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COMMERCIALIZATION OF ALTERNATIVE
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HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND POWER

OF THE

COMMITTEE ON

INTERSTATE AND FOREIGN COMMERCE

HOUSE OF REPRESENTATIVES

NINETY-SIXTH CONGRESS

FIRST SESSION

ON

H.R. 4345 and H.R. 4401

BILLS TO ESTABLISH A PROGRAM FOR REPLACING, BY 1987, 10
PERCENT OR MORE OF THE GASOLINE CONSUMED IN THE
UNITED STATES WITH ALCOHOL AND OTHER REPLACEMENT
FUELS DERIVED FROM COAL AND RENEWABLE RESOURCES

OCTOBER 10, 1979

Serial No. 96-103

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CONTENTS

Statements of—	Page
Hammesfahr, president, Hammesfahr, Winter & Associates, Inc	31, 33
Hottel, Hoyt C., professor emeritus, Massachusetts Institute of Technology..	31, 41
Jawetz, Pincas, consultant of energy policy, New York City	31, 36
Jeffords, Hon. James M., a Representative in Congress from the State of Vermont	12
Meroni, Jacques R., director, environmental research and energy planning, Ford Motor Co	25
Pollaert, Ted J., manager of synfuels, American Lurgi Corp	31
Additional material submitted for the record by—	
Jawetz, Pincas, consultant on energy policy, New York City, clarification for the record of the hearing on H.R. 4345	53

COMMERCIALIZATION OF ALTERNATIVE FUELS

WEDNESDAY, OCTOBER 10, 1979

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY AND POWER,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
Washington, D.C.

The subcommittee met, pursuant to notice, at 1:30 p.m., in room 2218, Rayburn House Office Building, Hon. John D. Dingell, chairman, presiding.

Mr. DINGELL. The subcommittee will come to order.

The subcommittee meets this afternoon to consider in hearings, H.R. 4345, introduced by our colleague, Mr. Jeffords. I am advised also by 107 of our other colleagues.

The legislation concerned would establish a program for replacing up to 10 percent or more of the gasoline consumed in the United States with alcohol and other replacement fuels derived from coal and renewable resources.

The distinction between H.R. 4345 and other bills on synthetic fuels pending before the subcommittee is this particular bill does not rely on Government financing but instead focuses upon the regulatory authority of the Federal Government to establish a precedent for marketing synthetic fuels by mandating that by 1990 no less than 10 percent of the established raw material input of domestic refiners be synthetic fuels.

This approach is patterned after the motor vehicle fuel efficiency standards legislation and leaves to industry the decisions as to how best to achieve compliance.

Without objection the text of H.R. 4345 and H.R. 4401 will be printed at this point in the record.

[The bills referred to follow:]

[H.R. 4345, introduced by Mr. Jeffords (for himself, Mr. Mineta, Mr. Anderson of Illinois, Mr. Simon, Mr. Perkins, Mr. Glickman, Mr. Emery, Mr. Bedell, Mr. Gradison, Mr. Neal, Mr. Wampler, Mrs. Heckler, Mr. Moorhead of Pennsylvania, Mr. Leach of Iowa, Mr. D'Amours, Mr. Baldus, Mr. Madigan, Mr. Johnson of Colorado, and Mr. Panetta) on June 6, 1979;

Cosponsored on June 12, 1979, by:

Mr. Moakley, Mrs. Snowe, Mr. Hopkins, Mr. Rahall, Mr. Weaver, Mr. Carter, Mr. Murphy of Pennsylvania, Mr. Kogovsek, Mr. Downey, and Mr. Nolan;

Cosponsored on June 15, 1979, by:

Mr. Thompson, Mr. Bereuter, Mr. Ertel, Mr. Wilson of Texas, Mr. McKinney, Mr. Hughes, Mr. Traxler, Mr. Wolpe, and Mr. Blanchard;

Cosponsored on June 19, 1979, by:

Mr. Whitehurst, Mr. Marriott, Mr. O'Brien, Mr. Hillis, Mr. Gilman, Mr. Grasley, Mr. Walgren, Mr. Pepper, Mr. Conyers, Mr. Daschle, Mr. Akaka, Mr. Coelho, Mr. Patterson, Mr. Roth, and Mr. Scheuer;

Cosponsored on June 20, 1979, by:

Mr. Price, Mr. Mazzoli, Mr. Miller of California, Mr. Stangeland, Mr. Yatron, Mr. Lent, Mrs. Chisholm, Mr. Winn, Mr. Edwards of California, Mr. Heftel, Mr. Weiss, Mr. Goodling, Mrs. Byron, Mr. Sawyer, and Mr. Markey;

Cosponsored on June 27, 1979, by:

Mr. Hawkins, Mrs. Fenwick, Mr. Fisher, Mr. Courter, and Mr. Stokes;

Cosponsored on July 11, 1979, by:

Mr. Roe, Mr. Dornan, and Mr. McHugh;

Cosponsored on July 17, 1979, by:

Mr. Conte, Mr. McCloskey, Mr. Butler, Mr. Solomon, Mr. Hyde, Mr. Lee, Mr. Jeffries, Mr. McClory, Mr. Railsback, Mr. Tauke, Mr. Broomfield, Mr. Guyer, Mr. Erdahl, Mr. Horton, Mr. Pritchard, Mr. Smith of Nebraska, Mr. Sensenbrenner, Mr. Petri, Mr. Wylie, Mr. Sebelius, Mr. Gudger, Mr. Conable, Mr. Hollenbeck, Mr. Mitchell of New York, Mr. Findley, Mr. McEwen, Mr. Purcell, Mr. Buchanan, Mr. Erlenborn, Mr. Corcoran, and Mr. Seiberling; and

H.R. 4401, introduced by Mr. Mineta on June 8, 1979,

are identical as follows:]

A BILL

To establish a program for replacing, by 1987, 10 percent or more of the gasoline consumed in the United States with alcohol and other replacement fuels derived from coal and renewable resources.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 SHORT TITLE

4 SECTION 1. This Act may be cited as the "Replacement
5 Motor Fuels Act of 1979".

1

FINDINGS

2

SEC. 2. The Congress finds that—

3

(1) the United States is currently importing significant quantities of the crude oil needs of the United States;

4

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(2) a substantial portion of such crude oil is needed for the production of gasoline sold in commerce; and

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(3) renewable resources, coal, and other substances can provide a sufficient source of replacement fuels suitable for blending with gasoline to decrease the need for imported crude oil.

13

DEFINITIONS

14

SEC. 3. For purposes of this Act—

15

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17

18

(1) the term “alcohol” means methanol, ethanol, or any other alcohol which is produced from renewable resources or coal and which is suitable for use by itself or in combination with other fuels as a motor fuel;

19

20

21

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23

(2) the term “replacement fuel” means alcohol or other liquid produced from coal, oil, shale, or other substance as may be determined by the Secretary, for the purpose of mixing with gasoline to be used as a motor fuel;

1 (3) the term "replacement motor fuel" means any
2 fuel described in paragraph (2) mixed with gasoline for
3 use as a motor fuel;

4 (4) the term "commerce" means any trade, traffic,
5 transportation, exchange, or other commerce—

6 (A) between any State and any place outside
7 of such State; or

8 (B) which affects any trade, transportation,
9 exchange, or other commerce described in subpar-
10 agraph (A);

11 (5) the term "motor fuel" means any substance
12 suitable as a fuel for self-propelled vehicles designed
13 primarily for use on public streets, roads, and high-
14 ways;

15 (6) the term "refiner" means any person engaged
16 in the refining of fuel oil to produce motor fuel, includ-
17 ing any affiliate of such person, or any importer of gas-
18 oline for use as a motor fuel;

19 (7) the term "Secretary" means the Secretary of
20 Energy;

21 (8) the term "United States" means each State of
22 the several States and the District of Columbia;

23 (9) the term "ultimate purchaser" means, with re-
24 spect to any item, the first person who purchases that
25 item for purposes other than resale; and

1 (10) the term "renewable" means any source of
2 energy which is available in an inexhaustible supply in
3 the foreseeable future.

4 REPLACEMENT FUEL PROGRAM

5 SEC. 4. The Secretary shall establish, pursuant to this
6 Act, a program to promote the development and use of re-
7 placement fuels in the United States. Such program shall be
8 designed to promote the replacement of gasoline to be used
9 as a motor fuel with replacement motor fuel containing the
10 maximum percentage of replacement fuel as is economically
11 and technically feasible for use as a motor fuel.

12 DEVELOPMENT PLAN AND PRODUCTION GOALS

13 SEC. 5. (a) Under the program established under section
14 4, the Secretary, in consultation with the Secretary of Trans-
15 portation, the Secretary of Agriculture, the Secretary of
16 Commerce, and the heads of other appropriate agencies, shall
17 review appropriate information and determine—

18 (1) the most suitable raw materials, other than
19 petroleum or natural gas, for the production of replace-
20 ment fuels;

21 (2) the nature of the replacement motor fuel dis-
22 tribution systems, and the various production processes
23 which use feedstock other than petroleum and natural
24 gas, necessary for the rapid development of a replace-

1 ment motor fuel industry, including a proposed timetable for the development of such systems and processes;

2 (3) the technical and economic feasibility of including liquids extracted from oil shale and coal as part of the replacement fuels program; and

3 (4) the technical and economic feasibility of producing sufficient replacement fuels, by the calendar year 1992, in order to replace 20 percent or more, by volume, of the projected consumption of gasoline used as a motor fuel in the United States for that year.

4 The Secretary shall prescribe, by rule, a substitute percentage goal for purposes of paragraph (4) if he determines that 20 percent is inappropriate.

5 (b) The Secretary shall, by rule, establish production goals for the optimal production of replacement fuel in the United States in each of calendar years 1981 through 1987. In establishing such goals, the Secretary shall—

6 (1) take into account the availability of reliable sources of replacement fuel produced from renewable resources, coal, and substances other than petroleum and natural gas; and

7 (2) provide that the production goal for replacement fuel for calendar year 1987 and thereafter shall be not less than 10 percent by volume of the projected

1 consumption of gasoline used as a motor fuel in the
2 United States for each year.

3 (c) In carrying out subsection (a), the Secretary shall—

4 (1) identify ways to encourage the development of
5 a reliable replacement fuel industry, and the technical,
6 economic, and institutional barriers to such develop-
7 ment, and

8 (2) include an estimation of the production capac-
9 ity of replacement fuel needed to implement the provi-
10 sions of this Act.

11 (d) Not later than one hundred and eighty days after the
12 date of the enactment of this Act, the Secretary shall com-
13 plete his review and determinations under this section and
14 prepare and transmit a report thereon to each House of the
15 Congress.

16 REPLACEMENT FUEL REQUIREMENTS

17 SEC. 6. (a) Of the total quantity of gasoline and replace-
18 ment fuel sold in commerce during any of the following years
19 by any refiner (including sales to the Federal Government),
20 replacement fuel shall constitute the minimum percentage de-
21 termined in accordance with the following table:

In the calendar year:	The minimum percentage of that volume which replacement fuel constitutes, shall be—
1981, 1982, 1983, 1984, 1985, and 1986.	Determined by the Secretary under subsection (b) of this section.
1987, 1988, and 1989	10 percent.
1990, and each year thereafter	The percentage determined feasible under section 5(a)(4).

1 (b) Not later than July 1, 1980, the Secretary shall pre-
2 scribe, by rule, the minimum percentage replacement fuel, by
3 volume, required to be contained in the total quantity of gas-
4 oline sold each year in commerce in the United States in
5 calendar years 1981 through 1986 by any refiner for use as a
6 motor fuel. Such percentage shall apply to each refiner, and
7 shall be set for each such calendar year at a level which the
8 Secretary determines—

9 (1) is technically and economically feasible, and
10 (2) will result in steady progress toward meeting
11 the requirements under this section for calendar year
12 1987.

13 (c) Each refiner shall report annually to the Secretary
14 the percentage replacement fuel by volume contained on the
15 average in the total quantity of gasoline for use as a motor
16 fuel that refiner sold during the preceding calendar year.

17 (d) The requirements under subsection (a) on any refiner
18 may be satisfied directly with replacement fuel and gasoline
19 refined and blended by the refiner or indirectly pursuant to
20 any contract or other arrangement with replacement fuel and
21 gasoline refined or blended by others.

22 (e) The Secretary may, on the application of any person,
23 make adjustments to reduce the minimum percentage re-
24 quirement as it applies to that person, but only if and to the

1 extent that such adjustments are consistent with the purposes
2 of this Act.

