, it is important that financial assistance be provided to get these systems on line. At the same time, it is vital that new technology be encouraged, tested, demonstrated, and utilized. Additional demonstration projects, like the Baltimore pyrolysis plant with all its headaches and heartaches, need to be seriously considered for future funding.

What American cities and counties desperately need is a variety of alternative technologies from which to select solutions to unique local problems. They can intelligently select from viable alternatives only if the Federal Government plays a significant part in encouraging research and development, providing demonstration grants, providing for the testing of materials and equipment used in waste disposal plants, gathering information on the successful technologies in use in Europe, and providing a central technical information service for every State, county and city.

I have been emphasizing the role of government in developing energy-from-waste technology. What about industry? Industry alone cannot solve the technological problems.

Mr. FLORIO. Could I interrupt? We are going to have to go vote. We will be back in a few minutes and you can resume your testimony at that time.

Thank you.

[Brief recess.]

Mr. OTTINGER [presiding]. We will resume our hearings.

Mr. Kuchta, I believe, was delivering his testimony.

Mr. KUCKTA. Yes; I was commenting on the involvement of private industry in the efforts in Baltimore. We were totally confident in 1972 that private industry would have the technological know-how to build a successful waste disposal energy production facility for our city, but we were very disappointed when one of America's largest industrial organizations told Mayor Schaefer of Baltimore that the project was a failure, that the pyrolysis process would never work, and that the company had decided to abandon the project in our city completely.

This really did happen to us. In this case it took government, city government, to solve a variety of problems and make the plant work. Of course, we had no alternative because we have to collect and dispose of a daily stream of refuse collected from residential properties and picked up from our streets and alleys; all of this with very, very little landfill capacity.

The reduction of solid waste in Baltimore by pyrolyzation or incineration will prolong the life of our landfills and make them safer and cleaner. To prevent similar costly and discouraging experiences for other U.S. cities, I strongly recommend that the Federal Government take a far greater, more aggressive role in encouraging the development of both new and existing technology so that we can solve solid waste disposal problems by converting much of that waste to energy we so urgently need.

Thank you.

[Testimony resumes on p. 202.]

[Historical and background information on Baltimore's pyrolysis solid waste disposal plant, referred to, follows:]

## CITY OF BALTIMORE

WILLIAM DONALD SCHAEFER, Mayor



## DEPARTMENT OF PUBLIC WORKS

FRANCIS W. KUCHTA, Director  
600 Municipal Building, Baltimore, Maryland 21202BALTIMORE'S PYROLYSIS SOLID WASTE  
DISPOSAL PLANT

## Historical and Background Information

(July 13, 1979)

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Pyrolysis Plant

## CHRONOLOGICAL HISTORY

October, 1972 - Monsanto and City signed contract. Construction begins.

Initial Financing Breakdown

E.P.A.	-	\$6,000,000
State	-	\$4,000,000
City	-	\$4,742,000
Total	-	\$14,742,000

Supplemental Funds \$850,000 (City paid extras)  
Total - \$15,592,000

Total City Commitment = \$4,742,000 + \$850,000 = \$5,592,000

January, 1975 Plant commissioned as construction being completed.

January, 1975 thru September, 1975 Shakedown period

September, 1975 Monsanto admitted the plant would not meet contractual guarantees.

September, 1975 to December 31, 1975 The City and Monsanto negotiated the performance guarantee payback and a new supplemental agreement.

December 31, 1975 City and Monsanto signed supplemental agreement.

January 23, 1976 EPA awarded an additional grant of \$1,000,000 for the supplemental agreement.

Supplemental Financing Breakdown

Monsanto Payback	-	\$4,000,000
EPA Grant	-	\$1,000,000
		\$5,000,000

February 2, 1976 Modification work begins

April 30, 1976 Modification work complete except for kiln relining. Kiln relining deferred until after other modifications have been tested.

May, 1976 thru July, 1976 Modification testing. Test runs were of short duration - five days or less, because of repeated kiln lining refractory failure.

August, 1976 thru September, 1976 Reline kiln and replace a section of the kiln shell damaged during test runs.

November, 1976 Start system with all changes recommended by Monsanto.

November, 1976 thru January, 1977 Monsanto attempted to get a continuous 30 day test run, but never was able to achieve it. The longest continuous run was 18 days.

February 1, 1977 Monsanto recommends project be abandoned as a Pyrolysis Plant.

February 7, thru February 18, 1977 Monsanto withdrew all personnel and equipment from plant site. Withdrawal complete February 18, 1977.

February 22, 1977 City begins operations without Monsanto.

March 18, 1977 City completes its first run of 24 continuous days. This is the longest continuous run to date. A throughput of approximately 560 tons/day had been achieved.

April 25, 1977 City starts second run.

May, 16, 1977 Second run terminated. Three weeks of successful operation achieved the following results:

Week 1 - Approximately 18 hours of operation per day.  
Approximately 660 tons per day processed.

Week 2 - Approximately 20 hours of operation per day.  
Approximately 665 tons per day processed.

Week 3 - Approximately 22 hours of operation per day.  
Approximately 700 tons per day processed

December 31, 1977 -- Year End Totals (February 18 - December 31)

Solid waste processed	68,000 tons
Steam production	263,000,000 pounds
Revenues earned	\$768,000 (from Gas & Electric Company)

January - February, 1978 -- Construction underway on the following:

Gas purifier  
220 foot high stack  
two induced draft fans  
electrostatic precipitator

Total: \$4,980,442.

May - June, 1979 -- Construction completed -- test period

Processing 600 tons of solid waste per day producing 1.4 million pounds of steam per day. Completed successful 30-day test.

July, 1979 -- Inspection of new components after test

Inspection revealed inadequate lining of new ductwork. Correction of this problem underway. Plant will resume regular operations this month.

# City aides renew hope in pyrolysis

The Sun  
Thursday  
February 2, 1978

## Pyrolysis Plant

STATUS — FEBRUARY, 1978

### Repairs set to allow waste-steam plant to work at capacity

By ROBERT A. ERLANDSON

Baltimore's pyrolysis plant has processed 88,000 tons of solid waste—half of what it was meant to handle—and has sold \$800,000 worth of steam to the Baltimore Gas & Electric Company since the city took it over one year ago, the public works director said yesterday.

But the plant was closed again January 10 to undergo \$5 million in repairs and redesign, which Francis W. Kuchta, the works director, said he expects will make it work at full capacity by January, 1979, and bring it into compliance with state and federal air pollution requirements.

Mr. Kuchta said he is "still enthusiastic" about the future of the pyrolysis plant, based on last year's operations and the changes in design.

Erection of a new 220-foot smokestack will miss the state-imposed February 23 deadline, however, and the plant itself will probably remain closed until August, the public works director said yesterday.

William C. Ross, the plant engineer, said that he now expects the stack to be completed by mid-March, but that this is only one reason for the long closing.

Mr. Ross said the plant, which now represents a \$24 million investment in federal, state and local funds, was closed to prepare for the stack installation and to permit demolition of some of the original—but unworkable—features.

Much of the work being done was required by the state Health Department, when it ordered the plant closed for five days in June because of excess air pollution.

Monsanto Enviro-Chem, Inc., which launched the experimental garbage disposal plant in 1972, gave up its role in the project one year ago yesterday.

Under city aegis, Mr. Kuchta said yesterday, the plant has functioned well, though admittedly at half capacity as solutions were sought to the manifold problems.

He said a report covering February to December shows that the plant handled about 300 of the 1,700 tons produced daily in the city and produced 28.4 million pounds of steam.

Vic Moore, who manages the plant, said he considered that production "a very good run—better than Monsanto ever did, and they built it."

Hollis Keck, who is in charge of engineering for McNamara Fabricators, the company making the steel smokestack, said the first section, 30 feet, is scheduled for delivery next week and will take a day to install.

Under its contract with the city, McNamara will receive \$518,342 to build the stack, a \$1,000 bonus for each delivery day before February 23 and \$1,000 a day penalty after that.

Pyrolysis Plant

## PROBLEMS AND THEIR SOLUTIONS: Achievements by City Forces Since February 18, 1978

1. The City found it was more economical to use a type hammer in the shredders that is discarded after it is worn out (sold as scrap) instead of the original type that is rebuilt. The new type hammer has a longer life which cuts down on man-hours spent maintaining the shredders.
2. The operation of the plant was changed from 24 hours per day, 7 days per week to 24 hours per day 6 days per week, using Sunday for preventative maintenance.
3. Maintaining a steady feed rate to the kiln is essential for proper operation. Since the original design of the Atlas could not accomplish this, the City elected to feed the kiln directly from the receiving pit, using one shredder. The Atlas is now used as a secondary source of feed to the kiln, a backup storage facility. An inventory of shredded trash is maintained in the Atlas so that if a problem occurs in the front end of the plant, feed can be maintained from the Atlas until the problem is corrected. The Atlas has been modified to allow a front end loader to enter the Atlas and load the stored trash onto the outfeed conveyor.
4. Additional reinforcement was added to the base of the 2000 H.P. induced draft fan (C-8) to strengthen the base, eliminating the balancing problem that had caused considerable down time because of excessive vibration.
5. Discontinued use of all water to the scrub tower, thereby reducing the wet, dirty build-up on the rotor of the induced draft fan, which also caused the fan to go out of balance.
6. The hot gas by-pass valve was sealed closed, increasing steam production.
7. Increased use of kiln speed to maintain proper condition in the kiln.

## THE PROCESS: Kiln, Afterburner, Waste Heat Boilers and Steam Production

Pyrolysis is the physical and chemical decomposition of organic matter brought about by the action of heat in an oxygen deficient atmosphere.

## THE KILN

Baltimore's pyrolysis reaction takes place in a refractory lined horizontal rotary kiln with a designed through-put of 42 tons of solid waste per hour. The kiln is 100 ft. long, 19 ft. in diameter and can be rotated from .1 R.P.M. to 2.0 R.P.M.

The kiln is initially heated with fuel oil burners using #2 fuel oil to a start-up temperature of approximately 1300°F. When solid waste is fed into the kiln, the heat required to accomplish our pyrolysis reaction is provided by the partial burning of the trash. At times #2 fuel oil must be supplemented to maintain the process. This is used when the trash has a heavy moisture content; otherwise, the kiln's solid waste fuel is self sufficient.

The gas temperature is maintained at the feed end of the kiln between 1500°F and 1600°F. The gas temperature is primarily controlled by adding air to the kiln. When the feed-end temperature is maintained correctly the fire end temperature is from 1800°F to 2000°F. This temperature is monitored by a ray-o-tube pyrometer which is looking at the kiln refractory.

The gas temperatures at the feed-end are critical; if the temperature exceeds 1750°F slagging occurs; if the temperature decreases to 1450°F the residue will be partially unpyrolyzed.

#### THE AFTER-BURNER

The pyrolytic gases leave the kiln and go to the after-burner where they are combusted with additional air. The gases consist of the following:

	<u>Percent by volume, dry basis</u>
Nitrogen	69
Carbon Dioxide	11
Carbon Monoxide	7
Hydrogen	6
Methane	3
Ethylene	2
Oxygen	2

To assure complete combustion of the gases the temperatures are maintained between 2400°F - 2600°F by adding additional air. These temperatures were also maintained to assure slag would flow out of the gas purifier into a quench tank.

#### WASTE HEAT BOILERS AND PRODUCTION OF STEAM

The heat released from burning the gases in the after-burner are directed into the waste-heat boilers, operating in parallel, which are capable of generating 200,000 pounds of steam per hour. The inlet temperatures of the boilers are maintained at approximately 1600°F by adding air at the discharge side of the after-burner. If for any reason the feed of solid waste is stopped to the kiln, a burner using #2 fuel oil is started in the after-burner and will maintain approximately 70,000 pounds of steam per hour. Approximately 75% of the steam generated is sent to the Baltimore Gas & Electric Company at a pressure of 300 PSIG. This steam pressure is reduced to 150 PSIG through a control valve one mile from the plant site; where BG&E monitors the steam quality before going to downtown Baltimore for use in heating and air conditioning. The remaining 25% of steam generated is utilized in the plant process.

Pyrolysis Plant

## ROLE OF TECHNICAL ADVISORY COMMITTEE

Monsanto pulled out of the Pyrolysis Plant February 18, 1977, after completing a test run of 25 days on February 7th. The City began the next test run on February 22nd and terminated it on March 18th, after 24 days of continuous operation. The Mayor's Pyrolysis Advisory Committee was named on March 8, 1977 and had their first meeting on March 16, 1977. At that time the major problems discussed were deteriorating operation, need for personnel modification, fan vibration, atlas bin, kiln feed system, gas purifier, lack of redundancy, need for additional weigh scale and installation of an electrostatic precipitator to meet air pollution standards. No recommendations by the Advisory Committee were made.

The Pyrolysis Advisory committee met again on March 31, 1977 after an inspection of the plant internals was made. The Advisory Committee recommended the gas purifier be patched using castable refractory, and that test bricks be installed for evaluation after the next run. Committee members from Bethlehem Steel supplied part of the test bricks for the gas purifier, and also offered to perform the gas purifier slag evaluations in their ceramic laboratories.

The Committee recommended that the atlas storage silo be reinforced and a hole be cut in the side to enable a front end loader to enter and to work inside.

The Committee recommended a new weigh scale on the inclined belt conveyor be installed to allow feed to go directly from shredders to the kiln.

The Committee recommended the ram feed tubes be modified by reducing the tube length and by removal of the tube restriction plates.

The City patched the gas purifier using the castable refractory, installed the test bricks, modified the atlas storage silo, ordered a new weigh scale, and modified one of the two ram feed tubes.

INDUSTRIES AND ORGANIZATIONS REPRESENTED  
BY ADVISORY COMMITTEE PARTICIPANTS

Engineering Society of Baltimore  
Bethlehem Steel Corporation  
Martin Marietta Corporation  
Johns Hopkins University  
Maryland Environmental Service  
Baltimore City Bureau of Operations  
Whiting Turner Contracting Company  
Whitman Reardon & Associates  
Farrier Industries  
Resources Management Associates, Inc.  
Baltimore Gas and Electric Company  
U. S. Environmental Protection Agency

Excerpts from the principal findings of analysts during site visits from November 29, 1977 - January 13, 1978 as published in:

The Status of Resource Recovery. Report prepared for the Subcommittee on the Environment and the Atmosphere, Committee on Science and Technology, U. S. House of Representatives, 9th Congress. August 1978. U. S. GPO.

Baltimore was first attracted to pyrolysis because their primary need was to reduce the volume of refuse to be landfilled. The ease with which the pyrolytic gases could produce steam was also attractive since many buildings in the nearby downtown area are heated and cooled with steam, and there are many clothing manufactureres which use it in their operations. And, of course, the distribution system was already in place.

In the opinion of the Baltimore officials many of the problems encountered were due to the turnkey contract, the manufacturer's lack of experience with garbage, and scale-up problems. Others have asserted that the turnkey contract was not a factor. Under the turnkey agreement the contractor would not run the plant after it was built and had performed for 30 days at the stated capacity of 1,000 tons per day (TPD). Therefore, the Baltimore argument goes, some components were not built as ruggedly as they should have been. And while the manufacturer had long experience with materials handling, and had successfully operated a 35 TPD pilot plant, this was not sufficient to master the intricacies of garbage. Among the problems encountered were: several difficulties with the conveyor systems (a design problem); the refractory lining in the kiln broke up and fell out; a fan which controlled the movement of the pyrolytic gases suffered seemingly uncorrectable vibration problems; the gas purifier was half as big as needed; and the garbage storage hopper wouldn't work as designed. In fact, at least once solidified garbage had to be blasted out with dynamite. The most serious problem, though, in terms of the cost required to correct it, was the development of air pollution problems which had never shown up in the pilot plant operation. Sub-micron size particles were emitted to the atmosphere; adjusting various operating parameters would not control the pollution and electrostatic precipitators were purchased. They were being installed at the time of the site visit.

Monday  
June 18, 1979

## Pyrolysis plant at 'full capacity,' burning trash, producing steam

By Kelly Gilbert

After more than five years of trouble, the Baltimore pyrolysis plant has finally passed a 30-day operating test and is burning trash at what city officials call "full capacity" of 600 tons a day.

In addition, the plant is producing 1.4 million pounds of steam a day, most of which is being sold to Baltimore Gas & Electric Co. But the city is not recovering metals and glass it had hoped to recycle and sell.

The total investment in the plant,

with \$5 million worth of new anti-pollution equipment required by state and federal environmental agencies, now is \$25 million to \$26 million.

When the city contracted to buy the plant in 1972, the cost was to be \$14 million in city, state and federal money.

Mayor Schnaefer, the pyrolysis project's most ardent supporter in the face of sometimes sharp public criticism, planned a press conference this afternoon to announce the plant's success and the end of a five-year city struggle

to make the solid waste disposal plant work, according to Susan Wright, a press aide.

Public works officials were more cautious in their optimism, however.

Jacob J. Bochinski, the assistant chief of solid waste who serves as the plant superintendent, said the pyrolysis plant will be shut down next week for about seven days for preventive maintenance and an inspection of both new and

[Continued, Page C 3, Col. 1]

## City pyrolysis plant runs at full capacity

[Continued from Page C 1]

old parts of the facility.

"We may have to shut down every five or six weeks to clean it," Mr. Bochinski said of the plant. "So far, everything looks pretty good, but we won't know for sure until we shut it down this time to inspect."

"Our confidence is building up every day," said Francis W. Kuchta, the public works director. "We'll have problems from time to time, but nothing we can't handle, the same as with any other machine."

"Hopefully, the plant will continue to work indefinitely, except for Sundays," said James Kapplin, the public works information chief.

Mr. Kapplin emphasized that the operating test, completed Friday, showed (1) that the plant works, (2) that it can comfortably handle 600 tons of trash a day and (3) that it can produce a steady supply of steam.

The pyrolysis plant now is being fed 600 tons of unprocessed trash a day and reducing that trash intake by about 75 to 80 percent. The 600 tons a day is just over half the rated capacity of 1,100 tons a day that the plant originally was supposed to handle.

Baltimore officials got into serious pollution trouble several years ago when the plant was built, because it was supposed to be in operation in time to replace the old Reedbird incinerator that was shut down in 1975 and was supposed to substantially reduce, to ash, more than half the city's daily output of trash and garbage at a time when city landfills were nearly full.

However, the plant did not work, and the city and federal governments were forced to plunk millions of dollars more into the facility for anti-pollution equipment and redesigned equipment after the city took control of the plant when its designer, Monsanto Enviro-Chem Systems, Inc., bailed out of the project.

At present, Mr. Kapplin said, the pyrolysis plant is burning about one-third of the city's daily trash, another one-third is being burned in the Pulaski highway incinerator and the remainder is being put into city landfills.

When the second phase of the Pulaski incinerator renovation is complete, in about a year, all of the city's trash will be sent through reduction facilities, which will enable the city to extend the life of its landfills, Mr. Kapplin said.

The News American  
 Tuesday  
 June 19, 1979

# Mayor says city pyrolysis plant ready for daily operation

By Dan  
 The News American

Baltimore's problems plagued Pyrolysis Solid Waste Plant — abandoned in frustration by its original designers and builders in 1977 — finally is ready to begin converting 600 tons of refuse into 1.4 million pounds of steam on a daily basis, according to city officials.

The plant, afflicted for most of its 6 1/2-year history with financial, mechanical and environmental problems, has been operating successfully under test conditions for the past 30 days. Plant officials expect the pyrolytic conversion of trash into steam to become a full-time operation beginning Saturday, after one final check.

Schaefer, who toured the Russell Street facility Monday, appeared confident the plant would operate regularly — Monday through Saturday — after circulating Monsanto Enviro-Chem Inc., the designer and builder, for abandoning the project in

February 1977 and showing "no corporate responsibility."

He also guaranteed that the plant would process 1000 tons of solid waste per day," he said. "Then they told us that the pyrolysis process would never work. We've come a long way since Monsanto gave up on us."

Schaefer congratulated the engineers, who he said they "believed in the project when it only had a 50 percent chance of survival."

Federal, state and city agencies financed the plant originally and worked closely with Monsanto in obtaining some funds and expertise based on a plant prototype built by the company in St. Louis. That plant processed 25 tons of solid waste refuse per day, and Schaefer noted the company's inability to adapt the design for operation of a much larger plant. "Monsanto just didn't understand the problem of solid waste that our people did," he said. "It's made up of many different materials.

They didn't appreciate our experience, and told us they had their own experts."

In the past 18 months, the city has invested \$5 million in design and equipment modifications. The new air pollution controls include two electrostatic precipitators, two induced draft fans, a 28-foot high stack and a gas scrubber.

The city engineers replaced the Monsanto parts and satisfied federal air quality control regulations as well as the Maryland standards, which are among the toughest in the nation.

The Baltimore Gas & Electric Co. has agreed to purchase the plant at a price that will fluctuate with the cost of a barrel of oil. The utility company will use the energy to power its Westport steam generation and distribution plant, which cools and heats many buildings in downtown Baltimore. The plant, owned by BGE, will save about 2 million gallons of oil annually by purchasing the steam. During a year of test runs in 1977, the pyrolysis plant produced 60,000 tons of solid waste and produced 250

million pounds of steam, generating \$788,000 in revenues for the city.

The plant also was intended to reclaim steel and glass from the refuse, but it is no longer a top priority. The city has decided to stockpile the recycled materials in the future, the plant may initiate such a project but, for the moment, officials simply want "to get the plant to keep working."

Schaefer was especially pleased that the plant is operating because by converting 90 percent of the refuse it collects into steam, only 20 percent is left to be dumped at the Pennington Avenue landfill.

"Like many cities," he said, "Baltimore has a serious problem with solid waste. Some of the old landfill sites were taken by the legislature. We may run out of landfill space very soon."

Although the mayor was confident the pyrolysis plant now will be operational, he did not rule out the possibility of some minor problems, and other officials agreed with his assessment.



SCHAEFER; Blasts Mon

# Pyrolysis

City plant, in action soon,  
will make steam from garbage

It's been fashionable, these past seven years, to snicker when the words "pyrolysis plant" are mentioned. Actually, tears would have been more in order — and so would applause for the city for tackling the project at all.

The plant was supposed to burn household garbage and trash in an oxygen-deficient kiln, thus producing combustible gases to be burned in a boiler to produce steam to heat and cool downtown buildings. It was a pioneering effort on the city's part, an experiment. The city had heard that the technology, even though unproved, had possibilities, and it managed to get \$26 million in federal, state and its own funds to hire the mighty Monsanto chemical firm to build the plant, today easily recognizable on the Russell St. approach to Baltimore because of the colorful hues in which it is painted. Monsanto was selected on the basis of a prototype plant it had put up in St. Louis. But the prototype burned a mere 35 tons of solid wastes a day, and the real thing in Baltimore was supposed to handle 1,000. But it never did. In the kind of corporate move that gives American business a bad name, Monsanto threw up its hands, said the plant would never work and took a walk.

So there was Baltimore, stuck with a \$26 million "facility" that could do little except decorate the skyline. But for over two years the sanitation people have been working to salvage the plant. In the past 18 months \$5 million has been invested in more and better equipment and to bring that equipment into conformity with environmental standards.

In a week or so the plant will be burning 600 tons a day — and selling the resulting steam to the Baltimore Gas & Electric Co. Estimates are that \$1.5 million thus will be produced annually for the city, and that 2 million gallons of oil will be saved every year. In our view, the city and the Division of Sanitation personnel who saved the plant from becoming a white elephant (or, at least, an op art pachyderm) deserve a vote of thanks.

The Sun  
Monday  
June 25, 1979

## From Paralysis to Pyrolysis

City workers have turned a monumental flop into at least a partial success story in getting the previously paralyzed pyrolysis plant back into production after the Monsanto company had abandoned its defective brain child. Although currently closed again for inspection of all working parts, the modified plant has performed well in a 30-day test, handling 600 tons of trash and garbage daily and producing steam for the Baltimore Gas and Electric Company at the rate of 1.4 million pounds a day. Of critical importance, new anti-pollution equipment has enabled the plant to meet both state and federal air-quality standards, whereas it was once under a state health order to close down.

In turning to practical-minded men in the city's own public-works department to get the plant running, Mayor Schaefer appears to have relied wisely on years of first-hand experience in handling large volumes of rubble. Monsanto's novel low-oxygen baking process worked well enough, they found, but the means of moving refuse to the kiln was complicated and subject to frequent failure. They had to bypass as impractical, for

instance, the cone-shaped storage bin, attractive as it may be to the eye, and with other alterations and \$5 million in pollution controls, the plant's total cost has risen above \$25 million. But Baltimore by now desperately needs its capacity.

If the pyrolysis plant can be kept in steady operation at 600 tons a day, that represents a third of the city's daily trash collections, currently fast outrunning available landfill space. The Pulaski highway incinerator also handles 600 tons a day, and when its capacity has been doubled a year from now, Baltimore should no longer have to dump raw refuse in landfills. Further, if the pyrolysis plant can produce more than 1 million pounds of steam a day, that is worth \$3.75 per 1,000 pounds at current energy prices, which for city taxpayers means their trash becomes both an energy-saver and a money-maker. The plant was also designed to recover metal and glass, which would greatly reduce the 20 per cent residue, but so far the city's in-house skill in handling refuse does not extend to knowing how to get a good price for marketable scrap, which is a pity.

Mr. OTTINGER. Thank you.

We will hear next from Mr. Landman, who is going to be testifying, I take it, in place of Supervisor D'Amato.

#### STATEMENT OF WILLIAM J. LANDMAN

Mr. LANDMAN. Thank you, Mr. Chairman.

I am sanitation commissioner for the town of Hempstead in New York, representing Supervisor Al D'Amato and the 850,000 residents of our town.

Just for general information, our town is one of three comprising Nassau County adjacent to New York on the east and on Long Island. We generate over 800,000 tons of solid waste per year; as such, solid waste is an important involvement in our community development.

After about 7 years of planning, we have just recently come onstream with the resource recovery facility capable of producing almost 40 megawatts of energy in a waste-energy concept; more importantly, dealing with our solid waste demands of 2,000 tons per day.