3 ENFORCEMENT BY THE SECRETARY

4 SEC. 7. (a) Any person who violates any requirement of
5 section 6(a) is subject to a civil penalty of not more than \$1
6 per gallon for each gallon of fuel sold that is not in compli-
7 ance with section 6(a). Such penalties shall be assessed by
8 the Secretary.

9 (b)(1) Before issuing an order assessing a civil penalty
10 against any person under this section, the Secretary shall
11 provide to such person notice of the proposed penalty. Such
12 notice shall inform such person of his opportunity to elect
13 within thirty days after the date of such notice to have the
14 procedures of paragraph (3) (in lieu of those of paragraph (2))
15 apply with respect to such assessment.

16 (2)(A) Unless an election is made within thirty calendar
17 days after receipt of notice under paragraph (1) to have para-
18 graph (3) apply with respect to such penalty, the Secretary
19 shall assess the penalty, by order, after a determination of
20 violation has been made on the record after an opportunity
21 for an agency hearing pursuant to section 554 of title 5,
22 United States Code, before an administrative law judge ap-
23 pointed under section 3105 of such title 5. Such assessment
24 order shall include the administrative law judge's findings
25 and the basis for such assessment.

1 (B) Any person against whom a penalty is assessed
2 under this paragraph may, within sixty calendar days after
3 the date of the order of the Secretary assessing such penalty,
4 institute an action in the United States court of appeals for
5 the appropriate judicial circuit for judicial review of such
6 order in accordance with chapter 7 of title 5, United States
7 Code. The court shall have jurisdiction to enter a judgment
8 affirming, modifying, or setting aside in whole or in part, the
9 order of the Secretary, or the court may remand the proceed-
10 ing to the Secretary for such further action as the court may
11 direct.

12 (3)(A) In the case of any civil penalty with respect to
13 which the procedures of this paragraph have been elected,
14 the Secretary shall promptly assess such penalty.

15 (B) If the civil penalty has not been paid within sixty
16 calendar days after the assessment order has been made
17 under subparagraph (A), the Secretary shall institute an
18 action in the appropriate district court of the United States
19 for an order affirming the assessment of the civil penalty. The
20 court shall have authority to review de novo the law and the
21 facts involved, and shall have jurisdiction to enter a judgment
22 enforcing, modifying, and enforcing as so modified, or setting
23 aside in whole or in part such assessment.

24 (C) Any election to have this paragraph apply may not
25 be revoked except with the consent of the Secretary.

1 (4) If any person fails to pay an assessment of a civil
2 penalty after it has become a final and unappealable order
3 under paragraph (2) or after the appropriate district court has
4 entered final judgment in favor of the Secretary under para-
5 graph (3) the Secretary shall recover the amount of such pen-
6 alty in any appropriate district court of the United States. In
7 such action, the validity and appropriateness of such final
8 assessment order or final judgment shall not be subject to
9 review.

10 PROCEDURES FOR RULEMAKING

11 SEC. 8. Section 501 of the Department of Energy Orga-
12 nization Act of 1977 shall apply to any rule, regulation, or
13 order having the applicability and effect of a rule (as defined
14 in section 551(4) of title 5, United States Code) prescribed or
15 issued under this Act.

16 AUTHORIZATION OF APPROPRIATIONS

17 SEC. 9. There is authorized to be appropriated to the
18 Secretary to carry out section 5 not to exceed \$1,000,000 for
19 the fiscal year ending September 30, 1980.

Mr. DINGELL. We are very pleased that our colleague, the principal author of that legislation, Mr. Jeffords, who has worked very hard on this matter is before us as our first witness. The Chair is most pleased to welcome Mr. Jeffords at this time for such statement he wishes to give.

STATEMENT OF HON. JAMES M. JEFFORDS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF VERMONT

Mr. JEFFORDS. Thank you, Mr. Chairman. I have a prepared statement which I will submit for the record. I would prefer to summarize that and focus on some areas that I believe need additional attention.

Mr. DINGELL. Without objection, the whole of your statement will be inserted into the record at the appropriate place. We will be delighted to receive your statement. [See p. 15.]

Mr. JEFFORDS. Mr. Chairman, I do want to thank you for holding these hearings, not only on my own behalf but on that of the prime sponsors, of which there were several in the bipartisan effort to assist as best we can in solving some of the Nation's energy problems.

I would point out that this was first conceived as really a total option to other suggestions such as the energy security corporation. I think now as time has passed there is a recognition that it can either operate separately or operate very well as a complement to other programs which are being considered.

The bill could stand on its own two feet, or work as a wrap-around and, I believe, as an insurance policy to make sure the other efforts and initiatives that are coming forward are successful.

First of all what it does is it insures a market. It insures that when we do reach a certain time there will be a requirement upon the refiners to purchase something that comes from a fuel source other than oil out of the ground. That is basically what we are trying to do.

We are saying we need an alternative. We have lots of options. It could be shale. It could be tar sands. It could be alcohol. It could come from coal. It could be a number of things.

Let's get everybody working together to find out the cheapest, best way to fill the market. We'll know that market will be there, which should assist in such things as gaining the ability to finance.

Also, in working with other programs, whether it be tax incentives or otherwise, it gives an option and the ability to spread the price increases or the price differentials not only onto the taxpayers but also onto the consumer. It gives you the flexibility to adjust the burden of each sector.

It will provide a competitive alternative to things such as the energy security corporation, because it will also alert people out in the private sector that if they have the ability to provide something cheaper and less expensive, or if the market will exceed the production of those things that have been Government financed, they will be able to sell their product. This will help check the cost of the Government-financed programs and will also provide the kind of competition and incentive to private enterprise that will put all of our great economy to work finding solutions.

As has been brought out, we have the support of some 107 cosponsors. In addition to that, the Education and Labor Committee when working in this area also unanimously endorsed the bill in subcommittee and close to unanimously in the full committee which probably brings the full support on record to well over 130 or 140 members.

We also have today for you some excellent witnesses, some of whom have appeared. In the past, I have had an opportunity to examine their testimony for our other committee. I think they will give you excellent testimony on some of the questions which may arise.

I would like now to briefly focus on some areas where I still have some concerns in accepting the mandate concept.

There is considerable concern that the product spectrum may be too narrow if you focus on gasoline. In the Education and Labor Committee, after consideration and hearing indirectly from General Motors and others that there may be a switch to diesel; after looking at the possibilities there we found you can add these various products, including alcohol, to diesel and gain the efficiencies as well there as you can with gasoline.

We expanded the product spectrum to diesel fuel. There are additional suggestions that the bills perhaps ought to be expanded through the whole spectrum of petroleum products if your goal is the reduction of imported oil, why not reduce it wherever you can?

There is other evidence that this might be helpful in reducing cost by having a mandated market across the board and thus reducing total costs.

There has been some concern expressed about the levels of the goals established within the bill; this is, whether or not they are too ambitious. Certainly the committee ought to give careful consideration to the evidence to see whether or not those goals ought to be adjusted in one way or the other, to see whether they are reasonable goals and goals that the committee feels can be reached.

There is also some concern raised about the problems which may be created for the small independent refiners. The original bill did not deal with that. I talked at length with FTC counsel and I worked with them in coming up with a concept which we have had drafted in a modified bill. We will provide the committee with this draft, which gives some leeway and flexibility to the Secretary, although not to exempt small refiners because the committee is well aware what happens when you exempt independent and small refiners. You may end up with counterproductive results.

We have some options in the sense of establishing a fee system for exemption which would be equal to the costs they would have to pay if replacement fuels were available to them. If they do not find it is available, these kind of concepts can be used to insure that you do not give competitive disadvantages or encourage the springing up of small independent refiners to circumvent the intent of the law. It doesn't give competitive advantages by total exemptions.

I think there are a number of options. I know some of the witnesses will have suggestions in these areas.

I must say I have been working with this a considerable length of time and have spent a lot of time on this. I find I have not

become discouraged but more enthusiastic about this proposition making a real contribution toward solving the Nation's energy problems.

I commend it to the committee with the endorsement of those I have referred to and hope the committee will act expeditiously to report out what I think is an excellent option to assist us in this very difficult area.

Thank you, Mr. Chairman.

[Mr. Jeffords' prepared statement follows:]

STATEMENT OF

THE HONORABLE JAMES M. JEFFORDS

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE, I AM GRATEFUL FOR THE OPPORTUNITY TO APPEAR BEFORE YOU TODAY TO TESTIFY ON H.R. 4345. I WILL BEGIN WITH A BRIEF REVIEW OF THE BILL'S HISTORY.

ON JUNE 6, I INTRODUCED THE REPLACEMENT MOTOR FUELS ACT ALONG WITH A BIPARTISAN COALITION OF 19 MEMBERS. H.R. 4345 NOW HAS 107 COSPONSORS; A COMPANION BILL WAS INTRODUCED IN THE SENATE ON JUNE 25 BY SENATORS RIBICOFF, NELSON, RANDOLPH, BAUCUS, AND DOMENICI.

THE BILL WAS PUT IN FINAL FORM AFTER I HAD SAT THROUGH AGRICULTURE COMMITTEE HEARINGS ON ALCOHOL FUELS AND FIVE DAYS OF HEARINGS ON SYNTHETIC FUELS IN THE EDUCATION AND LABOR COMMITTEE. DURING THE EMPLOYMENT OPPORTUNITIES SUBCOMMITTEE HEARINGS, I QUESTIONED WITNESSES ABOUT THE CONCEPT OF MANDATING THAT REFINERS SELL A FIXED PERCENTAGE OF THEIR MOTOR FUEL PRODUCT IN THE FORM OF SUBSTANCES THAT REPLACE PETROLEUM. A NUMBER OF WITNESSES REACTED FAVORABLY TO THE IDEA, AND HAVE PROVIDED A GOOD DEAL OF VALUABLE INPUT AND EXPERTISE.

THE SUBSTANCE OF H.R. 4345 WAS INCORPORATED IN A BILL REPORTED BY THE EDUCATION AND LABOR COMMITTEE ON JULY 13. THE EMPLOYMENT OPPORTUNITIES SUBCOMMITTEE ADDED THE REFINER'S MANDATE AS TITLE III OF THIS BILL, THE DEVELOPMENT OF DOMESTIC ENERGY RESOURCES ACT.

THERE ARE SEVERAL REASONS WHY THE BILL HAS GENERATED A STRONG AND DIVERSE SUPPORT BASE. THAT WE MUST DEVELOP ALTERNATIVES TO PETROLEUM HARDLY NEEDS EMPHASIZING AT THIS POINT. HOWEVER, IN CONSIDERING ALTERNATIVES IT IS IMPORTANT TO DISCRIMINATE ACCORDING TO A VARIETY OF FUTURE ENERGY DEMANDS. FOR EXAMPLE, WHILE I AM A LONG-STANDING SUPPORTER OF RAPID SOLAR POWER DEVELOPMENT, I RECOGNIZE THAT SOLAR CAN'T FILL OUR LIQUID FUEL NEEDS. TO THE EXTENT THAT THE AMERICAN LANDSCAPE HAS BEEN CHANGED TO ACCOMMODATE AUTOMOBILE TRANSPORTATION, AND TO THE DEGREE THAT AMERICANS PREFER TO AND IN MANY

CASES MUST CHOOSE AUTOMOBILE TRANSPORTATION, WE CAN'T IGNORE THE NEED TO FIND LIQUID ALTERNATIVES TO OIL.

IN ADDITION TO ADDRESSING THE NEED FOR TRANSPORTATION FUEL ALTERNATIVES, THE REFINERS' MANDATE APPEALS TO A BROAD RANGE OF COMPETING INTERESTS. IT GUARANTEES A MARKET FOR PETROLEUM SUBSTITUTES WITHOUT DICTATING THE ULTIMATE MIX OF TECHNOLOGIES THAT WILL PRODUCE REPLACEMENT FUELS. THE BILL CAN THUS ENCOMPASS THE PROPONENTS OF ALCOHOL FUELS FROM BIOMASS AS WELL AS THE PROMOTERS OF SYNTHETIC FUELS FROM NON-RENEWABLE RESOURCES.

FURTHERMORE, H.R. 4345 REAFFIRMS THE VALUE OF OUR FREE ENTERPRISE SYSTEM. COMPETITION FOR THE MANDATED MARKET WILL DETERMINE HOW A REPLACEMENT FUELS INDUSTRY DEVELOPS, AND COMPETITION WILL PRODUCE THE MOST EFFICIENT INDUSTRY. NEEDLESS

TO SAY, DISINCENTIVES TO EFFICIENCY ARE EXPENSIVE WHEN CAPITAL COSTS OF \$2 - \$3 BILLION FOR A 50,000 BARREL-A-DAY PLANT ARE AT STAKE.

THE MANDATE APPROACH ALSO PROMOTES EQUITY WITH RESPECT TO WHO BEARS THE COSTS OF DEVELOPMENT. REFINERS WOULD PASS ON THE COST OF REPLACEMENT TO THE USER, WHEREAS THE TAXPAYER WOULD HAVE TO FINANCE ANY SUBSIDY PROGRAM.

THIS APPROACH ALSO OFFERS THE AMERICAN PUBLIC THE SECURITY OF KNOWING THAT THE ENERGY INDUSTRY WILL WORK TOWARD A SPECIFIC GOAL. IT ELIMINATES THE CONCERN THAT, FOR ALL THE SUBSIDIES AND INCENTIVES WE OFFER POTENTIAL PRODUCERS, WE MAY FIND IN TEN YEARS THAT WE ARE NOT MUCH CLOSER TO HAVING A FULL-FLEDGED REPLACEMENT FUELS INDUSTRY.

H.R. 4345 IS COMPATIBLE WITH A NUMBER OF OTHER APPROACHES. IN FACT, I SUBMIT THAT A MANDATE WOULD WORK TO IMPROVE THE EQUITY, CREDIBILITY AND EFFECTIVENESS OF THE OTHER PROPOSALS THAT ARE PENDING BEFORE THIS CONGRESS. MANY HAVE SAID IN THE COURSE OF THE DEBATE OVER PETROLEUM SUBSTITUTES THAT YOU NEED BOTH A CARROT AND A STICK TO GET THE INDUSTRY GOING. I FIRMLY BELIEVE THAT IF WE PROPOSE HANDING OUT TAXPAYER FUNDS IN THE MAGNITUDE OF \$88 BILLION OVER THE NEXT DECADE, WE HAVE TO MAKE SOME DUTIES INCUMBENT UPON THE RECIPIENTS OF THOSE FUNDS. WE HAD BETTER MAKE SURE THAT THIS TRULY REPRESENTS A GOVERNMENT INVESTMENT IN A MORE SECURE ENERGY FUTURE. A MANDATE ACCOMPLISHES THIS BY

DEMANDING SOME CERTAINTY THAT THE SUPPLY WILL ACTUALLY MATERIALIZE WITHIN A REASONABLE TIME FRAME.

A MANDATED NATIONAL MARKET NOT ONLY PROVIDES A COUNTER-WEIGHT TO FEDERAL INCENTIVES; IT ALSO BALANCES THE PROPOSED METHOD OF ADMINISTERING THOSE INCENTIVES. ULTIMATELY, AN ENERGY SECURITY CORPORATION WOULD HAVE TO MAKE SOME DECISIONS ABOUT WHICH COMPANIES AND TECHNOLOGIES MERIT PURCHASE CONTRACTS, PRICE SUPPORTS, LOAN GUARANTEES, AND SO ON. IT WILL NO DOUBT BASE THOSE DECISIONS ON THE BEST INFORMATION AVAILABLE AT THE TIME. BUT DESPITE ALL THE BEST INTENTIONS, I AM CONVINCED THAT THE ENERGY SECURITY CORPORATION CAN'T FORESEE ALL THE MARKET-PLACE CONTINGENCIES. I CAN IMAGINE ALL KINDS OF OPTIONS THAT THE ESC WOULD HAVE NO WAY OF ANTICIPATING. WITH A MANDATED NATIONAL MARKET, HOWEVER, ENTERPRISES WITH CHEAPER PRODUCTS STILL HAVE A STRONG INCENTIVE TO COME FORWARD AND COMPETE WITH ESC-BACKED PLANTS.

IN SHORT, FEDERAL INCENTIVES AND ADMINISTRATIVE DEVICES NEED THE CHECKS AND BALANCES EMBODIED IN A MANDATE. FEDERAL PURCHASE GUARANTEES CAN'T ENSURE THE DEVELOPMENT OF A PRIVATE MARKET. SOME TIME DOWN THE ROAD PRICE GUARANTEES COULD PLACE US AT THE MERCY OF OPEC; EVERY TIME WE SET A TARGET PRICE THEY COULD CREATE HAVOC IN THE MARKET BY MANIPULATING THEIR OIL PRICES. A MANDATE MAKES GOOD ECONOMIC SENSE, BECAUSE IT IMPROVES THE RISKS AND THE COMPETITION IN A FEDERALLY-PROMOTED INDUSTRY.

TO BRIEFLY OUTLINE THE BILL'S FEATURES, H.R. 4345 ESTABLISHES A PROGRAM FOR REPLACING, BY 1987, 10 PERCENT OR MORE OF THE GASOLINE CONSUMED IN THE UNITED STATES WITH ALCOHOL AND OTHER REPLACEMENT FUELS DERIVED FROM RENEWABLE AND NON-RENEWABLE RESOURCES. OF THE OIL CONSUMED DAILY IN AMERICA, NEARLY HALF CONSISTS OF GASOLINE, AND THE AMOUNT OF GASOLINE CONSUMED--7.41 MILLION BARRELS--COMES CLOSE TO THE AMOUNT OF OIL WE IMPORT EVERY DAY. THE DEPARTMENT OF ENERGY PROJECTS THAT GASOLINE DEMAND FOR THE PERIOD 1985-1990 WILL BE IN THE NEIGHBORHOOD OF 7 MILLION BARRELS PER DAY. IN REPLACING 10 PERCENT OF THAT PETROLEUM WITH OTHER SUBSTANCES, WE WOULD SAVE ABOUT 700,000 BARRELS PER DAY OF IMPORTED CRUDE.

REFINERS WOULD BE REQUIRED TO PHASE IN SUBSTITUTE FUELS,

BEGINNING IN 1981, WITH QUANTITIES INCREASING TO 10 PERCENT BY 1987. THE BILL IS DESIGNED TO ALLOW REFINERS MAXIMUM FLEXIBILITY IN REACHING THAT GOAL. THEY COULD MIX THE FUELS THEMSELVES, OR CONTRACT WITH OTHERS TO DO IT. THEY COULD ALTER THEIR PERCENTAGES AT DIFFERENT TIMES OF THE YEAR AND AMONG THE GEOGRAPHIC REGIONS THEY SERVE. IF THEY FAILED TO MEET THE GOAL AT THE END OF THE YEAR, THEY WOULD BE FINED A DOLLAR FOR EACH GALLON OF FUEL SOLD IN VIOLATION OF THE LAW.

THE COST TO THE CONSUMER OF 20 PERCENT REPLACEMENT WOULD NOT PROVE EXCESSIVE. IF YOU REDUCE BY 20 PERCENT THE \$1.00-PER-GALLON PRICE OF GASOLINE, AND ADD TO THE REMAINING 90 CENTS A COST AS HIGH AS 13 CENTS FOR REPLACEMENT FUEL, YOU ARRIVE AT A PRICE INCREASE OF ONLY 3% AT THE GAS PUMP. THIS MODEST INCREASE ASSUMES REPLACEMENT FUEL COSTS OF AS MUCH AS \$55 PER BARREL REFINED, OR THIRTEEN CENTS FOR EACH ONE-TENTH GALLON OF REPLACEMENT FUEL.

THERE IS ROOM FOR ARGUMENT ABOUT SOME OF THE BILL'S PARTICULARS. PEOPLE MAY DISPUTE THE SIZE OF THE GOAL; I KNOW MANY FEEL THAT 10% REPLACEMENT BY 1987 REPRESENTS AN OVERLY AMBITIOUS STANDARD. BUT I BELIEVE THAT A FIRM GOAL IS NECESSARY TO GET THE INDUSTRY GOING; I AM ALSO CONVINCED THAT IT WILL SPUR THE INDUSTRY IN THE MOST EFFECTIVE AND LEAST OBSTRUCTIVE MANNER.

IN ADDITION TO QUESTIONING THE SIZE AND DATE OF THE GOAL, SOME HAVE SUGGESTED THAT H.R. 4345 SHOULD ADDRESS A BROADER RANGE OF PETROLEUM PRODUCTS. SENATOR PELL HAS INTRODUCED A BILL THAT ENCOMPASSES A LARGE BODY OF PETROLEUM PRODUCTS; SO HAS CONGRESSMAN ROBERT WALKER. IN RESPONSE TO SOME OF THESE SUGGESTIONS, I HAVE HAD A NEW DRAFT PREPARED THAT ALLOWS THE SECRETARY TO CREDIT REFINERIES FOR THE SALE OF PETROLEUM REPLACEMENTS OTHER THAN MOTOR FUEL, WHEN THOSE FUELS ARE BY-PRODUCTS OF A TECHNOLOGY THAT PRODUCES IN PART MOTOR FUEL-QUALITY SUBSTANCES. WHILE I CONTINUE TO BELIEVE THAT WE NEED TO PAY SPECIAL ATTENTION TO DEVELOPING SUBSTITUTE TRANSPORTATION FUELS, I WELCOME OTHER VIEWS ON THE APPROPRIATE PRODUCT RANGE.

THE NEW DRAFT MAKES ONE OTHER IMPORTANT CHANGE. UPON HEARING SOME CONCERN EXPRESSED ABOUT THE PROBLEMS THAT SMALL INDEPENDENT REFINERS MIGHT FACE UNDER A MANDATE, I HAD THE

FEDERAL TRADE COMMISSION REVIEW THE BILL FOR POSSIBLE ANTI-TRUST IMPLICATIONS. AFTER RECEIVING THEIR ANALYSIS, I DETERMINED THAT SMALL INDEPENDENT REFINERS DESERVED SOME SPECIAL CONSIDERATION. THE NEW LANGUAGE ALLOWS THE SECRETARY TO GRANT A SMALL INDEPENDENT REFINER AN EXEMPTION FROM THE REPLACEMENT MANDATE UPON A SHOWING THAT DESPITE GOOD FAITH EFFORTS HE CAN NOT OBTAIN REPLACEMENT FUEL FOR THE PERIOD INVOLVED AT REASONABLE PRICES AND TERMS. THIS IS NOT A SIMPLE EXEMPTION, HOWEVER. THE REFINER MUST AGREE TO PAY THE SECRETARY A FEE IN AN AMOUNT DETERMINED BY THE SECRETARY TO ASSURE THAT EXEMPTIONS DO NOT CREATE COMPETITIVE ADVANTAGES FOR THE EXEMPTED REFINERS.

THIS NEW SECTION, ADDED AT THE END OF THE BILL'S ENFORCEMENT PROVISIONS, PROTECTS SMALL INDEPENDENTS AGAINST A POSSIBLE MONOPOLY SITUATION WHERE THEY ARE UNABLE TO OBTAIN REPLACEMENT FUELS FROM PRODUCERS. THE FEE WOULD BE LARGE ENOUGH TO GUARANTEE THAT THEY MAKE EVERY EFFORT TO OBTAIN SUPPLIES; THUS THE PROVISION WOULD NOT SUBVERT THE PURPOSES OF THE ACT. AGAIN, HOWEVER, I WELCOME OTHER SUGGESTIONS ON HOW TO ACCOMMODATE THE NEEDS OF INDEPENDENT REFINERS.

TO SUMMARIZE, I BELIEVE THAT A MANDATE REPRESENTS THE MOST EQUITABLE, EFFICIENT AND PRODUCTIVE APPROACH TO STIMULATING THE DEVELOPMENT OF A REPLACEMENT FUELS INDUSTRY. H.R. 4345 MAKES THE MANDATE FLEXIBLE ENOUGH TO WORK FOR THE REFINERIES, AND FIRM ENOUGH TO PROVIDE MARKET CERTAINTY FOR THE PRODUCERS. IT ALSO MINIMIZES THE NEED FOR TAXPAYER SUBSIDIES AND FOR GOVERNMENT INTERVENTION IN MARKET FORCES. I URGE THE COMMITTEE'S SERIOUS CONSIDERATION OF THIS PROPOSAL, EITHER INDEPENDENTLY OR IN CONJUNCTION WITH RELATED INITIATIVES.

Mr. DINGELL. Mr. Jeffords, the committee commends you for a very helpful statement. We also commend you for the very high leadership you have provided in this matter and for the innovative thinking that has guided you in your conduct of your affairs here.