To date, and while we are in the early start-up and some several people alluded that the jury is still out on our plant, and I certainly concur in that; in the 7 months of operational start-up, we have sold 80 million kilowatts of electrical power to our public utility.

The town of Hempstead is not new in this waste-to-energy concept. We have a plant built in 1952 which is still operating at 600 tons a day, which is a waste-to-energy plant; it develops electrical power, 1,500 to 2,500 kilowatts per hour, but it is a waste-to-energy plant. This new facility is a logical extension of that experience.

Our second plant, built in 1964, is also a waste-to-energy plant. So we have been in the resource recovery business for a considerable period of time. The new facility in its largest salability, the export of power, obviously becomes the interest and hopefully one of the successes that everyone is looking forward to.

We had problems getting this type of project together. There was some suggestion earlier that the lead time is extensive. Yes; we had it. In New York we were precluded from contracts beyond a period of 5 years. We required special legislation to go to a 20-year contract for resource recovery. That has been accomplished. Obviously anyone else would have the benefit of the loss of that year of time.

Secondly, at the time we started developing this contract in 1972, there were no other similar types of contracts which developed performance and specifications of a nature and size and capital intensity similar to this project. We are breaking some new ground in developing that contract. Some of these things will tend to reduce the lead time.

The new technology that has emerged contains obviously considerable risks, the need to apply concepts that would tend to reduce these risks are obvious. In our particular case we opted at the time of building a facility to deal with our solid waste problem with zero risk, which was being offered by the Parsons & Whittemore Corp.

Many other people at that time were still very firmly committed to having a concept, flow chart; all they wanted was \$50 million and would be happy to build the facility for us. This did not seem appropriate considering our experience had been in the present

and existing forms of technology of incineration, that of building a plant with known capabilities that have been developed over the past 25 or 30 years.

We did not feel we were capable of operating over a long term a facility with new technology. So the zero-risk capabilities offered in our bidding and in the ultimate contract that was signed was ideally suited to our particular needs and application and, more importantly, dealt with our particular needs to abandon landfill as a way of life.

Long Island happens to be a sole aquifer for potable water supply and landfilling is no longer being considered. Additionally, the cost of landfilling was so high as to warrant going into this project.

In any case, our town's interest was highlighted by the so-called zero risk, that is the full financing, construction, and operation of this plant for a period of 20 years.

We are trying to develop at this point, within the short period of time it has been on line, an experience factor that will prove perhaps in the next year or so whether in fact the jury can bring in a verdict of success. The plan in its financing, development, and operation has been deemed at the early stages to be just that.

I suggested the 80 million kilowatts of power already sold to our public utility. More importantly, to get the project underway with some of these constraints that we had experienced, one of the key factors that has allowed us to be successful perhaps in getting the project fully constructed and operational was the cooperation with the public utility.

You had in Long Island Lighting Co., an opportunity to participate and they did so readily and willingly in terms of entering a contract with the Parsons and Whittemore organization to accept all of the energy, about 32 megawatts per hour, at the plant export capacity and to pay to the corporation the generation rate, not a negotiated rate but their published generation rate for energy. It is about 23 mills per kilowatt hour at the present time. This was obviously a great inducement to packaging this whole project.

So the plant in its total capacity has the ability not only to process the solid waste, but to generate onsite up to 32 megawatts of power for sale to Lilco.

Lilco further participated in the actual capitalization of the two turbines to the extent of \$7 million. The plant went onstream in October 1978 and to and through the early part of August operated between 6,500 and 11,000 tons per week. It is experiencing presently, unfortunately, some labor difficulties.

We have several intransigent positions, management on one side and the labor unions on the other, a private corporation unfortunately is acting as a quasi-municipal service to the extent of providing a service to a community.

The Parsons-Whittemore firm is not a free agent when it comes to the fuel supply. We control that and deliver it to them. But in this operation they have no protection such as the Taylor law and as such, this labor problem has caused a temporary interruption in our ability to deliver solid waste. I do not feel that has anything to do with successful development of the plant.

Operationally, the process of preparing fuel and such waste-to-energy conversion has been successful, as is the separation of met-

als and glass from the as-received solid waste. Residual problems remain in the color sorting of glass and the effective marketing of such product, as well as the marketing of some metals. Primarily, the cost of transport of such recoverables affects the economics of marketability in certain instances.

Some of the secondary issues such as odor controls, things which I do not think anyone concerned themselves with at the outset in the plant, have given us local problems but they are solvable. To that extent the successes I think are there. Time will produce the ultimate verdict.

Mr. FLORIO. You say they are solvable, or they are solved?

Mr. LANDMAN. Solvable.

The corporation in its capital-intensive involvement at this point has added another \$1.5 million to their capital funding for the purpose of dealing with this problem. Pulp papermills, which is the progenitor perhaps of this concept of wet-pulping, does not seem to concern themselves too much with the odor that travels down the river.

In our particular area, having 6,500 people per square mile, the escaping odor from the process obviously is not at tolerable level. They have a negative draft system which was somewhat inadequate. They are moving at the present time to make these corrections. However, it does not interfere with the ability in the basic concept of processing the waste to energy. While it has become a political issue perhaps on a local level, it has not had anything to do with the basic technology of the plant.

One of the things that we are a party to that is very important, and this relates to some of the positions that I will offer in just a moment, is that we share 40 percent of the revenues derived from Lilco. We are talking about something in the neighborhood of \$12 per ton. We will share 40 percent of that as an offset against our tipping fee.

As mentioned earlier by Mr. Greenberg, who relates to Parsons & Whittemore through Dade County, this plant is funded by them. We pay only a tipping fee. Beneficially, the incentive of revenue sharing up to 40 percent of energy revenues produces approximately a \$4-per-ton credit against the tipping fee. As energy revenues are based on Lilco's generation costs, increased full costs to Lilco increased the value of waste-to-energy credits and a slight hedge against inflation.

Similarly, on a much smaller scale, are the nominal revenues expected from glass and metals. So it is this relationship that is an incentive not only for us to bring material there and somewhat of a hedge against inflation; as the energy costs for the purchase of fossil fuels by Lilco rise, so does the cost for the generation of fuel rise and we in fact share in that continually.

We are not looking for it to rise, but as it does it tends to offset the inflation pressures of the tipping fee throughout the life term of the contract. What we have to do—and we believe very strongly that the future of solid waste management is unalterably bound to a relationship between municipalities and private corporations—we must continue to spur some interest in the relationship in order to keep these particular concepts alive, developing new technology.

The technology that is being developed by individual corporations must be supported and developed.

It may hold that the wet-pulping process 20 years from now may be the prominent one; it may hold it may not be the successful one or take a secondary role, but whatever role, these private corporations' efforts must continue to move in that direction. As has been mentioned before, the fuel, guaranteed flow of solid waste as a need to assure the viability of a project is absolute. In our case we have it.

I have absolute control over the fuel within the town of Hempstead and, consequently, we do not have any problem. A receptive public utility is obviously necessary, the willingness of a public utility to partake and participate, whether it be financial or otherwise, in the project; in our particular case it is onsite generation. We do not have to take an RDF to some remote location.

Consideration should be given in that direction to tax considerations perhaps to the public utility for its participation rather than a mandate which may be somewhat difficult. Continued improved tax considerations and perhaps improved depreciation allowances seem necessary to the corporations to maintain their interest in developing these systems.

From the standpoint of the Federal Government, I think a continuation of the maximum technical advice from these agencies are a must, the ability to assimilate the information from these developing concepts and make them available to communities who have viable and doable projects are necessary, but I do not feel that any direct funding by the Government is a necessary ingredient in order to make these projects fly.

Qualified corporation, with its pledge of full faith and credit behind the project, I believe, becomes totally committed as opposed to a concept of developing a project with someone else's money.

I think the attitude should always be that if you "put your money where your mouth is," you seem to stay with it. The sense of time delays has been covered; there is some consideration that these barriers caused by whether you call it governmental redtape or otherwise, I think are well founded; I think can be eased up with a matter of administrative change. Time becomes important to all of us in the solid waste program in terms of developing these programs. Some of the time delays we have experienced have been eliminated by the circumstance of experience.

If we can follow that same pattern with our regulatory agencies in terms of permits, applications, all the necessary ingredients both on the State and Federal level, a project of good size I think can be effectively developed in a relatively short period of time, perhaps 50 percent of the experience time we had. We had more than 7 years in bringing it to fruition.

Mr. FLORIO. I am going to have to vote again. We will be back.

Mr. OTTINGER [presiding]. Mr. Landman, I will let you finish up here. I am sorry I missed your full testimony.

Is there anything in particular that I missed that you think I ought to hear? If so, let me know.

Mr. LANDMAN. I have been generally paraphrasing from the written testimony.

I would like to close in my remarks if I may, repeat what I said earlier. I believe the future generation of solid waste management is tied to the interface between municipal government and private industry. I believe they have the capability of developing and advancing new technology more effectively and perhaps ultimately in a more beneficial way, particularly as relates to solid waste.

It appears that broadly our municipal effort has been somewhat unsuccessful generally in solid waste management. By encouraging this relationship, I think we have the ability to achieve the technological advances we are all looking for.

The continuation of our dependency on landfill and the resultant pollution factors attenuating such systems seem 19th century thinking. As we approach the 21st century, the ability to deal effectively with solid waste and at the same time recover resources in the form of energy and recyclables should enable us to reverse our current "one-way society" and its one-time use of our rapidly depleting natural resources.

I think that is the direction that should be taken. The energy relationship in terms of fuel to energy, while it will not, if we process all the garbage in the United States, cause any real dent in the energy demands of our country or the dependency on fossil fuels, it, coupled with some of the other programs being developed, may very well deal with the deficiencies that we are now facing.

Thank you, Mr. Chairman.

[Testimony resumes on p. 214.]

[Mr. Landman's prepared statement follows:]

PRESENTATION TO SUBCOMMITTEE  
ON ENERGY DEVELOPMENT AND APPLICATIONS

Committee on Science and Technology  
U.S. House of Representatives

September 20, 1979

William J. Landman - Commissioner of Sanitation  
Town of Hempstead, New York

Mr. Chairman and Members of the Committee:

My name is William J. Landman. I am the Commissioner of Sanitation for the Town of Hempstead, New York, representing the Presiding Supervisor Al D'Amato, the Members of the Town Board and the 850,000 residents of our Town. The Town of Hempstead is the larger of the three towns, comprising Nassau County on Long Island and immediately adjacent to the City of New York, on the east. Our population density is over 6500 per square mile and our solid waste production exceeds 800,000 tons per year.

After seven years planning, development and construction, we commenced operating a total resource recovery facility in October of 1978, which concentrates on the waste-to-energy principle, with the capability of processing 2000 tons of solid waste per day and energy production for sale to the public utility, Long Island Lighting Company, in excess of 32 megowatts per hour. To date, in the very early start-up operations of this plant, we have generated and sold almost 80 million kilowatt hours of power, using processed garbage as a fuel. In total operational mode, the energy derived therefrom could service the energy needs of approximately 15% of the residential homes in our community.

The Town of Hempstead is not new to the waste-to-energy concept. Our Merrick Refuse Disposal Plant (600 tons per day), was completed in 1952 and is still operational, utilizing garbage as a fuel. This plant accepts unsorted refuse, which through the use of the incinerator furnaces and waste heat recovery boilers, generates up to 2500 kilowatts per hour. This energy however, is not for export but is utilized for all energy needs of the plant

itself, its support facilities and street lighting on the facility site. The plant has no connection to the public utility. The Town further supplemented its waste-to-energy concept in 1964 by the construction of our Oceanside Plant (750 tons per day), which in addition to using steam primarily for the generation of electricity (maximum 3000 kilowatts per hour) for in-house use, additionally desalts water for plant use. Both of these plants were financed and built by the Town and are operated by employees of the Department of Sanitation on a twenty-four hour per day basis.

Our recent efforts were an extension of our prior experience in the generation of electrical power, using solid waste as a fuel and the Presiding Supervisor and the Town Board, in embarking on this program which has achieved reality, reflected upon the extension of our experience as a means of dealing with the mountains of solid waste to be processed daily, both by incineration and landfill and at the same time, recognizing the value of recoverable resources both in terms of minerals and the more valuable energy source.

The result is a plant that has been financed, constructed and operated exclusively for the Town of Hempstead by private industry to deal with the daily intake of solid waste generated by the residents of our community and at the same time, to recycle glass, ferrous and non-ferrous materials and convert the burnable fraction of our solid waste to energy.

For the past ten years, there has been considerable interest by private industry in the development of a total concept plant, as a solution to the solid waste problems of urban centers. Various private concerns utilizing their own research and development facilities, produced concepts as in the case of the Town of Hempstead, which extended their expertise in their principal corporate interests. The wet pulping process developed by Black-Clawson, a subsidiary of Parsons and Whittemore, is an extension of the paper pulp industry activities, in which the corporation is engaged. In effect, some private corporations were developing an extension of their prime interest in an attempt to deal with this national problem.