The committee and the country owe you thanks for what you have done. I would commend you on behalf of the committee.

The Chair would like to ask one question. The bill as I read it is quite clear in its language in that it would authorize the use of coal as one of the raw materials from which the replacement fuel would be drawn. Is that correct?

Mr. JEFFORDS. That is correct, Mr. Chairman.

Mr. DINGELL. You do believe coal would be a viable and useful and desirable source for production of alternative fuel?

Mr. JEFFORDS. Yes, I do. The evidence I have heard and certainly the reading I have done indicate that probably is one of the most likely sources of substitutes for our present fuel system, which will probably come on line most quickly. There are certain others out there such as alcohol. They may well provide the least expensive, best solution, and of course this bill says you can sell whatever the best one is. There will be a market for it, and this ought to make things come on line much more quickly and at less cost than might otherwise be put to the consumer and the taxpayer.

Mr. DINGELL. Thank you very much. The Chair recognizes my friends and colleagues. The Chair recognizes first the gentleman from New York, Mr. Ottinger.

Mr. OTTINGER. Thank you, Mr. Chairman.

I join you in congratulating my good friend from Vermont for his innovative efforts.

I wonder if we do not need to have some kind of more qualified approach to the bill. Most of the synthetic fuels are still experimental. We do not know about the ability to produce in quantity and there are grave doubts about the price.

I wonder if there should not be some qualifications. If it turned out to be much more costly for consumers, do you want us to go ahead with it anyway and how do you handle possible problems of unavailability?

Mr. JEFFORDS. I think we would handle it probably the same way we do the automobile industry. You establish the goals and you push like heck and if you find out the goals are too stiff you readjust them down. You might have to make some concessions for those that have met the goals.

I think the important thing is to make sure we do something and that we do actually see some improvement, that we establish a goal and put everybody's nose to the grindstone to make sure that we get as close to that goal as we can.

Mr. OTTINGER. In the automobile standards we did more than establish a goal. We established a requirement which if it was not met there would be a penalty for each mile per gallon that the fleet average of an automobile manufacturer failed to meet the standard.

How do you handle that?

Mr. JEFFORDS. It is handled basically the same way. In other words, for every gallon that you sell in violation of the mandated goal for your corporation you pay a \$1 a gallon fee. There is some

question about whether or not that fee is too high. I leave that problem to the committee.

It should be set sufficiently high to give the kind of incentive that is necessary to make the industry comply, but not so high that it becomes obviously overburdensome and counterproductive. Somewhere in that area, we believe, is the answer. You may need to give flexibility to the Secretary of Energy to alleviate some situations.

It is basically the same approach that was used with respect to the automobile industry.

Mr. OTTINGER. The cost of this in the case of fuels would just be passed onto the customers at still higher prices would it not?

Mr. JEFFORDS. That is correct. It gives you an additional option. If you pass it alone then of course the cost would be passed onto the consumer. If you pass it in conjunction with either tax incentives or loan guarantees or, more importantly, guaranteed prices, then you have the ability to shift the load either to the consumer or to the taxpayer depending upon how it appears at a later date that the burden ought to be best carried.

Mr. OTTINGER. You just assume that the environmental standards for these fuels would be met so there is no exemption of environmental standards?

Mr. JEFFORDS. That is correct. I have a great faith in the free enterprise system and its ability to operate notwithstanding its objections at times to present rules and regulations. I believe it could do the job. I would hope that would be the case. I know there is a move at least for procedural speeding up of operations but I certainly do not want to see anything of substance changed in this area.

Mr. OTTINGER. I have great faith in the free enterprise system. I am not sure I have great faith in some of the synthetic fuel processes and their ability to meet the kind of timeframe you are talking about. I think that is something we really have to look at.

I suppose, at a price, some of these things can be done and, combined with subsidies, particularly in the alcohol fuels area, you could make a substantial contribution. That is really what concerns me.

Thank you, Mr. Chairman.

Mr. DINGELL. The Chair thanks the gentleman. The Chair recognizes my good friend, Mr. Sharp.

Mr. SHARP. Thank you, Mr. Chairman. I also want to laud the efforts of Mr. Jeffords. I know he has put a lot of work into this.

Does your proposal require that the percentage of 10 percent come from domestic production?

Mr. JEFFORDS. Yes; it does. In other words, we are taking a look at the problem of trying to get the Nation off imported oil. We have a lot of options around; let's find the cheapest one and let's replace on an increasing basis the amount that is used that comes from something other than oil out of the ground.

It is not only just domestic, but it excludes conventional oil out of the ground and out of the conventional well and looks to other sources. It seeks to develop the industries needed to get us out of the bind we are in.

Mr. SHARP. It would prevent Exxon from being in a position of creating a synthetic fuels plan elsewhere in the world where it might escape pollution standards or something else and might find that more convenient and then shipping it back to this country as its percentage.

Mr. JEFFORDS. I am not sure that question has been specifically addressed in the bill. It is one that ought to be of concern, certainly if we are looking toward remedying the imported oil situation. I had not thought about what happens if you are able to find a foreign source, but certainly we ought to face that the national goal is to get off the foreign supply. I do not believe it is specifically addressed in the bill.

Mr. SHARP. In your discussions with people have you had any concern raised over the question of the role of the major oil corporations? In essence if we require them to get 10 percent of their supply from the refineries their incentive might be under the law to precisely do that themselves rather than rely upon and take a chance upon other outside competitors to produce it for them.

We might actually drive the largest of the oil corporations into activities they may or may not have in their plans. We may in fact further concentrate the industry.

Mr. JEFFORDS. Of course there is that possibility. I would say personally that I do not mind them using their money rather than mine to develop an alternative which would be competitive.

You must remember that other people are able to get into the market at a cheaper cost, then they are not going to have the monopoly type of control. Plus you have the protections of anti-trust laws. Further, there is some protection in the modified bill which takes care of them trying to shut out independent refiners. It gives independents an option if they cannot find the supply, so they are not penalized, driven out of the market, or out of business. We do give them that ability to insure competition with the majors.

Mr. SHARP. Let me ask you a question on the terms of the flexibility of your goal. In your discussions have you found much support for one or two possibilities, where you either set a blank goal for 1987 or to set a couple of early phase in goals of 1 percent or 2 percent to assure an early market before the one year?

It does not strike me that one is superior over another.

Mr. JEFFORDS. I have not heard much concern on that aspect as much as I have heard concern about the feasibility of a 10-percent goal by 1987. Originally we tried 1985. No one would agree to that. We figured 5 years might be enough. With all of the needs for developing technology et cetera that seemed unreasonable so we moved it up to 1987.

There is considerable thought that maybe it ought to be 1990. I do not know the answer to that. The committee obviously has to give considerable thought to that.

My own feeling is that I would rather see it a little bit higher than people would like, to make sure we have a maximum effort. Then you could take a look at it in 2 or 3 years and say we do not want to drive people to exorbitant costs and heap additional costs onto the public that may be unnecessary, balancing all of the other things you have to think about in the economy.

I think it would be wrong to go too slow because it would not be an effective tool to accomplish what needs to be done.

Mr. SHARP. I was thinking we would have to balance the two interests of those who are making the investment in the synthetic industry in anticipation of the guaranteed market and if we played around with the guaranteed market in a sense we might totally undercut that. I can see where we can scale that 10 to 9 or down to something that would still assure a market but it might be a smaller market if the production was not there.

Mr. JEFFORDS. A very firm assurance of maintaining the goals has to be given in order to make sure that the capital necessary to supply the market comes forward. If it appears that the goal may be abandoned in a year or two, it obviously would place the industry in a tremendous risk situation. It would have to be very carefully done and I am sure this committee would act responsibly.

Mr. SHARP. Another thing strikes me but without any real consideration I do not know if it should be a concern to us and that is changing technology in the automobile, if in fact we are anywhere near a dramatic change in the fuel like to a hydrogen fuel or something of this sort, whether or not this approach might have any impact on tending to drag out and lock in existing motor technology.

I am glad to see you were adjusting to the diesel because that is obviously something we need in the future.

Mr. JEFFORDS. That is one concern you ought to address when you take a look at the spectrum that ought to be included within the bill. That is, whether you should expand it or not. Second, you have to figure out what would happen if all of a sudden you had all electric cars, meaning a substantial reduction in consumption. That means you have the option of adjusting your goal percentagewise in order to maintain an adequate market so that the producers do not end up with stuff they cannot sell.

You have options available, and in that case it would be an increase in the goal rather than a decrease. If you want to replace what is coming in, if it is still coming in, and you have everybody in electric cars then all you have to do is adjust your goal upward in order to insure the market is there.

Mr. SHARP. Thank you very much, Mr. Jeffords. Thank you, Mr. Chairman.

Mr. DINGELL. The Chair thanks the gentleman.

Mr. Jeffords, the National Energy Act provides a 4-cent-per-gallon tax forgiveness on any gasoline type fuel that uses 10 percent or more alcohol. This comes down to be a subsidy of about \$16.80 per barrel. This is for alcohol fuels not made from coal.

This question does not really relate to your bill but it tends to raise a question that is of concern to the Chair.

Why should the Nation subsidize ethanol, grain alcohol, and not methanol, which is coal alcohol which may make possible the use of a whole new source if we afford the appropriate subsidy to that kind of alcohol additive and which might free up grain as a food for human beings instead of going into gasoline to run our automobiles?

Mr. JEFFORDS. Of course that is a very painful question to me because we do not have any coal. We have some other options.

Maybe I can defend that proposition and then perhaps agree with you somewhat.

I think most of the money that apparently will be coming forth in the energy security corporation, et cetera, will be for developing synthetic coal or synthetic fuels. At least that is the present plan as I understand it. There is also money that is obviously going to be available for biomass conversion.

I would think the area where there is the most likelihood of the small person and the small business getting involved is methanol-ethanol production. You may want to take a look at it from the angle of providing the kind of incentives that may be necessary for people who would not qualify for other incentives.

To be honest with you, and I do not come from a grain area either, but we have some areas of great interest, for instance in the use of whey from cheese. There is an excess of some 700 million pounds of that product around the country, and EPA is closing down on people for dumping it in streams. They have to get rid of it. There is actually a negative product cost involved. They have to pay to get rid of it.

You have that. You have a lot of wood. I can envision a cottage-type industry running around and picking up from stills.

Mr. DINGELL. Wood would produce methanol.

Mr. JEFFORDS. That is correct.

Mr. DINGELL. Whey probably would produce ethanol.

Mr. JEFFORDS. Yes.

Mr. DINGELL. Is this a valid discrimination?

Mr. JEFFORDS. I am trying to make it valid for the defense of my own needs but, to be honest with you, Mr. Chairman, I think if you are trying to get people to use gasohol it becomes very difficult to defend a subsidy or a benefit to one producing area as against another.

We should be looking for the cheapest and most available way of doing it and we ought to have an equitable system of subsidy that brings forward the cheapest source. If it happens to be coal, then I think we have to accept that.

I happen to feel that with whey and the negative product cost, plus the excess labor that may be available at certain times of the year on farms where you can almost get a zero labor cost, they probably could bring on something that is very competitive at a low cost and I would hate to see that dampened.

Mr. DINGELL. Mr. Jeffords, the committee thanks you for your help to us and we again commend you for your labors on this legislation which is very important.

Our next witness is Mr. Jacques R. Maroni who is the director of environmental research and energy planning for Ford Motor Co.

Mr. Maroni, we are pleased to see you with us today and we thank you for coming.

If you will identify yourself fully for the record we will be delighted to receive your statement. If you would like to have some of your friends or associates sit at the committee table, you would be welcome to do so.

STATEMENT OF JACQUES R. MARONI, DIRECTOR, ENVIRONMENTAL RESEARCH AND ENERGY PLANNING, FORD MOTOR CO.

Mr. MARONI. Thank you, Mr. Chairman.

My name is Jacques R. Maroni. I am environmental research and energy planning director for the Ford Motor Co.

The Ford Motor Co. is pleased to have the opportunity to comment on H.R. 4345. Energy in liquid form provides compelling advantages in the design and operation of self propelled vehicles among which are portability, storability, ease of handling and rapid refueling and accordingly Ford has a great interest in ensuring a national supply of liquid fuels.

The growing uncertainty of U.S. supplies of natural liquid fuels obviously accelerates our interest in the development of liquid fuels from nonpetroleum sources. The abundance of solid fuels is well known.

These resources which include coal, lignite, peat, shale and tar sands may be some 60 times greater than that of petroleum in liquid form. Liquid fuels can be produced from them and also from hundreds of organic materials that can be grown as renewable energy crops.

In short, there is a great variety of source material and many different technologies already exist to process these materials into liquids.

It should be recognized however that not all of these technologies can be said to be fully proven in the commercial sense. Most of them appear to be more capital intensive than conventional petroleum exploration and production.

We believe nevertheless that the time to start the transition to nonpetroleum liquids has arrived because the lead times are very long and because the economic and social risks of starting too late far outweigh the economic and social costs of having started too soon.

For this reason we are encouraged by the increasing interest that has been demonstrated in alternative sources of liquid fuel in recent months. It is important that Congress continue to address the issue with a sense of urgency and choose among the various options.

Regardless of the approach that may be adopted it is clear that we must assure substantial quantities of nonpetroleum fuels as oil supplies diminish. Certainly the preferred solution in our view is one in which market forces would bring on the synthetic liquids. History tells us that this would be the least costly and the least disruptive route.

Unfortunately the worldwide petroleum market has been increasingly dominated by political rather than economic forces and it is doubtful that we will have enough warning to rely on the market alone for an orderly transition to nonpetroleum fuels. This clearly suggests the need for some Government role.

There are many ways in which the Government can encourage timely synfuel production. For example Congress, through the Energy Security Corporation, could provide subsidies and guaranteed markets for synfuel production or tax incentives could be created for the same purpose.

Today's hearing focuses on another concept by which Government could encourage synfuel production, Government mandated replacement of petroleum with nonpetroleum fuels.

While there are a number of changes we would suggest to the specific language of H.R. 4345, some of which were previously covered by Congressman Jeffords, let me begin by saying that the underlying concept of this approach has much to recommend it.

By guaranteeing a limited but growing market for synfuels it would provide learning experience sooner than the market without such a push would be likely to provide.

It would leave to the private sector the many complex decisions concerning the choice of source, technologies, location, and marketing plans. This should encourage, we believe, each producer to adopt the particular synfuel strategy that would be most efficient for him and for his customers and it would avoid most of the bureaucratic problems of too much centralized decisionmaking.

It would avoid or at least it would minimize direct taxpayer subsidies and burdens on the Federal budget.

It would guarantee a predetermined amount of synfuel production by a given date.

It could be effected without a major short-term price impact on consumers. At a 10 percent phase in for example which could not be achieved before 1987 or later, even if synfuel were to be sold by producers or refiners at double the per barrel price of petroleum the retail price of gasoline at the pump would go up only about a nickel a gallon.

Most important of all may be that the mandate would allow all sources and all technologies to compete. As the Chinese philosopher said in another context, "Let a thousand flowers bloom."

This is not to say that a mandate is without problems. As you know the auto industry has operated since 1975 under a mandate to double the fuel efficiency of the average car by 1985. Certainly this mandate has brought about substantial fuel savings.

The 1980 model domestic cars will consume nearly 4 billion gallons less than their 1974 counterparts in their first year of operation. By 1990 the Department of Energy estimates that gasoline consumption by all cars on the road could be about 19 percent below the absolute 1978 levels despite a probable 21 percent increase in the number of cars on the road.

This progress has been accompanied by problems. The overly rigid approach involved in these standards has caused very heavy and often uneconomic expenditures as manufacturers have worked to overcome the uncertainties of unproven technologies and other risks that are inherent in the mandate and its sanctions.

Turning to the legislation before us we might draw some lessons from the auto experience. Like EPCA H.R. 4345 we think mandates a maximum percentage of replacement of petroleum by synfuels on a very ambitious schedule. It does not appear realistic in our view to talk in terms of a 1981 initial requirement; certainly a leadtime of at least 5 years would be necessary to turn on a variety of technologies even if no delays are encountered as a result of difficult environmental issues.

Certain additional changes might seem appropriate. For example we think it is too narrow in its application to motor fuels only.

Restricting a synfuel mandate exclusively to motor fuels could rule out the lowest cost solutions. Several liquefaction processes yield fuels that are best suited for displacement of petroleum now used under boilers or in combustion turbines and some of these appear to have relatively attractive economic and technical aspects. That is petroleum that could be upgraded to gasoline.

There are special problems with certain synthetics as motor fuels. These may include materials compatibility, emissions effects; phase separation and the need for a generally higher degree of chemical purity than fuels for some stationary applications.

Motor fuels require a national distribution system that could well be jeopardized if the investment required for conversion of the distribution network were too costly for small operators.

We think also the law should permit credits for the production of gaseous fuels when these fuels are of nonpetroleum origin and displace petroleum. Some of the processes have gas as a by product.

Some provision must be made as has been mentioned earlier for small refiners who could face special difficulties in meeting the law unless some provision were made for them to buy through syndicates or to pay an equalizing fee to entitle them to nonparticipation.

Perhaps a more appropriate measure for a synfuel phase-in would be the energy content or the Btu content rather than a volumetric measure.

The \$1 per gallon noncompliance penalty to be levied against the producers seems excessively punitive. If it were enforced we believe it is the consumer who could suffer from unduly restricted fuel supplies as some refiners could cut back their throughput of petroleum to maintain mandated blend ratios. This concern would be aggravated in the case of a motor fuel only mandate. A refiner short of the necessary synfuel blend could simply switch to home heating oil and reduce his gasoline throughput.

In summary, our view is that the concept behind H.R. 4345 has a great deal of merit and should receive serious congressional consideration along with other measures.

A mandate need not be exclusive of other proposals. Some incentives for example may be needed to start up certain new processes and develop new sources. We would hope that any mandate approach would be flexible enough to avoid burdensome administrative rules; economic hardships; punitive enforcement or other forms of counterproductive results.

Perhaps the most important thing for us to do is to decide on a course of action and get under way before time runs out on all of us.

Thank you.

Mr. DINGELL. Mr. Maroni, you have given the committee a very helpful statement and a great deal to think about.

The Chair recognizes my good friend from New York, Mr. Ottinger.

Mr. OTTINGER. I have no questions. I would like to join the Chair in expressing appreciation for a very constructive statement.

Mr. DINGELL. The Chair recognizes my good friend from Indiana, Mr. Sharp.

Mr. SHARP. Thank you, Mr. Chairman.

Mr. Maroni, do I understand that you kind of envision a slightly different concept still focused on the refinery in which case we might mandate that out of that refinery's outflow and in theory let's say the goal is 10 percent, 10 percent of the Btu content must be a synthetic fuel thereby leaving them either through a paper arrangement with a synthetic fuel producer or through the literal purchase and running it through their refinery that you will give them more flexibility? Does what I have said make sense?

Mr. MARONI. Congressman, I think it is essentially what I have said. I do not believe that there is a single synthetic liquid answer to the national problem. I think the least cost answer would not be the same depending on which region of the country you are looking at or which application you are looking at.

I think there is a need for a variety of solutions. I think a law which would permit the producers to choose that solution which is most effective and least costly in their circumstance to the particular market they serve is desirable in the public interest and would displace petroleum whether it is used now under a boiler or not.

That petroleum could be upgraded to motor fuels at a lower cost than a synthetic fuel could be made to go directly to a gasoline tank.

Mr. DINGELL. If the gentleman will yield, what you are saying is we essentially should fix the percentage to the entire throughput of the refinery as opposed to applying it only to motor fuels so they can engage in fuel switching and still maintain the desired output by running a larger amount of kerosene or No. 2 or jet fuel instead of the gasoline.

Am I correct?

Mr. MARONI. Yes, Mr. Chairman. As an example I think the production from coal into methanol is relatively environmentally benign. There is a proven technology which is now used around the world and it does not require extensive R. & D. to prove it out. It is, therefore, essentially ready to go. It happens to have methane as a byproduct.

The methanol that would be produced by such a system could displace petroleum which is now used in combustion turbines. That petroleum can then be upgraded by existing refineries and all of that can be done at a lower cost than to have mandated a synthetic fuel into a gasoline blend.

Mr. DINGELL. I think you have made an excellent point. I thank the gentleman for yielding.

Mr. SHARP. Are you suggesting you still must have literally the throughput of the synthetic fuel or rather you only have to have it on paper. That is a very large refinery might still operate in the traditional manner but they would have had to contract with the guarantee that being sold on the market as a substitute for their running it through would be a comparable fuel. That gives them an element of flexibility that I think would be an element of flexibility that Mr. Jeffords allows to the smaller refinery, but not necessarily to the big refinery.

Mr. JEFFORDS. You can work it on paper so that you are in effect responsible for the 10 percent replacement in the ultimate regardless of whether it is run through your refiner or whether it is an arrangement you make with the mixing plant if it is alcohol or

whether it is going directly to retailers so you have the responsibility for that on paper.

Mr. SHARP. I think you are suggesting if we used a Btu measure we might be able to get greater compatibility among the various fuels.

Mr. MARONI. The reason for the Btu measure is that not all liquids have the same Btu content and most energy users are interested in Btu's and not gallons. You do not really want water produced by this law.

Mr. OTTINGER. If the gentleman would yield on that note, there is a tradeoff that has to be worked in here with regard to alcohol fuels, because they do have an octane boosting effect. Despite the fact they have a lower Btu count per gallon, the octane effect could still make them valuable.

Mr. DINGELL. The gentleman is correct. You boost the octane and you diminish the Btu where you use alcohol.

Mr. MARONI. In order for us to take advantage of the added octane it has to be reserved for a new car. When it is used as a retrofit for 125 million vehicles the fact is the high octane is essentially lost because it is too late to change the compression ratio of the engines.

Mr. OTTINGER. If the contemplated use is as a replacement for re-refining oil in order to replace the octane lost by lead as an octane booster, then there is a value there that is not reached by just measuring the Btu's. I think that ought to be accommodated in the legislation.

Mr. SHARP. Mr. Chairman, if I could ask the witness a couple of questions that he may or may not feel he could respond to; one is I am constantly asked by my constituents about the utilization of gasohol on the market in their cars and whether there is any damage to it. I wondered if you could give us any judgment.

Mr. MARONI. I have limited competence in that area. I can only report to the best of my understanding the companies have conducted the necessary tests and have extended their warranties to the use of gasohol, in the form in which that product is now being offered in the United States.

Mr. SHARP. I wondered if I might ask a longer range question. What kind of dramatic change in fuels do you think are possible any time in the reasonable future with the question of the hydrogen car or electric, what kind of pattern do you see as potentially emerging?

Mr. MARONI. Again my competence has its clear limits here. I would like to mention only in connection with your question on hydrogen that I think if hydrogen ever makes it as a fuel into cars it is likely to be by reason of a system to decompose a liquid onboard to manufacture the hydrogen as the vehicle runs and that methanol manufactured from coal is the most likely liquid to accomplish that.

Mr. DINGELL. The Chair thanks the gentleman.

Mr. Jeffords?

Mr. JEFFORDS. I have no questions, Mr. Chairman.

Mr. DINGELL. Mr. Ward?

Mr. WARD. In testimony before the House Appropriations Committee in June or July of this year Mr. O'Leary testified he be-

lieved that within 10 years with no major design modifications cars could be running on 100-percent methanol. Do you have an opinion about that?

Mr. MARONI. Yes, I do not believe it is possible that there could be that much methanol produced in the United States within 10 years and, second, I do not believe that the existing cars could be operated satisfactorily on 100-percent methanol.

Mr. WARD. You think there would have to be some design changes to achieve that?

Mr. MARONI. I think to achieve optimum operation, absolutely.

Mr. WARD. Is there a point when you deal with some of these mixtures like 10 percent and 20 percent, where is a reasonable point to draw a line before you have to start making changes in the automobile?

Mr. MARONI. I think that the answer to that is unfortunately quite complex and depends on which liquid and which blend you are addressing. I think with respect to ethanol that a 10 percent blend is considered by my technical colleagues to be acceptable.

I think there are other blends such as methyl tertiary butyl ether or tertiary butyl alcohol where it might be possible to go to higher percentages.

Mr. DINGELL. If counsel will yield, those require greater energy input to create the substitute fuel, do they not?

Mr. MARONI. I think it is conceivably possible to manufacture those from coal. If they were manufactured from petroleum they would in no way solve our problem. They are presently manufactured from petroleum. I am suggesting that over the long run they may be manufactured from coal and if they were, they would be beneficial.

Mr. DINGELL. This is not on the shelf technology?

Mr. MARONI. This is not ready-to-go technology, but could be made ready to go probably within a decade.

Mr. DINGELL. Thank you.