The emergence of this new technology and concept was a radical departure from the prior generation of incinerators. Previously, design engineers would assemble various available manufactured components into a refuse disposal plant. The new technology developed concepts far removed

from those previously used as in the case of Black-Clawson's Hydrosposal system and offered such a complete package, which included the finance, construction and operation over a long-term contract. Obviously, it was not deemed advantageous to a municipality to entertain the full operation of a facility far removed from that which we had experienced as in the case of existing incinerator technology, which evolved gradually through the years. In our case, the Town's interest was highlighted specifically, by the fact that the corporation was not at that time (as so many others were) looking for the municipality to fund the plant, but was willing to assume the full risk of financing privately, without any general obligation to the taxpayers of the community. The need, however, was for a long term contract to adequately retire such intense capital costs.

At this point, emerged the first of problems in developing the program. Town law in the State of New York, precluded a Town Board from entering contracts in excess of five years and special legislation was introduced on behalf of the Town of Hempstead, passed by both houses and signed into law by the then Governor Rockefeller in 1973. It provided that for the purposes of solid waste management projects, a contract up to twenty-years, could be executed, subject to the competitive bidding laws of the State of New York.

Secondarily, the inability, at that time to refer to previous contracts for requests for proposals (RFP) addressing specific needs, the Department of Sanitation, Town Attorney and Bonding Counsel, developed an RFP that stated only required performance; and to meet competitive bidding laws, did not reflect any specific design or method. The RFP required the successful bidder to finance, construct and operate (for twenty years), a facility that would:

- a) process up to 2000 tons per day
- b) recover and recycle all non-burnables, glass, metals, etc.
- c) utilize as a fuel, the residual light fraction of the solid waste
- d) to construct the facility in an environmentally acceptable manner and in accordance with all applicable statutes relating to incinerators.

After review of the bids offered, the Town Board accepted the recommendation in December 1974 that Hempstead Resources Recovery Corp. (HRR), a wholly owned subsidiary of Parsons and Whittemore, Inc., (also

Black-Clawson parent corporation) was the successful bidder and directed HRR to proceed with financing plans. The initial plan to publicly market revenue bonds collapsed in 1975, with the emergence of the City of New York's financial difficulties and resultant impact on the market. The Town granted several delays to HRR to complete financing and HRR was able to privately place 46 million dollars with three major insurance companies, via the route of the Town of Hempstead Industrial Development Agency and additionally required funding of 27 million dollars with the Bank of Paris. Ground breaking took place on May 26, 1976.

Twenty-six months later (August, 1978), the plant accepted the first solid waste for testing and trial runs and after utilizing over 16,000 tons for this purpose, the plant became operational in October of 1978.

The salient points of the contract provided:

1. HRR to process up to 2,000 tons per day (11,000 tons per week of solid waste) delivered by the Department of Sanitation and its accounts (HRR is not a free agent with regard to seeking solid waste for processing).
2. HRR to separate non-burnables for recovery markets; glass, aluminum, ferrous and other non-ferrous.
3. HRR to utilize burnable fraction as a fuel for on-site steam production (2-200,000 lb/h) boilers and steam turbines (2-20 mw/h) and distribute to Long Island Lighting Company (LILCO) sub-station on-site.
4. The Town to accept return of 3% (volumetric), 7% by weight, of inert ash, the product of combustion.
5. HRR and Town to share 60%-40% respectively, energy revenues (presently \$.023 per kwh from LILCO).
6. HRR and Town to share 75%-25% respectively of gross sale price of other recoverables.
7. HRR to finance, construct and operate to 1996, with Town option to acquire or renew operating contract.

8. Town to pay tipping fee for each ton delivered (Minimum guarantee - 1000 tons per day), adjusted annually, based on 50% of the percentage change in Consumer Price Index affecting Town (current gross fee per ton, \$16.30 less revenue credits).
9. HRR to expand plant to 3,000 tons per day upon order and direction of the Town.

From October, 1978 to July, 1979, no garbage was landfilled and the process uninterrupted, varying from 6500 tons per week to 10,500 tons per week, processed. Recently, several labor disputes between HRR and unionized employees, has caused operational interruption, a matter generated somewhat by the uniqueness of the operation, vis-a-vis the various trades and start-up problems of organization.

Operationally, the process of preparing fuel and such waste-to-energy conversion, has been successful as is the separation of metals and glass from the as-received solid waste. Residual problems remain in the color sorting of glass and the effective marketing of such product, as well as the marketing of some metals. Primarily, the cost of transport of such recoverables affects the economics of marketability in certain instances. Controlling odors, a contract commitment, from the process has been a start-up problem as the negative draft design to utilize odorous air from the process as combustion air, appears somewhat inadequate at times. HRR is currently modifying air-control systems, which is expected to resolve this issue.

In overview, the processing of the Town's solid waste at this waste-to-energy plant, is effective and has demonstrated the ability to eliminate our dependency on landfills and older incinerators. In light of the new technology and the continued total commitment by HRR to improve operations (at no additional cost to the Town), the operational start-up problems appear minimal.

The obvious advantage of this contractual method with full private funding, is the no risk posture assumed by the municipality. While the Town must guarantee 1000 tons per day, its total production of solid waste creates no problem in meeting this minimum commitment. The tipping fee per ton, while subject to annual fluctuation based on the Consumer Price Index, is currently under considerable inflation pressures. Even at the current rate of \$16.30 per ton, it is between \$4. and \$5. less per ton

than the total cost to process solid waste with municipal forces at the Town's incinerators and landfills.

Beneficially, the incentive of revenue sharing up to 40% of energy revenues, produces approximately a \$4. per ton credit against the tipping fee. As energy revenues are based on LILCO's generation costs, increased full costs to LILCO increased the value of waste-to-energy credits and a slight hedge against inflation. Similarly, on a much smaller scale, are the nominal revenues expected from glass and metals.

From our experience, the following emerges:

In the order of priority, the assurance of the flow of solid waste to create a guaranteed fuel delivery, becomes prime to an interested corporation and its lenders, in assuring such a project.

On the energy side, a positive outlook by the public utility, in our case, LILCO, was of immeasurable service in bringing the project to reality. Forward thinking on the part of LILCO, in offering a long term contract to purchase all energy derived from this plant at LILCO's generation cost, was developed and LILCO further contributed 7 million dollars for the actual purchase of the steam turbines. The Town in responding to this cooperative effort, granted LILCO a long term lease for the on-site construction of a sub-station to accept such energy into their distribution network.

As the project was not constructed as a public work in the sense of the word, the corporation effectively fast-tracked construction as its own contractor and completed all construction well ahead of the originally scheduled 900 construction days. As a private corporation, it was not encumbered by the multi-contract law affecting public works in the State of New York.

It is our opinion that the interface between municipal government and private industry is the future generation of effective solid waste management, with waste-to-energy in the resource recovery concept taking a vital role.

Continued private interests and funding for these intense capital projects can be assured if :

1. The municipality has the "fuel" in its control and is able to afford minimum guarantee to attract project interests.

2. A receptive public utility to utilize either prepared fuel (RDF) or the energy derived therefrom, perhaps stimulated by tax considerations to the cooperating utility.
3. Tax considerations or improved depreciation allowance to the participating corporation as an incentive to continue independent research and development and the willingness to commit large capital expenditures to their own account when waste-to-energy is a major component.
4. Stimulation through tax credit, or allowances to companies utilizing recovered resources from total concept plants and improved rate structures of transport of recovered materials in Interstate commerce and perhaps credits for transport of recoverables in Intra-State commerce.
5. The continuation of maximum technical advice from governmental agencies to interested and qualified municipalities in the development of appropriate proposals. This may include funding for pre-project costs of such technical development, but not direct funding for actual construction. It is believed that given such motivation, private industry and the financial community will provide the necessary wherewithal for recognizably do-able projects. A qualified corporation with its pledged full faith and credit behind a project, becomes totally committed as opposed to the concept of development in "using someone else's money".
6. While response to certain government regulations is obviously necessary, the freeing up of extensive time delays in securing regulatory approval, is important to keep needed projects viable and moving. The recognition of regulatory agencies that in establishing regulations and control criteria, that full recognition be given to the practical realities of the technical community to comply with such regulations in a timely and economic manner.

The Town of Hempstead's effort in the first major interface in private industry and government in dealing with resource recovery, primarily energy as a vital component, is the first step away from the heretofore only moderately successful municipal efforts. It appears that where municipalities have been relatively unsuccessful, we should encourage this relationship with private industry to continue those efforts so that successes can be technologically achieved. The government's direction should lead to continued encouragement to the developing concepts now emerging. While it is recognized that all of the solid waste in the United States, if effectively processed as an energy source, would hardly dent the nation's dependency on fossil fuels, such effort when coupled with other alternatives, could present a sizeable issue and at the same time, advance the science of solid waste management, with the resultant of that developed technological advance. The continuation of our dependency on landfill and the resultant pollution factors attenuating such systems, seem 19th Century thinking. As we approach the 21st Century, the ability to deal effectively with solid waste and at the same time recover resources in the form of energy and recyclables, should enable us to reverse our current "One-Way Society" and its one-time use of our rapidly depleting natural resources.

Mr. OTTINGER. Thank you.

We will hear from Mr. Robert D. Schmidt, the SPM group. I understand you have somebody accompanying you.

#### STATEMENT OF ROBERT D. SCHMIDT

Mr. SCHMIDT. Yes.

Mr. Chairman and members of the subcommittee, I am Robert D. Schmidt, president of SPM Group, Inc., of Englewood, Colo., a suburb of Denver, Colo. I have with me as a guest this morning Commissioner Harold Wingler, commissioner of the city of Sioux Falls, S. Dak. I will try to cover some of the points that I feel have not been covered in the testimony as I heard it today.

SPM Group, Inc., is an American corporation whose mission is to design, build, own, and operate facilities and equipment capable of elevating waste to its highest social and economic values. Mr. Konrad Ruckstuhl, the founder of PAWERT SPM AG, now the chairman of SPM Group, Inc., was the youngest member of the Swiss Waste Council in 1942 in Basel, Switzerland. The Swiss Waste Council was organized to develop alternate energy sources for Switzerland, then surrounded by the Axis forces. Mr Ruckstuhl's involvement in the Swiss Waste Council, among other things, was the development of densifying, separating, grinding, and drying equipment and systems. At the close of hostilities, 1945-46, the price of heating oil was extremely low and Europe, particularly Switzerland, did not need alternate fuels. The technology developed during the war years by the Swiss Waste Council was put to use and expanded upon by Mr. Ruckstuhl. He developed projects involving the use of wastes which were constructed for various clients in many parts of the world. Municipal and agricultural wastes were used for the production of energy, cattle food supplemental, building products, and compost in these installations.

The National Center for Resource Recovery estimates that in 1990 there will be 122.2 million tons of municipal waste generated per year in areas where that waste could be processed. Of that 122.2 million tons per year, 91.650 million tons per year will be

recoverable. Resource recovery plants using current technologies could process this waste into refuse-derived fuel. This fuel could be used as an alternate energy source for utility powerplants and industrial energy.

SPM Group, Inc., is currently working with the city of Sioux Falls, S. Dak., and Minnehaha and Lincoln Counties in South Dakota. We are designing a 600-ton-a-day plant to convert the municipal wastes of the city and the two counties into approximately 350 tons of refuse-derived fuel. This fuel will be sold to Northern States Power Co. Northern States Power Co. presently has the Lawrence powerplant, a 25-megawatt plant, in a standby position primarily because of the high costs of fossil fuel and pollution problems resulting from burning coal. This plant has been shut down for approximately 2 years.

Should the conversion of this plant to the burning of approximately 87 to 90 percent RDF be successful, Northern States Power Co. has 10 other powerplants in their system that could also be considered for possible conversion to the burning of refuse-derived fuel for the production of electrical power. The Lawrence plant, when converted to the burning of RDF, will contribute approximately 15 percent of the energy need of the city of Sioux Falls and the surrounding two counties.

In order to develop a viable municipal resource recovery system, a private company must have five requirements fulfilled. The five requirements are listed below. Four of these have been covered in previous comments. Let me go over them as I see them.

First of all, a full-service contract with the municipality or district. This full-service contract should give the private company the right to operate and manage the resource recovery facility for a period of time long enough to guarantee the repayment of the particular debt involved with the project.

Method of finance: The community or municipality should have a method of enabling the private company to finance the project. This method of financing could be industrial revenue bond financing, pollution bond financing or general bond financing.

A fuel contract is absolutely necessary in order to insure continuing sale of the fuel generated by the processed wastes. This fuel contract can be with a public or private utility, or can be with municipal service organizations, such as hospitals, schools or with private or public industrial concerns that utilize energy.

A legal landfill must be available to the full-service contractor for resource-recovery residue and backup purposes should the resource-recovery plant be unable to function for short periods of time.

The contractor must have full control of the waste and a minimum guarantee of waste from the community to the resource recovery facility insuring continuity of operation. The Northern States powerplant is a peaking plant and the energy produced there will be fed into the grid system of the power company so that it is possible if our system would break down to convert to other sources for the electrical energy.

I would like now to take each of the five points and discuss them in more detail for the benefit of the committees.

Quoting from Decision Makers in Waste Management, EPA, 1976:

Private firms have greater expertise in management of capital intensive processing facilities than most public agencies; also, private management tends to be more adaptable to the needs of new systems. In some cities, the operation of such facilities by public employees has been unsatisfactory for a number of reasons, including union and civil service rules and pay scales that make it difficult to hire and promote motivated and competent employees; the city's lack of necessary technological and marketing sophistication, and the lack of profit incentives to run an efficient operation.

Communities in most cases are bound to limit the length of full service contracts, these requirements are generally controlled by charters. In many cases, these charters must be changed to accommodate the private management and ownership of a resource recovery facility. One method perhaps would be to license resource recovery facilities and in a similar method to that presently being used to license trash haulers. In this way the city can control the tipping fees required and can renew the license of the resource recovery plant based on prescribed and recognized standards of operation. The tipping fee involved in the full service contract and the fuel contract profit of the resource recovery plant make up the economic components of a facility. It is therefore most important that the municipalities recognize these components and view them accordingly. The resource recovery plant should throughout the life of the facility keep the costs of waste disposal at a level below what the community would experience using traditional disposal methods.

Two: Method of financing. Various options are open to private industry when the full service concept is used to deal with the problem of municipal solid waste. The use of industrial revenue bonds is a known method of financing. The present law carries an exemption of the \$5 million limit when this vehicle is used to finance resource recovery plants. Another form of financing can be equity capital involvement by the operating company. Ownership of the facility can be maintained by the communities and management contracts executed with private industry can be developed for the management of these facilities. The overriding consideration, however, is the ability of the owning and operating company to finance these projects. It is my understanding there is currently legislation in Congress that would provide ongoing fuel guarantee contracts that the operator would receive until such time as the cost of energy reached the cost of operating the facility. This subsidy should have a limit on the top end and be based on  $x$  number of dollars per million Btu's of fuel produced. Past endeavors of the Federal Government have been to develop demonstration plants and to study systems and applications. Technologies are available to convert municipal solid waste to energy. The financial barrier presently in the industry is one of not having sufficient guarantees to build a resource recovery system and keep the system viable until such time that the cost of energy is reached at a level consistent with the cost of the resource recovery facility.

Three: It is absolutely essential for a resource recovery plant operator to have a firm take-or-pay fuel contract with a fuel user. The Sioux Falls, S. Dak., project is designed to supply refuse-derived fuel in flake form to an existing powerplant that is owned by

Northern States Power Co. This plant is one of 11 similar plants in the Northern States system. In order to finance a resource recovery facility a fuel contract is necessary for the duration of the funding. In the case of the Sioux Falls project, we anticipate to finance for a 20-year period. Our fuel contract contemplates a time period of 20 years and 3 months from the date of delivery of the plant to the operator. It is in the fuel contract area and the utilization of refuse-derived fuel that I feel the most important problems exist. Much additional research must be done and many demonstrations must be made in various types of burning equipment to determine the burning characteristics and the ramifications of the use of RDF fuel in boilers and other types of burning devices. One of the reasons for the delay in the Sioux Falls project is satisfying the utility company that: (1) The contractor can provide the quantity of refuse-derived fuel, and (2) the ability of the utility electrical plant to burn the refuse-derived fuel with minimum modifications to the system and minimum modifications to the pollution control equipment in order to satisfy local, State, and Federal requirements concerning emissions.

Four: Backup legal landfill. In addition to providing a way of disposal for the residue left from a resource recovery facility, a backup landfill also serves to decrease the capital cost of a resource recovery plant. In the case of Sioux Falls, S. Dak., the Lawrence plant is a peaking plant and the hours of operation are advantageous for the use of refuse-derived fuel. The plant would operate on a 5-day, 2-shift basis. The RDF would be supplied from the resource recovery facility to the peaking powerplant on a 16-hour basis daily. The system is designed to start up and shut down each 16-hour cycle; the utility can market the electricity produced and pay a much higher rate for this type of peaking operation. The 8-hour shutdown per day allows preventive maintenance work on the equipment. The backup landfill eliminates the need for redundancy in the system, and consequently lowers the capital cost. The landfill also provides a place for disposal should the plant break down.

Five: Control of waste. The resource recovery facility must be assured of a continuous supply of wastes from the community. The resource recovery facility, in fact, acts as a landfill operator. In effect the operator obtains from the city rights to operate the landfill and receives a tipping fee for its services. The tipping fee is regulated by the city and the operator consistent with a reasonable return on investment plus a profit for the operation of the facility. The city can control the conduct of private haulers on the basis of a license arrangement. Communities who operate municipal sanitation services can obviously guarantee the supply of wastes to the operator.

The Comptroller General of the United States in his report to Congress on February 28, 1979, said, "Federal efforts to convert waste to energy are fragmented, uncoordinated, misguided, uncertain in priorities, and lacking in detail overall strategy." My personal opinion is that the report underestimates the fragmentation and uncoordinated strategy. In the past, it appears the wishes of Congress have been strained through a filter system. The objectives of the various acts have been sidestepped or not duly enforced by the various agencies commissioned to enforce them. Virtually no

demonstration funds have reached the small communities of America. A great deal of money has been spent on labor-intensive studies and surveys with little results of a meaningful nature being passed on to the local managers and decisionmakers of cities and counties. Other forms of municipal wastes such as waste water and sewage have received much more attention and capture more of the communities' and Federal Government's tax dollars than solid wastes.

This company has received excellent cooperation from the Federal agencies involved with solid waste management, research and development, and demonstration projects. The Department of Energy, Office of Conservation and Solar Applications, Urban Wastes Technology Division, has been most helpful. Our opinion, however, of this agency is that the division dealing with solid wastes is not staffed or budgeted in accordance with the priorities outlined under the acts. The Environmental Protection Agency's approach to resource recovery has been primarily demonstration of large-scale units. It appears that the acts charge certain responsibilities to the EPA. The EPA has been unable to carry out these responsibilities because of lack of funds. The current urban policy grants from the EPA have certainly been a step in the right direction. The EPA is also caught between conflicting concepts of energy production versus environmental constraints.

Unfortunately, I have not had nor has my company had experience with the Department of Commerce; I am not aware of what the Department of Commerce's activities are concerning resource recovery and solid wastes.

Mr. Chairman, I would like to thank you and the committee members for this opportunity to appear and testify on behalf of a segment of the resource recovery industry. I welcome the opportunity to discuss my comments or answer questions concerning my testimony.

With the chairman's permission, I would like to introduce Commissioner Harold Wingler of Sioux Falls, S. Dak., to the committee. Thank you.

Mr. OTTINGER. Mr. Wingler, would you like to add anything.

#### STATEMENT OF HAROLD WINGLER

Mr. WINGLER. In essence of time I will take a very few minutes to tell you the commission aspect of it. As a city commissioner, we did vote, and the way we are going on this resource recovery plant is we issued a resolution for the industrial revenue bonding of it. We feel it should have been put into private enterprise, which is what we have done, for two reasons. That eliminates the bidding process. By State law we do have to have bids on anything over \$2,500, but it was going to private enterprise. The SPM Group will be building a plant, they will completely operate it, the city of Sioux Falls intends to get completely out of the landfill business, and it is the ultimate end I feel that we do get everything into resource recovery where they make gas, or DF or whatever, steam, whatever they want to make out of it. So it will not be long before the whole country will be walking on garbage, if this is not done.

I would urge the committee or any committees of the Federal Government to do anything they could toward this ultimate end.

And the gentlemen, I think, have repeated themselves; I will not go into that. If you want to talk about landfills, the problem that we have of getting landfills—and it is not only in a Midwest town like 100,000 in Sioux Falls, S. Dak.—I can appreciate the problems of the bigger metropolitan areas, and I do not envy these gentlemen at all that have anything to do with that in getting rid of waste. We do have 500 to 600 tons a day into our landfills, and if we can get into a fuel that will help out the energy crunch and energy cause, not only now but I mean in the years down the line, then I think our problems are over as far as solid waste is concerned.

I will not elaborate on anything else. These gentlemen have all covered that. We do feel that the committees or anybody, anybody that does have anything to do with EPA—I would like to see some of those rules and regulations relaxed a little bit, because to try to comply with EPA rules and regulations, air pollution and all that, it is awful tough, especially in our area with the Dutch elm disease taking 18,000 trees out of the city of Sioux Falls in 1 year. That is tough to bury those trees. It will take 50 acres and about 300 days, and you have a landfill full. Burning, I do not think that would pollute the air too much. I would like to see some kind of regulation come from the Federal Government to relax some of those rules and regulations.

I want to thank you for giving me the opportunity to be here.  
[Mr. Wingle's prepared statement follows:]

TESTIMONY BEFORE THE SUBCOMMITTEE ON ENERGY DEVELOPMENT APPLICATIONS, COMMITTEE ON SCIENCE AND TECHNOLOGY. U. S. House of Representatives, Washington, D. C., September 20, 1979 by Harold F. Wingler, Commissioner, City of Sioux Falls, 224 West Ninth Street, Sioux Falls, S. Dak. 57102

The City of Sioux Falls, South Dakota has taken the responsibility for garbage disposal sites for the past 25 years for approximately 125,000 people residing in the city and two counties.

Each time the city has had to locate a landfill site which would meet the approval of geologists, officials of the South Dakota Department of Environmental Protection and one which nearby citizens would permit, the job has become more difficult. This was the reason we began searching for a resource recovery system.

One year ago I went to Logan, Utah and Laramie, Wyoming to view a disintegration and briquet machine which would be incorporated into a complete line of resource plant for solid waste and rubble. These machines were built by the SPM Group, Inc. of Englewood, Colorado. As a former machinist and tool and die maker, I was much impressed by the quality and work of the machinery built by this group, so I pursued this plant further.

Our city commission and the commissions of Lincoln and Minnehaha counties agreed to financially fund an engineering and design study of the proposed plant. One hundred fifty thousand dollars was granted to SPM for this study of the proposed project.

After the city commission received the design and engineering report, it voted to adopt a resolution to permit the company to issue \$7,000,000.00 in industrial revenue bonds.

At the same time the company was preparing the engineering and design it was seeking a market for its fuel and a location for the plant. The site was located and agreement reached by the two parties, but the property was not in the city limits. The city commission cannot issue industrial bonds outside the city limits. Also the city does not provide

any utilities such as storm and sanitary sewers, water or power outside our boundary or street maintenance or snow removal services.

The land selected is in the Brandon Valley school district. Procedure by state statute requires the city to declare its intention to annex and secure the approval of the county commission. This was accomplished.

The Brandon Valley school district subsequently brought legal action against the city, county and the Sioux Falls school district asking for an injunction stopping the annexation on the alleged grounds that the annexation procedure was not properly followed; that the property to be annexed composes more than five percent of the Brandon Valley school district's assessed valuation and should not be removed from the school district. The temporary restraining order has not been issued by the court. The court case is scheduled for November 6, 1979. Court procedure could delay the plant's progress as a favorable decision for the city would surely be appealed to the state supreme court.

This briefly reviews for the record some of the opportunities and problems the city and two counties have been faced with during the past year. Naturally we are eager to move forward with the plans for converting 500-600 tons of garbage daily into an energy source, thereby eliminating the need for maintaining large sites for landfilling.

Mr. FLORIO. Gentlemen, I would like to address a question to a point several of the witnesses raised today. It deals not so much with the economic problems as I suppose it does with the the social-political problems regarding location of sites. All the testimony we have had over the last couple of hearings indicates that economics are such that it is most desirable to locate facilities where the waste exists. These sites are generally inclined to be urban areas. In the interest of minimizing the transportation costs, likewise, it is desirable to do the same. We had some testimony today about some of the problems associated with locating these facilities in urbanized areas or where there are great concentrations of people, and so on. I am wondering to what degree you feel that the technology is available, or can be made available, to overcome these real or perceived problems of placing these types of facilities in the best location in terms of economics without raising political or social problems associated with the undesirability of having such a facility in a community. Perhaps the gentleman from Baltimore might be best.

Mr. KUCHTA. I think the image of solid waste would have to be changed radically to do that. Most people, even if we talk struc-

ture, transfer station, incinerator, think of it in terms of the smoldering landfill that they have knowledge of and had experienced down through the years. In a city like Baltimore it is difficult, it is impossible, to find a site that is not within 200 feet of a residential property, and everyone takes the position we need it, it is desirable to have it, we should have it, but not next to me, someplace else.

Our landfills, we have tried to disperse landfills to the extent that we can, so that no one area of the city has all the burdens of landfills. The same way with incinerators. Now, whether technology can make them pretty, or smell less, I think that as far as that is concerned, our efforts have been towards incineration, that is, burning, either in the pyrolysis plants or the incinerator, which gives us a residue that is relatively inert, relatively innocuous, that can be taken to the landfill and not cause the problems that raw garbage would.

So the only technology that I can refer to is that which we have already experienced.

With regard to the transfer station, at the public hearings in connection with that, we had to assure the community that the station would be cleaned of garbage every day and disinfected so as not to cause a problem in the surrounding area. So I think we have the problem solved there, but not with anything of a unique technological basis but, nevertheless, a solution that is acceptable to the community.

Mr. FLORIO. Is your transfer station in operation?

Mr. KUCHTA. Yes, sir.