Mr. WARD. One of the problems you face is you have to know what the specifications of the fuel is in order to design your cars to utilize it?

Mr. MARONI. Yes. Of course, there are two parts to that question. If you consider the fact that there are vehicles that are running around at the moment and if you introduce a blend and allow existing vehicles to use it the first issue we face is what is the compatibility of those vehicles already designed and not just by us with any new blend you might introduce.

A second question is if you wanted to design new cars and new trucks to take advantage of a fuel to be made available in the future, what would be our ability to design with the knowledge of what that fuel will be?

Mr. WARD. My concern is is there a leadtime problem between mandating a certain blend by a certain time and your ability to build cars that efficiently utilize that blend.

Mr. MARONI. There is a very long leadtime both for us in designing the vehicles and for the fuel producers in putting the capacity into place. I suggested a minimum of 5 years to start the process. I think it will take 25 years or longer to make the transition.

Mr. WARD. Some of these fuels and particularly those from shale oil may have trace elements of toxic materials or carcinogenics in them. What problems does that create for you from an emissions standpoint?

Mr. MARONI. Again there is no simple answer to that question. The level of impurity which can be tolerated depends on the type of liquid that you are referring to and the type of application that it is going to be put to.

Our company is starting to test shale liquids and coal liquids with that question in mind and I cannot give you a better answer than that.

Mr. WARD. That is an uncertainty?

Mr. MARONI. It is an uncertainty but there is no present knowledge that it cannot be solved. It is a question of cost. There is cost in removing the impurities and there is cost to us in designing systems to remove them if they have not been removed by someone else.

Mr. OTTINGER [presiding]. Are there any other questions?

We want to thank you for your very helpful contribution.

We hear next from a panel consisting of Mr. Ted Pollaert, manager of synfuels for the American Lurgi Corp.; Mr. Frederick W. Hammesfahr, president of Hammesfahr, Winter and Associates; Mr. Pincas Jawetz, consultant on energy policy from New York City and a person who has been very helpful to me on the question of alcohol fuels, and Mr. Hoyt C. Hottel, professor emeritus of Massachusetts Institute of Technology in Cambridge, Mass.

Mr. Hottel testified before us a couple of months ago. We welcome you back.

Why do we not start with Mr. Pollaert? Unless the panel has a preference as to who shall go first, we will take them in the order announced.

STATEMENT OF TED J. POLLART, MANAGER OF SYNFUELS, AMERICAN LURGI CORP.; FREDERIC W. HAMMESFAHR, PRESIDENT, HAMMESFAHR, WINTER & ASSOCIATES, INC.; PINCAS JAWETZ, CONSULTANT ON ENERGY POLICY, NEW YORK CITY; AND HOYT C. HOTTEL, PROFESSOR EMERITUS, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Mr. POLLART. Mr. Chairman, I welcome the opportunity to share some ideas with you on what can be done about one of the most vexing problems of our country; the ever increasing gap between energy consumption and energy production.

With deregulation of fuel prices the market will in the end correct the imbalance. Higher prices will tend to improve conservation which in turn will reduce demand. Higher prices will also stimulate production from formations and by methods which previously were not economical.

I am convinced that part of this increased production will come from synfuels plants which turn coal into gas and liquid products.

If such synfuels plants could be built as fast as the synthetic rubber plants of World War II fame we could wait until the cost of fuels had risen so high that building synfuels plants became economically attractive and then expect economic forces to correct the imbalance between demand and supply within a few years.

In reality it takes at least 5 years to build a synfuels plant and it takes 20 years to build an industry. Even if we start a concentrated effort as soon as fuel prices warrant this the imbalance between supply and demand will keep increasing for another 10 to 15 years.

If fuel from coal becomes attractive at \$40 a barrel just to pick a number then imagine what will happen to the cost and availability of oil 15 years after that \$40 a barrel barrier has been broken. Will it cost \$100 a barrel? Will it cost \$150 a barrel? What will happen to our economy when the cost of gas and heating oil goes to \$3 or \$5 a gallon?

Due to the long leadtimes it is essential to get a synfuels industry started before that industry is cost effective. A six plants demonstration program may be a good idea but by itself is not enough. Such a program in 5 to 7 years will show which of the six processes is economically attractive and what the produced fuel costs. It will still take 5 years to build a commercial plant and 20 years to build an industry.

The handwriting has been on the wall since 1973 but so far no single commercial synfuels project has been undertaken. If we limit ourselves to another demonstration program for the next 6 years our reserves of oil and gas may well have sunk so low that our economy is damaged irreparably.

An economic incentives program such as the one recommended by the Committee for Economic Development would get us started. With \$2 billion in Government incentives they figure \$13 billion would be made available by the financial institutions.

Add to this the equity capital of the operating companies and there is enough money to build 10 to 12 synfuels plants with a total output of over 500,000 barrels per day of crude oil equivalent. That capacity will not solve our problems but it is a good start.

What if the Committee for Economic Development is wrong? What if upon closer examination the private sector considers building synfuels plants an unattractive proposition notwithstanding the offered incentives?

The country just cannot afford that chance. We should have started to build synfuels plants in 1973. At the very latest we should start in 1980. With the carrot suggested by the Committee for Economic Development we need the stick of H.R. 4345.

With that bill enacted I would expect to see a number of methanol from coal and methanol/synthetic natural gas from coal projects go ahead. For several of such projects a considerable amount of the required engineering work has already been done.

Methanol can be mixed with gasoline like alcohol and is the synfuel with the lowest production costs. Producing methanol and synthetic natural gas in the same plant is more economical yet. All this technology is completely commercially proven and meets all current standards of the Environmental Protection Agency.

Nevertheless projects can be entangled in redtape and in court suits forever. The petroleum industry could be caught between H.R. 4345 which forces them to build synfuels plants and law suits by special interest groups forever delaying the construction of these projects. An Energy Mobilization Board with some muscle is therefore definitely needed.

If we set as a goal to have 10 percent of our motor fuels produced as synfuels by 1987 which is a very ambitious program, it would break down for the different synfuels sources roughly as follows.

The oil from shale industry seems somewhat optimistic in the assessment of the status of its technology. I doubt that the total production from all projects will exceed 100,000 barrels a day by 1987. Several commercial facilities with capacities of 50,000 to 100,000 barrels each could be under construction by then.

The largest initial contribution could be made by alcohol from biomass because these plants take only 3 years to build. DOE report DOE/PE-0012 gives estimated maximum alcohol production figures for 1985 and for 1990. An interpolation of these gives a maximum alcohol production level of 400,000 barrels per day by 1987. The actually attainable production level is probably considerably lower.

The remaining 400,000 to 600,000 barrels per day will have to come from coal. That means 8 to 12 plants each with a capacity of 50,000 barrels a day each.

It will not be easy to achieve this level of production by 1987. To achieve it will require H.R. 4345. Economic incentives alone cannot exert sufficient pressure to achieve this goal.

That is my statement on this subject.

Mr. OTTINGER. Thank you. Your statement raises a lot of questions. We will get to those shortly. Why don't we hear now from Mr. Hammesfahr?

STATEMENT OF FREDERIC W. HAMMESFAHR

Mr. HAMMESFAHR. Thank you, Mr. Chairman.

Mr. Chairman, I would like to express my appreciation to you and to the committee for this opportunity to offer testimony on the proposed program to develop a domestic synthetic fuel industry by creating a domestic gasoline market.

First let me present my credentials. I have been involved with commercializing advanced technologies for over 25 years, first in corporate management and now as a consultant.

Our current work is and has been for some years deeply in the field of synthetic fuels. As a result we have daily exposure to the question of the commercial readiness of synthetic fuel technologies and to the marketing, organizational and financial requirements of bringing major synfuel plants onstream.

The need to move commercial in the synthetic fuel area is one in my judgment of urgency. Foreign oil suppliers have clearly stated their intent to raise prices and to support those higher prices by curtailed production if necessary.

We are in fact being subjected by the oil supplying nations to a form of economic warfare. We have so far not devised an effective response to these foreign programs and we therefore pay tribute to the foreign oil suppliers.

We all know what earlier generations thought about paying tribute to a foreign nation. We too can do no less. We must recover control of our national energy supply. The bill you have under consideration is a good step toward this goal.

Liquid fuels, toward which this bill is directed, are a particularly urgent need. The mobility of our Nation and of our military de-

depends upon liquid hydrocarbon fuels. According to the Institute of Gas Technology petroleum liquids supply about 96.7 percent of the transportation energy requirements. Liquid fuels are similarly critical to the military.

Technically, for both civilian and military transportation fuels there is no substitute for liquid hydrocarbons.

There is in my judgment an additional reason for going commercial now. It is one of jobs. We buy approximately \$60 billion worth of oil annually from foreign oil suppliers. These \$60 billion are being used to finance foreign refinery, foreign petrochemical, and foreign general industrial development.

As a consequence we have already lost a decade of plant construction and the associated construction and operating jobs. We really should not be surprised at the persistence of high unemployment here. As we continue to import oil, we continue to export jobs and unfortunately to import unemployment.

To give a feel for the numbers, one year's imported oil bill about equals 40 synfuel plants at today's prices. Forty such plants would give direct employment to about 120,000 persons plus possibly an equal level of employment to the construction trades while the plants and the associated mines were being built.

With time, a downstream chemical industry will grow up around these coal conversion plants. When mature, it may be expected that there will be roughly two persons employed in the downstream chemical plants for every one in the coal refinery or approximately 240,000 downstream chemical employees.

Looking at it another way, the permanent payroll per coal refinery in 1979 dollars will be roughly \$90 million. We will clearly need many conversion plants. The payroll potential is therefore large for any coal mining area.

While we delay a national decision to start this industry it is these jobs plus the construction jobs preceding them and the downstream chemical industry jobs following them that are being sent overseas in the form of imported oil payments.

As recently as July of this year, the Oil and Gas Journal reported that some 50 American companies have moved to Mexico motivated at least in part by low fuel costs. It was estimated that 25,000 jobs would be created in Mexico and that \$100 million would be spent in investment.

The proposed legislation can substantially contribute to bringing us relief from our dependence on foreign suppliers. It creates a market in the gasoline sector for synfuels and it relies on the private sector to fill that demand. Both are constructive approaches.

The bill is further a parallel and complementary approach to that of the proposed 1979 Defense Production Act, H.R. 3930. The latter is directed to forcing the use of synfuels for national defense preparedness. As such it will be directed toward the heavier fuels—aviation jet engine and diesel. Together these two account for 95 percent of the Defense Department needs.

This bill therefore does not duplicate the proposed Defense Production Act revision. With some modifications that will be discussed, it could contribute to meeting the objectives of that bill.

The market for synfuels to be created by this legislation can be expected to be supplied primarily from coal conversion plants. The administration plan, for example looks to coal for 75 percent of its synfuel, to oil shale for 20 percent and to biomass—probably as alcohol—for 5 percent.

We therefore should look to the coal conversion technologies to see the way they can fill this demand for gasoline.

Coal conversion processes that can produce a gasoline-blendable fuel are of two general types for the purposes of this discussion. They are those for whom up to 50 percent of their primary products are in the gasoline range and second the literally one or two essentially 100 percent of whose products are gasoline-oriented. The former, the ones with a wider range of products, are believed the lower cost processes.

A recent study for example lists the cost of products from the single product plants as 20 to 40 percent more expensive than the products from the multiproduct plants.

If for example one takes the cost of fuels from a multiproduct plant as \$35 per barrel, then the cost of fuels via the gasoline only plants falls in the range of \$42 to \$50 per barrel.

This suggests to me that the legislative concept might be broadened productively from gasoline only to transportation fuels in general.

If that were done, the number of processes the bulk of whose product met the legislative intent would be substantially broadened. Further the additional output covered under this broadening is in the diesel and jet engine fuels range.

This change would therefore support the objectives of the Defense Production Act revision by making it easier to get such synfuel production.

We will in addition have to live with these plants for a long time. This broader designation will permit the private sector to use these more efficient processes. It gives, in short, greater flexibility all the way around.

There is in my judgment a problem with the volume target; replacement of 10 percent of the gasoline consumed by 1987 or a volume target of 800,000 barrels per day.

Unless the process scheme chosen produces or can be forced to produce 100 percent gasoline this implies a total liquids production level well in excess of 800,000 barrels per day. If the target be kept constant and credit given toward that target for other transportation grade replacement synfuels then the number of plants for 800,000 barrels of transportation fuels per day and the program cost both will be reduced and the probability of meeting the target goals increased.