Mr. FLORIO. Is there any problem perceived as far as the community is concerned?

Mr. KUCHTA. Up to this point, no. Rather interesting, if I may tell you a little story in connection with it, and I think it points up the community attitude. I attended a meeting in a school next to the transfer station and we were discussing the problems of the community, and one lady got up and told me about the odors that were coming from the transfer station and the rats that were coming across the street. I listened to her. After she finished, I pointed out to her that the transfer station had not opened yet. So it is that kind of attitude, community attitude toward any solid waste facility. It is garbage to them and that is it.

Mr. FLORIO. What is taking place at your transfer station? Is there compaction going on?

Mr. KUCHTA. It is a stepped facility that is being compacted into larger trucks, from the load packers into larger trucks, and then that is being transported to the pyrolysis plants or to the landfill, as necessary.

Mr. FLORIO. One of the problems they found when people consider transfer stations, not only the one you have alluded to in terms of smell, is people in the area not liking all these trucks coming through, the traffic that is generated—

Mr. KUCHTA. That is another problem. In the design, Mayor Schaefer had a very, very difficult time in explaining to the consultant the sensitivity that is necessary in locating a transfer station, in designing it, including the amenities that go over in a community, landscaping, low profile, truck exits or entrances, that are all very, very important as far as the residential community is

concerned. But that was achieved eventually, and right now I have had no complaint about the transfer station from the community, neither truck traffic nor odors.

Mr. LANDMAN. The not-in-my-backyard syndrome prevails no matter where you tend to site a facility and the ability to take it somewhere else so that they become the garbage capital is almost impossible.

It was suggested some years ago by the county executive of Suffolk County, when New York City suggested one of their plants was to export to the rather barren parts of Suffolk County, they would lay down on the road and block all the trucks. So no one wants anybody else's garbage. We tried to site, originally our first two plants were in marginal land, well removed from homes. As land became more valuable, the homes came in closer to our facility. Used that as a basis for siting this facility, went to an industrial area, the nearest house was a mile and a half away, put the plant in that location, assuming not only was it practical from a logistic standpoint of moving solid waste in our town, but it was also a good location, that did not preclude from the standpoint of perhaps some immediate hysteria. In the early startup people a mile and a half away suggesting that they were becoming threatened, their lives being threatened by the so-called new-boy-in-town facility that was not there before. Part of it was legitimate to the extent there was a certain odor problem that was occasional that caused some problems, but they were concerned about what existed in the odors, and if we do not smell the odor are we still being subjected to this? I think this occurred in both of our other plants. The first 6 months or so until you get it all settled in and get the operational mode settled down people become acclimated to the facility and you maintain it without any adverse environmental problems, you can do that, is the only answer. You cannot take it somewhere else. There are very few areas where there are locations removed that someone else will take your garbage, and hence you are stuck with the responsibility of dealing within the limitations of your own political subdivision. I see no answer to that; dealing with it is to find within your subdivision the ability to solve your problem and deal with it in such a way that it no longer becomes an enemy to the community or an unacceptable facility. I think it can be made acceptable to a community. I happen to live 800 feet from a 600-ton-a-day plant in an upper-middle-class community in Merrick. I am a resident, so are a lot of other people, and have relatively expensive homes. We can do it, it can be done as a landfill operator and incinerator operator and it is an acceptable part of the community. It was not the first year, but it is now, because you can maintain it in an appropriate manner, but it takes a great deal of effort, and technologically as well as the personal attention on behalf of the operator corporation.

Mr. FLORIO. In evaluating the tradeoffs between the approach for achieving cost efficiency by building bigger facilities versus the approach of building relatively small modular facilities requiring less capital investment, is it not true that the smaller modular facility is likely to incur less community resistance due to its smaller size?

Mr. LANDMAN. That seems like a double-edged sword: Do you have six facilities and have six areas of impact and effect, or do you have one facility effectively performing, and perhaps if you have some adversities they exist only in that one limited area. I am not so sure our community with its density of population, we are residential primarily, we have very little industrial properties, would tolerate even transfer stations, no less incinerators scattered throughout the 135 square miles of our community. I do not think it would be acceptable from the political standpoint or practical standpoint. But a central location not too far removed, logistically you can get to it relatively easy, at least perhaps concentrate your entire problem in that one area. On dealing with a single problem I think I would prefer to deal with one operational problem as technologically and operationally than have six operational plants subject to human frailties and what have you.

Mr. KUCHTA. The only thing I would add to that, we have been restricting our facilities to a certain classification of zoning, primarily industrial, and it might be true that the local government municipality can offset the zoning ordinance or ordinances. But we have not been doing that.

Mr. SCHMIDT. I might point out I think it depends on the situation as to what type of facility, that the National Center for Research Recovery estimates there could be as many as 500-600-ton-a-day plants in the United States, and I think you have to look at the type of facility that is being put up, and you have to look at the users of the fuel. Technically there are developments that may change the hauling distances, for example, of the fuel, where you can haul densified fuel rather than baled fuel or a fluffed fuel. So I think each situation has to be looked at individually. I do not think you can generalize as far as size of plants.

Mr. FLORIO. Let me ask a question with regard to a point made concerning the Federal Government's role and the available technology. Today was really the first time I have had anyone ask for Federal assistance in either disseminating technology or to help the municipalities make some decisions as to which technology is appropriate. For the most part we have heard that the technology is there, a lot of different types of technology, and that the private sector is capable of evaluating and determining which technology is appropriate for each particular circumstance. I think the assumption is that the municipality or governmental entities will go to the private-sector contract and then defer to the judgment of the particular private sector. Is that your thought regarding what the appropriate Federal role is?

I am going to have to ask you to hold your response for a moment. You may be thinking about the idea of whether or not the Federal Government should provide expertise and assistance to the municipalities to make those decisions independently of whatever advice they get out of the private sector, because I think, except for the Baltimore experience, most initiatives are joint public-private. If I could ask you to defer your response for one moment.

Mr. KUCHTA. Let me start, because I made the statement, and then I will explain what I meant by it. I think we have been talking about new technology from the standpoint of systems, new systems for doing this, and I think the technology goes deeper than

that. I have had experience now with incinerators, and problems with grates, and metallurgy of grates, and refractory of materials, all these kinds of things that go into the day-to-day operation of a plant that, in addition to technology with regard to inventing a new approach, have to be evaluated and experiences recorded. So it is useful to not only the designer but to the municipality if he has an existing facility and he has a problem and he wants to go in and put, say, new refractory materials in or new grates in or new conveyance systems or anything else.

We have had problems with conveyors as well as these other materials that I felt—and the reason I put the remark in my statement—that I felt should have some research and development consideration.

Mr. FLORIO. Is that really something the Government has any great degree of expertise in that they should become involved?

Mr. KUCHTA. No; but I think if we go to private industry for this, as we can, obviously you take what they consider the best from their knowledge, and I felt that there should be a place where the information is gathered and analyzed and reviewed for the use of the municipality. I could see the Government's EPA role in that, perhaps, maybe not EPA, but some other governmental agency.

Mr. FLORIO. Any other gentlemen?

Mr. SCHMIDT. I might point out the Bureau of Mines has operated a small pilot resource recovery plant outside of Washington, D.C., since 1973. I was not aware, I suppose because of my own ignorance, that plant existed. When I went over there 2 weeks ago they indicated they were not being funded and the plant was going to be closed down. I understand that plant was available for municipalities to submit their solid waste to the Bureau of Mines to analyze it and determine what might be a way of handling that waste was.

I think that is my point about this fragmented effort in the Federal Government. We are dealing with the Department of Agriculture and their materials of biomass conversion, which is wood waste, and Commissioner Wingler's problem in Sioux Falls, as you heard him say, 18,000 elm trees that had to be destroyed because of Dutch elm disease. That makes part of his waste woody, so it has a different nature to it over a period of time than you would normally relate to wood. There are many, many endeavors being done in the Federal Government, but I do not believe it is all brought down to a central point to where people like the commissioner can get information, and I think he could speak for himself, get information as to what he needs for his community.

Mr. WINGLER. There is quite a bit of information we need but we were fortunate getting 160 acres approved for landfill 4 months ago which put us home free, and we were out of anywhere to put garbage until we got that. So we do now have a place to go with it, and this plant is going to be, I hope—come to fruition here before too long, then we can put that land back into agricultural land and just use a small part of a backup plant.

Mr. FLORIO. Gentlemen, thank you very much for your testimony. It has been very helpful, and we look forward to working with you in the future. Thank you.

The subcommittees stand adjourned.

[The following statements were received for the record:]

TESTIMONY OF GEORGE H. BARBOUR  
BEFORE THE  
SUBCOMMITTEE ON TRANSPORTATION AND COMMERCE  
OF THE  
COMMITTEE ON INTERSTATE AND FOREIGN AFFAIRS  
OCTOBER 1, 1979

My name is George H. Barbour, I am President of the New Jersey Board of Public Utilities which oversees and regulates the operation of utilities in the State of New Jersey. I would like to share with the subcommittee the Board's experience with waste to energy resource recovery plants. I would specifically like to speak about the recovery and sale of methane gas obtained from an inactive solid waste landfill in New Jersey.

In the spring of 1976, negotiations began between the Board, Sanitary Landfill, Inc. located in Cinnaminson, Township, Burlington County, N.J. and Public Service Electric and Gas, New Jersey's largest public utility for the drilling and gathering of methane gas from the landfill. At the same time, negotiations began with the Hoeganaes Corporation located adjacent to the landfill, to establish terms and conditions for the sale of 1 million standard cubic feet (MMCF) per day of methane to Hoeganaes.

The major points of these agreements were that PSE&G would construct gas collection, cleansing, and distribution facilities, Hoeganaes would make whatever changes necessary for their equipment to utilize the gas; Hoeganaes will pay to PSE&G twenty-two cents, (.22¢), per therm of gas used and Sanitary Landfill will receive a royalty from PSE&G of 12½% of PSE&G's billing to Hoeganaes exclusive of that portion of the bill attributable to the New Jersey gross receipts and franchise tax (NJSA 54:30 A-16 et seq.)

The operation, which is believed to be the first of its kind on the East Coast, calls for extracting the gas through wells drilled into the lower portions of the Cinnaminson Landfill, removing some impurities, and delivering it to the Hoeganaes Co. where it will be used to operate a burner to melt scrap iron and make sponge iron used in auto parts. The burner can also operate on natural gas, which Hoeganaes buys on an interruptable basis. 1 mmcf, which has the heating value of about  $\frac{1}{2}$  the heating value of the natural gas PSE&G normally distributes, will be burned at Hoeganaes.

As part of an exploratory first stage 2½ years ago, PSE&G drilled 5 wells in the landfill. These wells were drilled with a hollow auger with a 6 inch casing pipe inside. The auger bored 50 to 60 feet, then a trap was sprung, the auger pulled and the casing left in place. The space around the casing was then filled with crushed stone.

The second stage of the program was begun in May of 1979, it consisted of boring 10 more wells, installing a pump station, a gathering station, transmission main (approx. 1500 feet long) a calorimeter and sulphide measurement instruments. The total investment by PSE&G was in the neighborhood of \$4000,000.

No grant money, federal or otherwise, was used in this project. Public Service had spent \$150,000 for the test phase (which the Board approved in Public Service's 1976 construction budget) and spent an additional \$250,000 to complete the project.

I am happy now to report, that as of August 16, 1979, the Hoeganaes Corp. began receiving gas from the landfill. They are currently burning about 220,000 cubic feet per day of the gas, and are experiencing no utilization problems. The heating value of the gas has been consistently around 603 BTU/ft<sup>3</sup> which is a little above the average samples taken. A figure of 550 BTU/ft<sup>3</sup> would allow PS to break even, at present levels. The contract with Hoeganaes guarantees gas with a heat content of 545 BTU/ft<sup>3</sup>. In this respect, the project may be considered successful.

Public Service Electric & Gas officials have recognized the risk involved in this project, but they have pointed out that if all the landfills in the P.S. franchise territory could be successfully tapped, nearly five percent of the company's annual gas need could be met from this unconventional source.

In its filing before the Board, Public Service had requested that the contract rate for the methane gas be set at \$ .22 per therm during the life of the contract. This was approximately \$ .08 per therm less than what Hoeganaes Corp. was paying for interruptable natural gas service prior to receiving the landfill gas. In its order accepting the contracts between Sanitary Landfill, Hoeganaes and Public Service, the Board noted the unique nature of this project. It also recognized the risk involved as well as the potential benefits. A successful venture, the Board noted, could ultimately provide a cheaper source of gas for a meaningful segment of New Jersey's population to the extent that a successful tapping of other landfill sites can be economically achieved."

The Board continues to believe that utilities must be encouraged to engage in prudent research and development efforts. Opportunities for conservation and the development of renewable resources should not be neglected. Yet we must be realistic about their contribution toward meeting an impending energy deficiency in the short-and mid-term while still maintaining a viable economy.

Conversion of solid waste to energy certainly deserves an extensive amount of investigation. At present, though, it cannot be depended upon as a major solution to either the country's energy or solid waste disposal problems. Experiments such as Public Service's Cinnaminson Landfill project must be encouraged on the State level. These are necessary to provide data and information in determining the production potential from Sanitary Landfills. Where sanitary landfills are close to industrial developments efforts should be made to explore the application of landfill gas as either a back up or primary gas. Effective planning should be used in the development of industrial parks so as to utilize any available recoverable gas.

A great deal of research work needs to be done in determining what types of landfills yield the most usable gas. There are certain design features in some landfills which make them better gas producers than others. But many of these features are opposite of what is presently considered good landfill design and operating criteria; such as high leachate and liquid volumes, loose ground compaction and porous cover material.

In order to make the exploration of landfill gas more attractive in New Jersey, the State may ease the gross receipts and franchise tax imposed upon utilities in New Jersey. In the Cinnaminson project, of 22¢ per therm charged to Hoeganaes, .1343¢ is attributed to the gross receipts tax. Federal income tax imposed on utilities profits from landfill gas sales may also be cut back, offering even further incentives to utilities and companies alike.

We believe that the Cinnaminson project has shown that it may be feasible and even rewarding to engage in landfill gas exploration. With federal and state incentives, recovering usable methane gas from landfills may become practical wherever these deposits exist. We may not know the long term potential for reclaiming methane until our project withdraws gas on a continuous basis for a long time, and we are able to test and evaluate results. But we believe that a continued experimental exploration and development effort should be encouraged now.

## Statement

By

Neil N. Seldman, PhD  
Director of Waste Utilization  
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1717 18th Street, N.W.  
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To

Waste to Energy Hearings

In July, EPA sponsored Section 11 (Non-Nuclear Energy Research and Development Act of 1974) Hearings to evaluate DOE's urban waste technology program. Citizens identified the following shortcomings:

Regional section 11 hearings held earlier this year have already identified critical shortcomings in DOE's urban waste technology programs. These are:

- . the extent to which actual decision making processes follows formal designs
- . inadequacy of public involvement in Program and Project Management System
- . inadequacy of DOE's rigid policies which disallow funding of recycling (source separation) and community scale waste utilization technology development
- . the overwhelming emphasis on commercialization of combustion technologies in the face of mediocre program results; and private sector financing and engineering firm testimony that these are unnecessary given the current state of the art; and that source separation programs can increase the efficiency of appropriately scaled combustion technologies by removal of non-combustible fractions. (See "Source Separation and Energy Recovery," Appended)
- . arbitrary criteria for funding which determine that only high cost (\$500,000 minimum) projects are considered; excluding development of lower cost technologies and processes which have proven viable and are based on the development of long term conservation and recycling habits by citizens.

Moreover, the report on regional Section 11 hearings does not fully reflect the utter frustration of local officials, community-based recyclers and environmentalists

with incomplete reporting on technological alternatives, limits and risks of large scale combustion technologies, absence of information on major accomplishments by community-based, municipal and private sector recyclers.\*

In sum, the federal government's urban waste technology program as is currently established is forfeiting increasingly higher opportunity costs of not investing in a diverse research and development scenario. An alternative scenario could establish recycling programs which conserve more energy than is produced through wholesale combustion of solid waste, and at a fraction of the cost. (At present, 7% of the nation's solid waste is recycled, and 1% is burned for energy recovery. Current funding programs, however, focus exclusively on expanding the latter option.) A national technical assistance/information dissemination /technology development program using a decentralized network of professional recyclers, and a national advisory board for resource recovery programs is desperately needed. Federal regulatory activities can be reduced through joint private sector/community-based enterprises which would create permanent local markets for "solid waste" materials. (In Seattle, Washington, for example, 20% of the 650,000 tons of solid waste generated each year is recycled exclusively through community-based and private enterprise buy-back, drop-off and curbside pick-up programs.)

These issues demand immediate attention, and the situation in Memphis, Tennessee, requires intervention. There, EPA and DOE officials are promoting a \$150 million co-disposal project designed to burn solid and sewerage wastes despite strong local

\* See testimony of Neil Seldman, Richard Anthony, Larry Holcomb, Michigan State Department of Natural Resources, Mindy Kershner, Conservatree Paper Co., Jim McMahon, City of Seattle, Norman Braton, University of Wisconsin, David Pate, Alabama Solar Coalition, Peter Grogan, Association of Colorado Recyclers, Cliff Case III, National Recycling Coalition, Cliff Humphrey, Modesto Ecology Action Institute, Richard Keller, Maryland Energy Office before DOE Industrial Energy Conservation Targets Hearings, July 25-31, 1979, Washington, D.C.

public and private sector interest in alternative approaches. (EPA's environmental impact assessment of the co-disposal approach has been found inadequate. See Phil Mummert, Regional Economic Development Center, Memphis State University, "Comments on Environmental Impact Appraisal, Nonconah Creek Basin, 201 Wastewater Facility Plan," 26 February 1979; and Susan Turley, "the \$400,000,000 Gamble," Memphis Magazine, May 1979.)

These facts lead us to the following conclusions:

1. DOE and EPA use of technical and scientific information in decision-making is inadequate. DOE's \$300 million commercialization program was prepared with no consideration of cryogenic rubber technologies, glass/plastic extruding technologies, composting/vermicomposting technologies, small-scale paper, glass and metals manufacturing technologies. Similarly, DOE's Urban Waste Technology Program has ignored these technical developments. Investment in expensive hardware is preferred over investment in participatory systems and low cost hardware which have a proven track record.

2. Communication of rationale for technology development decisions are inadequate and take place within a small network of industry, government and research institutions already convinced of DOE's orientation to develop only the large scale combustion option among a much broader spectrum of resource recovery technologies.

3. Integration of technology development and environmental research planning systems is inadequate as an entire network of local and state recycling associations, whose members have accumulated far more technical ability than DOE staff, has been excluded from participating in planning forums.

We therefore recommend the following actions:

1. Development of a Technical Assistance Network tapping local recycling expertise to provide help to local jurisdictions. Such a plan was submitted to EPA

in 1978. (This plan would have cost about \$150,000. Through its implementation if only additional 1% of the 135 million tons of waste materials were recycled in 1979, it could have served over \$30 million in local solid waste management costs.)

It would replace the current technical assistance programs which are inadequate. Specifically, EPA's peer matching program whose mission is to provide local experts to meet the needs of other jurisdictions is fragmented among several public agencies who do not have adequate contacts with recycling practitioners. Record keeping is haphazard. The program needs better coordination. EPA's technical assistance panels do not tap local experts although contracted consulting groups often lack personnel trained in recycling. Little money is allocated for recycling. The large consulting firms contracted for assistance are oriented toward large scale resource recovery projects.

EPA can revamp these programs to include maximum involvement of such professionally competent organizations as California Resource Recovery Association, Association of Colorado Recyclers, Washington State Recycling Association, Association of Oregon Recyclers, West Michigan Environmental Action Council, Environmental Action Council of New York City.

2. Develop an education and information program, modelled after state programs in Washington, Oregon and Maine to produce and disseminate literature, reports, films, slide shows, technical forums and computerized reporting. Currently, invaluable planning and technical reports have come out of recycling activity in California, Michigan, Washington and other areas. The Institute for Local Self-Reliance and Fresno County Department of Solid Waste Planning have succeeded to some extent in disseminating reports and technological developments in the private sector but the effort must be expanded. Consequently, an EPA survey dated 1972 revealing 90% willingness on the part of housewives to source separate is virtually

unknown. Similarly, reports by the Fremont Recycling Station, Seattle, documenting 68% participation in a curbside program and a California State Solid Waste Management report indicating specific breakeven levels for curbside and buy-back operations are not generally known.

3. DOE must either discontinue its policy of setting minimum capital cost requirements for project funding, and establish new criteria based on "net energy" benefits, or maximum pay off in energy returns per dollar invested; or establish a small grants program for urban waste technology development. This latter program must receive at least 50% of the available funding, including the commercialization and entitlements programs currently under consideration.

4. A National Citizens Advisory Board should be formed to review and evaluate DOE, EPA and DOC resource recovery programming with regard to its impact on conservation, environmental protection, economic development and citizen participation. This Board should be chosen from among community-based, municipal and private enterprise recyclers, modular combustion unit manufacturers, environmentalists, educators and local officials. 10 regional subcommittees should be established. Together, members could not only evaluate programs but also identify and prioritize research needs and local issues, report on new and developing technologies and participation processes. In brief, they would serve to channel information to DOE, EPA and DOC agencies and from these agencies to the state and local levels. This program could be integrated into the existing section 11 review processes.

5. DOE and DOC should develop a waste utilization research and development program to stimulate economy of scale analysis and demonstration of manufacturing technologies which could, at little or no increase in per unit production costs, produce products for local markets using locally or regionally recycled materials as primary feedstocks. DOC already has a RCRA mandate to develop markets for recycled

materials. DOE has primary commercialization responsibilities. By developing such manufacturing technologies a steady demand for waste stream derived materials would be insured. This would internalize, to the private sector, mechanisms for motivating residents to participate in so-called "reverse channels of distribution," i.e. citizens providing raw materials to industry. Local governments and the federal government could reduce regulatory activity. By utilizing private sector and community-based mechanisms, incentives would replace government intrusion in local government and the private sector. Such a program could also encourage joint private/public ventures integrating private enterprise and community-based organization.

We believe that these steps will allow DOE, EPA and DOC to better achieve their mission to develop and commercialize technologies that are economically practical, technically feasible and environmentally acceptable, while at the same time increase public participation in planning, implementation and evaluation program processes.

We conclude our testimony by focusing your attention to the Committee for a National Recycling Policy, of which we are both members. The Committee was formed in early 1979 under the following five principles:

1. Comprehensive recycling of solid waste is essential for the preservation of the nation's natural resources.
2. Comprehensive recycling of solid waste is essential for the stability of economic growth which is currently threatened by the scarcity and high costs of energy and raw materials.
3. Comprehensive recycling of solid waste is essential for the education of citizens to less wasteful consumption and disposal habits.
4. Comprehensive recycling and utilization of solid waste is essential for the community and economic development of the nation's declining inner-city and rural areas.

5. Comprehensive recycling of solid waste is compatible with energy recovery systems planned to burn wastes after recyclables are extracted from the solid waste stream.

Committee members include over 100 private sector businesspeople, university researchers, consultants, community-based recyclers and local and state elected and appointed officials. The resources and cumulative experiences and professional skills of the Committee are available to both House Committees and/or any other forums you may recommend, to help develop management and technical programs to implement comprehensive recycling in the economy.

The Committee represents those individuals who have invested the better part of the previous decade to the realization of environmentally sound, economically viable solid waste management. They would now like to see these accomplishments broadened through participation in federal policy forums and thereby help prepare our country for the future decades which will be characterized by energy and material resource shortages.

For further consideration we have appended the following ILSR staff documents:

1. Report to the County Commissioners of Kent County, Michigan.
2. Community Participation in Resource Conservation and Recovery Planning, American Society of Civil Engineers.
3. Application letter for NSF sponsored technical research agenda conference.

## SOURCE SEPARATION &amp; ENERGY RECOVERY

Prepared By: David Lenze, Resource Specialist  
Resource Recovery Division  
Department of Natural Resources

July, 1979

Source separation should be considered prior to considering an energy recovery facility for these reasons:

1. The heat value of the waste stream changes significantly if source separation is initiated -

a) Component	% of SW	Potential		% Reduction of Total SW	% Reduction of B Content of SW
		% Reduction by SS			
corrugated	9.2	60		5	9
office paper	3.8	55		2	3
newsprint	6.5	50		3	5
Total				11	17

Thus, removal of corrugated, newsprint, and office paper can reduce the heat value of the remaining solid waste by 17%. This in turn reduces the amount of steam that can be generated by the facility.

- b) On the other hand, source separation of noncombustible materials such as glass, aluminum and ferrous metals can increase the heat value of the solid waste.

Component	% of SW	Potential		% Reduction of Total SW	% Increase of BTU Content of SW
		% Reduction by SS			
glass	6	60		4	4
aluminum	.5	50		.2	.2
ferrous metal	7	80		6	6
Total				10.2	10.2

At recovery rates of 60% for glass, 50% for aluminum and 80% of ferrous metal, the heating value of solid waste could be increased about 10% (based on solid waste before removal of paper).

2. The weight of the waste stream changes significantly if source separation is initiated. From the tables above, it is evident that a multi-material source separation program can reduce the weight of the solid waste handled by 21%. Since the capital cost of energy recovery facilities is based on the daily tonnage for which it was designed, a source separation program could reduce its cost about 21%. But, if a source separation program were initiated after completion of an energy facility designed for all the solid waste in an area, the facility would operate below capacity and would therefore need to raise its tipping fees to compensate for what was removed.