Even with this change a target of 800,000 barrels of synfuels by 1987, or 16 plants of 50,000 barrels per day synfuel should be considered aggressively optimistic.

The financial support for the plants intended to be built under this legislation is the market demand created by the legislation.

Since subsequent legislation can change this market support, it would seem reasonable to me that there be included insurance, perhaps for a fee protecting the plant owners and financing groups against the economic losses that could result if later legislation

terminated or reduced the market here created. In fact I would expect such assurances will prove necessary to the assembling of the financing.

Similarly the penalties for noncompliance must be equally firm if the legislation is to achieve its goal. The legislative draft I have seen states that the Secretary of Energy may assess a penalty of not more than \$1 per gallon of fuel sold that is not in compliance. This opens the door to a range of penalties from token to severe.

Since this is the clause that gives meaning to the market to be mandated, it would seem to me there must be a nondiscretionary floor on the penalties at a level sufficient to support the multibillion-dollar plant commitments.

It is also true that to meet the demands of this program a number of pioneer commercial plants will be required. These pioneering first-of-a-kind plants have an inherently higher degree of risk than later ones. This will require assistance and support with a front-end financing. This risk is recognized and provision is made to assist with it in legislation now under consideration.

It is a fact that I think the committee should keep in its consideration.

Costs and prices under these programs always come up for discussion. Data I have seen indicate a 50,000 barrels per day coal refinery will cost about \$1.5 billion or \$30,000 per daily barrel.

It is interesting to compare this with the recent announcements by Venezuela of the cost of developing its heavy crude oil reserves. Petroleos de Venezuela Petroven, the State-owned oil company, announced it will invest \$3.5 billion in its heavy oil fields to develop the capacity to produce and to refine 125,000 barrels per day. This equals \$28,000 per daily barrel versus the \$30,000 of our own synfuels programs.

The Venezuelan official making that announcement also stated that Petroven felt the investment economic. By contrast investments of similar scale in synthetic fuel projects are being criticized here as uneconomic and imprudent. For both of us, we are investing in our future. Surely if Venezuela can afford this investment we can too.

In closing I would like to summarize by saying that this bill is a constructive and innovative approach. By strengthening it to assure that the markets for which these multibillion-dollar plants are to be built do come into existence and do not disappear and broadening to include transportation fuels the bill could be very helpful in establishing a synthetic fuel industry in the United States.

Mr. Chairman, thank you.

Mr. OTTINGER. We thank you. Mr. Jawetz?

STATEMENT OF PINCAS JAWETZ

Mr. JAWETZ. Mr. Chairman and members of the committee, the development of liquid fuels from renewable sources or from new sources other than petroleum or natural gas has been my concern for a long time and I am therefore glad to have the opportunity to present some of my conclusions in this attempt at U.S. energy policy.

In 1959, I worked in the production of shale oil from oil shales at the Empresa Nacional Calvo Sotelo, Puertollano, Spain. As such I have had a firsthand experience with oil shales.

At present I am writing the issue paper to be presented before the Panel on Tar Sands and Oil Shales for the 1981 United Nations Conference on New and Renewable Sources of Energy.

In 1976, I spent time in Europe visiting with alternate fuels oriented organizations. I have had the possibility to see what remains of the coal based war time German energy industry and to discuss the future use of these technologies.

During 1976 to 1977 I participated at the Hudson Institute in the preparation of a report that was eventually released under the title of "Suggestions for a Phase II National Energy Policy," which allowed for scenarios for the development of shale oil and coal liquids.

My interest in energy from fossil fuel sources has brought me in contact with the Department of Energy and its predecessors as far back as 1972.

Gradually I started to develop a second interest in energy from renewable sources and in effect the last 2 years I have spent most of my time in an attempt to formulate national policies that link agricultural policy to energy policy in a holistic approach and I studied the economical feasibility of fuel alcohols, topics on which I presented several testimonies before congressional committees, the Department of Energy hearings and other forums.

Because of these more recent activities for which I am known to members of this committee, I felt compelled to mention as an introduction my more general interests in the energy area as the Replacement Motor Fuels Act which is the subject of this testimony is a very general petroleum and natural gas replacement proposal and I feel that I have the facility to comment on all the alternate fuels mentioned in this act.

As a start I would like to say that I am in favor of creating the market for replacement fuels by mandating the introduction of alternate fuels according to a specified timetable and I think the Replacement Motor Fuels Act presents a sound program that would mandate a 10-percent substitution by 1987 and an eventual goal of a 20-percent substitution by 1992. I believe it is feasible to implement these programs.

My testimony intends to present material in support of the Replacement Motor Fuel act and to strengthen the Act by making the following suggestions:

First, instead of leaving the progression to 10 percent by 1987 at the discretion of the Secretary of the Department of Energy the act will become more meaningful were it to mandate specifically for 1980, 1 percent; for 1981, 2 percent; for 1982, 3 percent; for 1983, 4 percent; for 1984, 5 percent; for 1985, 6 percent; for 1986, 7 percent and for 1987, 10 percent.

Second, the act shall mandate the phasing in of the exclusive use of ethanol for the purpose of boosting the octane value of gasoline.

Third, the act shall allow for the inclusion of diesel fuel besides gasoline.

At this point I would like to ask the chairman to allow the inclusion to the record of backup material to this testimony.

Mr. OTTINGER. Without objection your material will be included in the record at the appropriate place.

Could you tell us briefly what the materials are?

Mr. JAWETZ. I will mention them further.

My first inclusion is an article in the Washington Post, "Clearing the Way for Synthetic Fuels," by the distinguished M.I.T. Professors Hoyt C. Hottel and Carrol L. Wilson. The article suggests the phasing-in of replacement fuels by the refiners and says that, "We have a good model in this country. It was the way we created a market for energy efficient cars. The Government set targets for gasoline efficiency which car makers had to meet or pay large penalties."

I would like to comment on this example. What has happened in fact in the auto industry is that we are driving now smaller cars that do indeed allow for more miles per gallon but use a different fuel, a fuel of a higher octane value.

The production of high octane unleaded gasoline requires at least an additional 6 percent of crude and for certain crudes this value is probably as high as 15 percent. The octane boosters for unleaded gasoline are produced outside the normal refining process in a second process—a reforming process. This process is energy intensive and thus the loss in the yield of gasoline per barrel of crude.

Looking up the mathematics of the car energy efficiency with this additional information in mind may change somewhat our opinion about the successes of our automobile manufacturers, and may teach us that we need to be extremely careful when suggesting changes to the industry.

Furthermore, the switch from leaded gasoline to higher octane unleaded gasoline is in effect indirectly the main culprit for many of our energy woes. Despite what is being said by the Department of Energy there is no shortage of refining capacity neither now nor in the immediate future.

When the former Secretary was testifying before Congress and saying that there was a refining capacity shortage he was referring to a reforming capacity shortage. Indeed it was the production of the octane booster and not of low octane gasoline that became a bottleneck in the production of needed gasoline.

My second attachment to this testimony is an announcement by the Shell Oil Co., dated June 18, 1979, that they will temporarily decrease the octane value of their unleaded gasoline and I quote, "In an effort to increase the availability."

The refinery yields are the most guarded secrets of the oil industry as small changes in these yields have tremendous impact on the refinery competitiveness. For a very long time I had difficulty in obtaining quotable values for the added requirement of crude in order to produce the higher octane unleaded gasoline.

As such the third attachment to my testimony is a statement by Tosco Corp., president and chairman of the board, Mr. Morton M. Winston—a major independent refiner—and I quote: "Gas shortage fears * * * demand for higher octane fuels that in turn require more oil." This quote is a rare find indeed.

December 19, 1978, the Department of Energy, Economic Regulatory Administrator, held hearings on "The Draft Environmental Impact Statement for Motor Gasoline Deregulation and the Gasol-

line Tilt." The tilt was intended to encourage the construction of new refinery capacity by recognizing the shift toward higher use of crude when producing the same volume of gasoline.

I testified against the tilt. The testimony is included in attachment No. 4. I saw that the real calamity will be that the tilt will encourage increased imports of crude.

Instead of looking for octane boosters made from crude or natural gas the refiners should be encouraged to phase in the use of fermentation ethanol produced from local and renewable biomass as a way to decrease imports.

A 10-percent ethanol/90-percent gasoline mixture increases the octane value by the needed 3 points and by backing out the octane booster made from crude does not replace just 10 percent of a petroleum product but actually 16 percent with an enhanced effect on decreased imports of crude.

Mr. David Bardin, who was the Administrator at the time, requested at those hearings from the six oil companies presenting testimony that day to make further written presentations including answers to my contentions. Only one company has in effect even as much as touched this subject in their reply.

Eventually, when recommending the tilt, the Department of Energy included two lines. I quote: "Gasohol should be considered as a clean gasoline additive and as an alternative to increased reforming capacity. (Pincas Jawetz.)"

I wonder indeed if anyone has read those two lines? To show the prevailing confusion on the subject of the tilt I enclose attachment No. 5 which is a New York Times editorial on the subject.

ALCOHOL ADDITIVES TO GASOLINE, AN ECONOMIC WAY FOR EXTENDING SUPPLIES OF FUELS AND FOR INCREASING OCTANE RATINGS

The accepted way to measure energy contents is in terms of Btu which is a calorific measurement that does not measure accurately the performance of a fuel in a motor vehicle engine.

I would like to contest what was said by the speaker from the Ford Motor Co. which mentioned the Btu as a measurement for energy used in motor cars. It simply is not so.

In effect ethanol as part of a mixture with gasoline, though only about two-thirds the Btu value of the gasoline, increases the efficiency of the fuel in terms of miles per gallon. Fleet tests with gasohol, a 90-percent gasoline and 10-percent ethanol mixture, in Nebraska and Illinois showed 5.3 percent and 6.1 percent increase in miles per gallon respectively. Taking the average for these tests 5.7 percent one develops a series of factors, 1.5 times 1.6 times 1.57 equals 3.77 where 1.5 shows that ethanol has only two-thirds the value in Btu's compared to gasoline; 1.6 from the fact that we are backing out octane boosters made from crude or natural gas and 1.57 based on the improvement in terms of miles per gallon.

This calculation shows us that each Btu of ethanol replaces 3.77 Btu's of crude or natural gas when used in a mixture with gasoline.

Why have these calculations not become commonly accepted until now? The answer is symbolically shown in attachment six and seven, the first is a sarcastic letter by the president of Mobil Research & Development Corp. to the editor of the Washington

Post containing a lot of misinformation, and the second an unbelievable graph published by the Department of Energy and implying that there is a direct correlation between Btu content and effectiveness in fueling a car. The authors of that report should have been sent back to college or worse.

My suggestions which are intended to strengthen the Replacement Motor Fuel Act would require to make mandatory the phasing in of ethanol as an octane booster additive thus obtaining the maximum return from this resource and the maximum decrease in imports of crude.

As even the Department of Energy Assistant Secretary for Policy and Evaluation has stated, fermentation ethanol is the only immediately available alternative for crude. One should mandate an immediate percentage for replacement of crude based fuels and this will translate out of necessity into an initial ethanol program.

Coal liquids, shale oil, or oil from tar sands require a 5- to 7-year leadtime and if this act becomes law the oil companies will surely make efforts to have some plants ready by 1987 thus allowing for enhanced replacement of petroleum.

Some of the novel fuels will have properties that will allow their use in diesel fuel and thus one should include diesel as part of this act.

Will there be enough primary material to produce ethanol? Without any doubt. Sugars, starches, and after preparation even cellulose can be fermented to produce ethanol.

As one example I have presented before several congressional committees the possible excess land that was covered by set-aside and land diversion programs and kept out of production with the help of Government subsidies. The fact that some of this land is going to be returned next year to the production of wheat does not detract from my argument as I have my doubts that a serious policy analysis has been performed on this subject by the U.S. Department of Agriculture.

Considering that we still subsidize the importation of crude it is possible indeed that the increased exports of grain to the Soviets does very little to our overall economic policy and that a fuel alcohol from grain program would have been a wiser policy.

In any case in 1978, 17.8 million acres of agricultural land were kept out of production with a subsidy of about \$1.6 billion. This land could have produced 4.8 billion gallons of ethanol that when used as octane booster could have backed out twice as much crude.

The \$1.6 billion spent anyway could have provided a 33 cents subsidy per gallon of ethanol. A subsidy twice as high could have been obtained if only a selected part of the diversion program land would have been made available for this purpose.