3. Prices for clean, source separated material are higher than for material recovered after disposal. Glass can be separated by color at the source and sold for about \$30 per ton. Mixed color glass sells for so little it may bring less than the cost of transporting it. Ferrous metals can also bring higher prices if source separated than if recovered from solid waste after incineration.
4. Removal of glass and metals will reduce the wear and tear on processing equipment and lower maintenance costs. It also improves the marketability of refuse derived fuel.
5. During times of short supplies of virgin materials, the prices for secondary material skyrocket. This is a big inducement for scavengers including waste collectors and haulers to remove material from the waste stream. Therefore, it is important to consider potential source separation even if the city does not decide to implement a source separation program of its own.
6. Energy recovery facilities are capital intensive and represent a huge investment with little flexibility to economically accommodate changes in solid waste characteristics. Source separation on the other hand does not require much capital investment and is very flexible to adapt to changes in volume and composition of solid waste.
7. There are substantial energy savings accruing to recycling certain materials rather than incinerating them. Office paper is such an example. Fifty percent more energy can be saved by recycling office paper than can be obtained by recovering its energy content through incineration.
8. The problems of solid waste are often best met through recycling and waste reduction programs. Energy recovery and sanitary landfills should then be used for the remaining solid waste. Once an energy recovery facility is built, there is a strong interest in maintaining the volume of waste for which it was designed. This leads to antagonism towards waste reduction and recycling efforts which may be better options. To avoid this potential conflict, source separation and waste reduction should be assessed early in the planning of an energy recovery facility.



## American Can Company

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Statement before the  
Subcommittee on Transportation and  
Commerce of the House Interstate and Foreign  
Commerce Committee and the Subcommittee on Energy,  
Development Applications of the House Committee on Science  
and Technology

We of American Can have been asked to submit a brief statement to your subcommittees concerning the financial and economic aspects of waste to energy programs. To do that, we must talk about Americology, our solid waste recycling operation serving the City of Milwaukee. This operation was built in 1977 at a cost of approximately \$20MM; the bulk of the financing came from industrial revenue bonds. Under a contract with the City, we take all of the residential garbage collected by the City and process or dispose of it. Our recycling operation uses mechanical means to shred the refuse and separate the light organic fraction for use as a fuel, from the heavy inorganics from which steel, aluminum and a glassy aggregate are recovered. Currently, our plant is processing approximately 800-900 tons a day and we are selling approximately over 300 tons per day of fuel and 30-50 tons of recovered metal. The plant is a technical success. In fact, it is probably one of only two large-scale solid waste resource recovery facilities in continuous daily

operation in the United States. Presently, we are still in start-up operations and we are making progress in improving the quality of recovered materials. For example, we are not at this time recovering aluminum, which is about 1/2% of the waste in Milwaukee, or the glassy aggregate because of some technical problems, but we expect to have these solved this year.

Now for the bad news. In spite of its technical success, the plant is not yet a money-maker. The problems relate to the quality of the product being produced, which we are improving, the relatively low tipping fee, and the relatively low demand and low price for our refuse-derived fuel product. While our fuel sells at the same price as coal based on its caloric value, we are pioneering its use at the local utility, and operating costs are higher than expected. Furthermore, the utility is still not using as much product as we can produce. Our marketing efforts are directed at identifying and establishing additional customers for both the light fuel fraction and the burnable heavy fraction from our recovery system.

The tipping fee is another issue. This is the fee the City pays for each ton of garbage delivered. In almost any resource recovery operation, the tipping fee is determined by the cost of alternate disposal systems and it varies widely around the Country. Our fee in Milwaukee is about \$12 per ton. New York City is presently estimated to run \$20-\$30 per ton. We believe a tipping fee of about \$15-\$30 a ton in current dollars would be required to support new investment in these types of facilities. Since the National average of residential garbage production runs slightly over a two-thirds of a ton per person per year, an increase in tipping fees to \$18 in Milwaukee would only cost each citizen an additional \$3.60 a year.

Where do we go from here? We have developed national leadership in the technology of resource recovery. We will not be making further investments unless we find the financial arrangements and the returns to be attractive. As landfills become harder to establish and further away from collection sites, traditional disposal costs will continue to rise. We believe this will ultimately insure the future for solid waste resource recovery.

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ROBERT W. MESERVE  
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 TRUSTEES

ALAN G. DUSTIN  
 PRESIDENT AND CHIEF EXECUTIVE OFFICER

September 20, 1979

COMMENTS OF THE BOSTON AND MAINE CORPORATION TO THE HEARING ON  
 WASTE-TO-ENERGY HELD SEPTEMBER 20, 1979

For the past two years, the Boston and Maine has been involved in active efforts to promote the use of used railroad ties and tie butts (pieces of rail ties) as a source of fuel. At the present time, the Boston and Maine has approximately three million of these tie butts scattered along our right of way and is often unable to dispose of them because of local ordinances or lack of adequate dumping space.

Each year, it is estimated that the domestic railroads remove two million tons of used ties in the course of normal maintenance operations. Nationally, this provides for a tremendous source of energy as well as a problem to the railroads regarding methods to properly dispose of the used ties.

The BTU content of these tie butts is quite high primarily because they were produced from hardwood timber and still retain much of the residual creosote from the original treatment. Studies have estimated that the BTU value of these ties is three to four times greater than wet saplings cut in the forest.

At the present time, the Burlington Electric Department in Burlington, Vermont, is well along the way to planning a wood-burning electric generating station which will consume 1500 tons of wood fuel each day. The plant is being constructed so that it can consume up to 400 tons of railroad ties or creosoted products per day as part of the 1500 ton mix.

In addition to the Burlington Electric facility, there are several other major paper mills and manufacturing facilities in New England that are considering converting to wood-burning generation and heat production. If all the railroads in the United States are considered as a whole, the substantial source of disposable creosoted products could serve as a major energy supply for industries capable of burning wood products.

There is a pressing need for research into improved ways of picking up and processing the tie butts and other creosoted material so that the cost of cleaning railroad rights of way does not offset the delivered price of used tie butts as a fuel source. Currently, it costs the Boston and Maine approximately \$1.25 per tie to pick the ties up off our right of way. Beyond this, there are transportation costs and other handling and processing costs which amount to \$.75 per tie. One of the problems that we face today is that no railroad has the resource or research capability to consider the development of either machinery that would grind the tie butts up for use in the generating facility or to develop a rail-mounted or highway-type apparatus that could be used to easily pick up the tie butts.

Action taken by the Subcommittee on Transportation and Commerce and the Subcommittee on Energy Development and Applications to encourage the Department of Energy to conduct pilot developmental projects to look at ways of lowering the cost of picking up this material off railroad rights of way would go a long way to marrying the substantial supplies of creosoted material with the ultimate users, the energy producers.

Thank you for giving the Boston and Maine the opportunity to express our feelings on this important energy conservation consideration.



A. G. Dustin  
President and Chief Executive Officer

**COMBUSTION EQUIPMENT ASSOCIATES, INC.**

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TESTIMONY OF  
COMBUSTION EQUIPMENT ASSOCIATES

I am Carolyn S. Konheim, representing Combustion Equipment Associates, Inc. CEA is a New York City-based company with 2600 employees engaged in the design and manufacture of pollution controls, energy and agricultural products. The New York Stock Exchange listed company has assets of over \$150 million and annual sales of \$163 million.

CEA designs, builds, owns and operates resource recovery plants which convert refuse from solid municipal waste into a high Btu synthetic fuel, ECO-FUEL<sup>RII</sup> through a proprietary patented process.

CEA strongly supports the national intent to create fiscal incentives to accelerate the production of synthetic fuels. ECO-FUEL is a synthetic fuel currently in production with approved environmental permits. The processing facility burns no refuse. Air emissions from the process heater are so low they are less than half the EPA criteria of a major source for air quality review. Use of ECO-FUEL in existing power plants can comply with all air emission standards and can help offset high emissions of certain coal burning plants. Processing ECO-FUEL consumes no water and causes no water effluent or consumption of scarce water supplies. Processing solid waste does not disfigure land; it salvages land from the blight of garbage dumps. It meets the urgent need across the nation to dispose of our mountains of trash.

The ECO-FUEL technology is in commercial production today. The fuel is fully compatible with the nation's existing power plants, requiring minimum investment in specialized boilers or pollution controls.

Private capital is already being invested in these plants attracted by tax advantages and the return resulting from disposal charges for the refuse and from sales of the fuel at a slight discount from the prevailing price of oil.

By 1990, current trends will achieve a probable 10 full scale plants which will produce the equivalent of 50,000 barrels of oil a day. However, with further fiscal incentives, it would be feasible to achieve 100 plants across the country, converting the nation's burden of refuse into the equivalent of 500,000 barrels of oil a day -- plants which will be built in every region of the country. Each state is a producer and consumer. The U. S. enjoys an abundance in the raw material -- garbage -- of this particular synthetic fuel. And with the technology at hand the fiscal benefits could be made available without delay.

The first commercial sized ECO-FUEL plant opened in Brockton, Mass. in 1976. A 2000 ton per day plant is now starting up in Bridgeport, Connecticut. Site preparation for a 3000 ton per day plant in Newark, New Jersey is underway. Another 3000 ton per day plant for the South Bronx in New York City is planned and will be sponsored by the New York State Urban Development Corporation. Others are planned.

All of this is housed in an attractive well landscaped modern industrial plant. It has no smokestacks, no odors, and emits no emissions into the air or water. The process uses no water. Not only are the plants welcome neighbors in the inner city for the jobs they provide but also for upgrading and attracting other industry to otherwise blighted areas.

Each proposed CEA plant has had the almost unique position among refuse handling facilities of being enthusiastically promoted by local community and environmental organizations.

The energy product of such 3000 ton per day ECO-FUEL plants is equivalent to producing 5000 barrels of oil a day. This is comprised of 4000 barrels as an environmentally acceptable fuel useable in exiting fossil fuel burning

plants. At 8000 Btu's per pound, each ton of ECO-FUEL contains the equivalent of 2.79 barrels of oil. ECO-FUEL is a standardized, high Btu, low sulfur fuel which is inert microbiologically and is virtually free of corrosive components. When used in the boilers, it is blown directly into the firing chamber displacing approximately 20% of the oil and enhances the burning of the oil due to the inherent high oxygen content of the ECO-FUEL.

ECO-FUEL is easy to transport and since it can be stored indefinitely, it is used like any fuel, as needed, to match electrical generating demand. That is, all of it is converted to "energy for useful purposes." It is not merely potential energy available for use whether or not the demand exists.

It is described in the February 1979 issue of Power Magazine:  
"The only refuse derived fuel of uniform quality commercially available today, ECO-FUEL II, is manufactured by Combustion Equipment Associates, Inc. ... ECO-FUEL II is a dry free-flowing powder with a high bulk density. Experience at several plants has proved that it is easy to transport, store, and handle with conventional equipment used in the cement and grain industries. Its consistency of particle size, high oxygen content, and uniformly high heating value allows rapid and complete combustion. Several engineers claim the flame pattern, flame stability, and ignition characteristics witnessed during ECO-FUEL combustion are equivalent to, or better than, those observed when burning pulverized coal. In addition, the fuel is flexible: It can be fired as a powder with existing, unmodified pulverized-coal burners, or in briquette form."

The cost of ECO-FUEL is currently lower than the price of oil. Its low sulfur content makes it particularly attractive in most metropolitan areas.

For those reasons, CEA has been able to establish long term purchase contracts with utilities. These include:

United Illuminating Co., Connecticut

Public Service Gas & Electric Co., New Jersey

New England Power Co., Rhode Island

and a half dozen others who have signed either letters of intent or preliminary agreements.

ECO-FUEL will be burned in routine operation at United Illuminating Company in Bridgeport beginning next month.

It is clear no technological breakthroughs are required. The risks are, therefore, minimal. However, a failure to include ECO-FUEL as a synthetic fuel qualifying for benefits will divert scarce investment capital, and manpower resources away from this promising area. The most dependable, most economic, most environmentally sound new energy source will remain untapped. Short term results are available.

In order to achieve the potential tenfold increase in production of this synthetic fuel, all legislation pertaining to synthetic fuel development should include in its definitions of synthetic fuel: "fuels derived from solid waste." A guaranteed long term market for this synthetic fuel would be the most effective incentive to bring about massive private investment.

Price supports enable the investment in waste to energy systems in areas where the current local energy market is priced too low to make an alternate fuel economic at this time. This is particularly true in areas outside the Northeast and where coal is the dominant fuel for power generation.

Price supports are authorized by existing Public Law 93-577, as amended by 95-238; however, they have not been utilized partly because of their limitations. They are restricted to energy products of municipally owned and/or operated "demonstration facilities." The restrictions are entirely

irrelevant to production of energy and unduly disqualify bona fide, full scale privately financed energy producing facilities.

Therefore, we urge the Senate to include in all synthetic fuel legislation the following language:

"The Secretary is authorized to establish a price support program to subsidize the fuel revenues in a project in a situation where specified local fuel market conditions would otherwise make the project infeasible. The total subsidy payment will be tied to the quantity of recovered fuel or fuel actually sold. The amount of the subsidy on a per million Btu basis will continue for the fixed life of the project.

The economic price at which development of alternate fuel supplies should be supported is the world market price of oil.

These price supports shall be available to all projects which are able to produce and sell fuel from solid waste.

An authorization of \$70,000,000 would be appropriate for fiscal 1980:

ECO-FUEL is a non-controversial, environmentally sound, commercially available low cost means of producing and consuming a synthetic fuel in every region of this nation. The Congress has an opportunity to make this synthetic fuel a near term reality.

[Whereupon, at 1 p.m., the subcommittees were adjourned.]

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