As shown a vigorous gasohol type program could go far in decreasing this country's woes. Last December this committee held hearings on gasoline supply and price increase problems. I wanted to testify and as it was not possible I did present my testimony for the record. I am sorry to note that the material was not included in that record and as such I submit it here again as attachments eight and nine.

Mr. OTTINGER. Without objection those documents will appear in the record at the appropriate place.

Mr. JAWETZ. The introduction of ethanol octane boosters would help the small refineries. Attachments 10 and 11 deal with this subject.

On January 17, 1979, I testified before the Department of Energy Economic Regulatory Administration against changes in the small refiners bias at that time, that is without full understanding the contribution that small refineries can have in the phasing-in of ethanol octane boosters. After all small refiners do indeed have a harder time setting up a reforming capacity and would thus with the help of appropriate policies be more amenable and possibly better positioned to help the phasing in of replacement fuels.

I hope that this presentation will be helpful in discussing the Replacement Motor Fuels Act and I would be pleased to answer questions and clarify some of my remarks.

[The attachments referred to by Mr. Jawetz may be found in the subcommittee files.]

Mr. OTTINGER. Thank you very much, sir. We appreciate your courtesy and your testimony. Mr. Hottel?

STATEMENT OF HOYT C. HOTTEL

Mr. HOTTEL. Mr. Chairman, I am a professor emeritus of MIT, formerly head of the fuels research laboratory of MIT's Department of Chemical Engineering, and presently a consultant on chemical engineering problems, particularly in the fuels area.

I am the author of a book on energy technology and have served on five energy-related national panels.

I am for the development of a liquid synthetic fuel industry. After we do things that are cheaper such as energy conservation, stimulation of search for oil and gas, shift from oil to coal on existing powerplants, shift from oil to gas on some of our domestic heating, there will still be a gap between domestic oil production and consumption that is suppliable only by continued large importation of oil unless we bring along the development of liquid synthetic fuel.

The situation is worsening so fast that lost time is unconscionable. I believe therefore that action now is needed, even though it may not be as good as it would be if delayed for 1 or 2 or 5 years.

Passage of legislation that calls for expenditures of enormous Federal funds to subsidize a liquid synfuel industry is not consistent with the frequently expressed concern over inflation, so popular these days and in my opinion so justifiable.

In discussing Federal support of process development we must distinguish between a pilot plant and a demonstration module. The former allows the process to be debugged and furnishes the engineering basis for full scale design. A demonstration module on the other hand is a full size unit which, suitably multiplied makes a commercial plant.

If industry has a process which it says it believes sound enough to justify construction of a demonstration module, the only reliable proof of that belief is a willingness to finance it. The decision on whether a process is ready for a pilot plant or for a demonstration module is very difficult. The quality of the decision is related to the market for the product and particularly to the quality of personnel involved in the research and engineering. The range of quality

among the many processes up for consideration today is unidentifiably but certainly large. What has any group to lose by optimistically taking the position that its process is ready for a demonstration module if the Federal Government pays the bill? Repeated, the best test is a willingness to finance the process if a market exists for the product, that is, if there is adequate foreseeable profit from a process proved technically successful. On these grounds I favor continuing Federal support of pilot plants for attractive but unproved processes, but commercialization should be left to industry.

There is much evidence of existing know-how for commercialization of liquid synfuel processes:

First, in 1975 I visited South Africa's Sasol plant producing today 24,000 barrels per day of petroleum-like liquid products from coal. A planned expansion began in 1976, located in a coal field with 60 years' supply. The expansion will continue for another 5 years to bring the total production to 112,000 barrels per day.

Second, in western Canada there are two commercial tar sands plants. One started in 1967 and today is making 45,000 barrels per day and the other started in 1978 at half its design capacity of 105,000 barrels per day.

Third, oil from shale is an old story. The Parahoe Development Corp. has produced 100,000 barrels of crude shale oil at Anvils Point. One U.S. oil company has said it needs only a \$3 a barrel subsidy to decide to go ahead on a commercial scale.

Fourth, a number of other processes described in testimony before this subcommittee or before the Committee on Science and Technology of the House are in pilot plant or later stage of development and some of them look extremely promising. Concerning them this generalization is warranted: Their present state of development is at least as advanced as the state of our technology for producing synthetic rubber in 1942 when the decision was made to go ahead with commercialization. Although only about 2½ years were required to get into production on rubber full scale, the expectation that conversion of coal to oil will be achievable in so short a time is not realistic. Constraints on industrial processing operations are today much greater than they were in wartime 1942. But U.S. industry knows enough to go ahead.

Despite the existing technical know-how concerning synfuel, its present estimated costs, if it is made by any of the many processes that are being proposed, are enough above that of OPEC oil to give any company which builds a full scale plant with its own funds a better than even chance of large scale financial loss. If there is agreement that, one way or another, our Nation must act to move synfuel into commercialization then some form of Government intervention is a necessity. Legislation could aid in commercialization in one or more of many ways, grouped here into three categories:

One, by guaranteed Federal purchase of product; by investment tax credits; by production tax credits; by accelerated depreciation.

Two, by adding to the present partial support by DOE of pilot plant construction, which I heartedly favor; additional and major Federal investment in or loan guarantees on commercial scale plants, an action variously estimated by the administration as costing \$88 billion, or \$20 billion now, plus an additional unknown but very large later financial support.

Three, by guaranteeing the existence of a market by mandate, requiring every United States refiner to be responsible for the consumption of synfuel at a rate fixed in relation to the refinery throughput and rising year by year until 1990.

No scheme that involves Government intervention in private industry is free from all inequity, but the three classes of schemes just mentioned differ enormously in the magnitude of that inequity. I favor the third scheme, the mandate principle, as constituting the most benign kind of intervention of Government with industry.

A summary of the merits of the mandate principle over the methods of the other two categories follows:

One, the mandate principle adds nothing to the Federal budget. Schemes in category 2 add billions of dollars.

Two, it adds nothing to Federal bureaucracy. Category 2 adds thousands of jobs.

Three, the main argument supporting removal of price controls is that nothing teaches the user of fuel to change his habits of energy consumption like a price increase. Schemes one and two pass added costs on to all taxpayers. Scheme 3, the mandate concept, puts the cost where it belongs, on the user of fuel. Aid to the needy is a separate problem and should be handled separately and not mixed in, to spoil the principles of designing a system for energy conservation or increased production.

Four, the mandate scheme puts choices of process, product and price in the marketplace where the working of the competitive forces of the free enterprise system will give the public the most suitable products at the lowest prices.

Five, it avoids early freezing of process choices which inevitably follow on decisions by Government officials on process and product aided by Government.

Six, it is compatible with other plans.

Seven, it can be implemented quickly with no elaborate and complicated contracts, legislation, or administration involved as in other plans.

Eight, it uses a recent proven model of a system that worked in the 1970's, the mandated efficiency of motor cars.

Nine, it gives no special privileges for competition in the synfuel race. If Government intervention has to be accepted in one form or another the mandate principle is fairest to the oil industry. No process has been singled out for preferred treatment.

Ten, it puts a minimum administrative burden on the Government.

I should interpolate that my comments are to a mandate scheme somewhat different from H.R. 4345 and this can be confusing. I did not spell out the other principle.

Mr. DINGELL. Mr. Hottel, if you find it appropriate at the proper time to give us your comments as to what that mandate scheme would be, it would be helpful.

Mr. HOTTEL. May I continue and then I will do that.

Mr. DINGELL. At the time you feel appropriate, sir.

Mr. HOTTEL. I have not taken this position hurriedly. Eight years ago I wrote with Jack Howard a book on new energy technology which has gone through six printings. Between 2 and 3 years ago I began to talk about the mandate principle but aroused little inter-

est. This spring the discussion was resumed with Prof. Carroll Wilson of MIT's world coal study and this June I testified before this subcommittee on the mandate scheme.

I was at that time a minority of one in a meeting devoted to testimony on and the discussion of the Federal purchase guarantee principle, and very little attention was paid to the mandate concept.

It is my understanding that DOE believes the scheme would favor the large oil companies because they have special expertise in the area of fuel conversion and because they are more readily able to raise the large capital required for a 50,000 barrel per day plant and dominant oil companies could reap improperly high benefits, and that the mandate scheme is therefore unacceptable not on technical but on policy grounds.

I do not believe either of the reasons are valid. The American public has a distorted view of the oil industry. A different mandate scheme from the one I favor, bill H.R. 4345 which is under consideration by your subcommittee today, refers to the Emergency Petroleum Allocation Act of 1973 for a definition of "small independent refiner." He is one whose daily throughput of crude does not exceed 175,000 barrels per day.

Refineries of size below 100,000 barrels per day process one-third of the Nation's daily processing of 17 million barrels, and the largest oil company processes only about 8 percent of the total.

To indicate the breadth of participation in hydrocarbon processing—the data include refining units and chemical industry related to refining—there have been since 1975 some 50 to 60 plants in the planning stage at any one time, 200 in the engineering design stage, and 300 under actual construction. Between 307 and 330 were completed per year during that period. The capital investment runs about \$4 billion per year and the C. F. Braun Co. expects this to double by 1990.

As a sample of how the construction activity is spread throughout the spectrum of company size, 58 items involving 31 owners were listed under Louisiana in all stages of construction from planning to completion. In Texas 102 units were in construction alone and the 80 or so owners included Amoco, Arco, Chevron, Cities Service, Exxon, Gulf, Mobil, Shell, Sun, Phillips, Texaco, Union Oil, and 67 others.

If the opportunity for profit from construction of a synfuel plant is offered by guaranteeing a market through mandate I do not visualize a situation controlled by a few biggest oil companies. As to engineering competence I hope we do not hold that against a company whether it is big or small.

An interpolation is in order here. The mandate scheme I favor differs significantly from H.R. 4345 and is much more similar to Senator Pell's bill S. 1509 and includes in synfuel—which is sort of my analog to what is called replacement fuel in H.R. 4345—the full spectrum of products made by the conversion of coal or oil shale or biomass, including products varying all the way from SRC I, solid at low temperature and capable of use either to replace petroleum products used in refinery processing furnaces or by hydrogenation to yield petroleum like products, all the way from that to refined synthetic gasoline or alcohol.

Let me find my testimony before the House Committee on Science and Technology which in one paragraph succinctly describes the difference between my mandate scheme and H.R. 4345. A number of the comments made today were related to this difference.

This quotation is from testimony on September 13 before the House Committee on Science and Technology and it summarizes the other mandate concept.

Starting in 1985 every U.S. refiner of crude petroleum must report to DOE the previous year's input to his refinery. In 1985 he must include in his input a quota of synthetic fuel equal to 1 percent of the previous year's refinery feed. There shall be no double counting of the quota as by resale of purchased synfuel to another refinery but any refinery may transfer its quota requirement to another refinery with or without payment.

Alternative to meeting its quota a refinery has the option of paying to the Federal Government a penalty equal to twice the average cost of OPEC oil, f.o.b. Persian Gulf, equal in volume to the unsatisfied quota.

There shall be no constraint on what shall constitute synfuel either as to quality or raw material source providing the latter is not petroleum or natural gas. Different barrel equivalent values will be assigned to different qualities of synfuel, the responsibility for value assignment being lodged in the Department of Energy.

Mr. DINGELL. Would you give them the requirement if they do it by Btu or by some other mechanism? One problem is if we just give them that authority without some kind of standard we may wind up with an unconstitutional law.

Mr. HOTTEL. It is difficult to fix upon a single set of numbers. I listened to the testimony today on the merit of alcohol as a remover of other additives, but I find it difficult to begin to put in all of those special characteristics that different products have. Not because it is right but because it is the simplest and most nearly right, I favor a Btu basis or a Btu basis modified by hydrogen content, because it is the hydrogen content of one of these synfuels which determines whether it is close to petroleum.

SRC I is liquid at high temperature. It has very little hydrogen in it. It is not worth as much per barrel as SRC II which has more hydrogen, or as syncrude from the solvent process.

There would be some argument as to what these equivalents are. It would take some hard thinking. I would not be for putting in the antiknock value of any of the components. That would necessitate running an analysis on the syncrudes of various sources, hunting for the chemical structure in relation to antiknock if one really wanted to bring in the antiknock concept in complete detail, and it makes little sense to go that far.

Only as an example, a quota of one barrel of syncrude might be met by 1.3 barrels of SRC I, 1.2 barrels of SRC II, 1.1 barrels of shale oil and 0.7 barrels of nonpetroleum source diesel oil or gasoline.

There should be no constraint on what the refiner does with his synfuel. It may be used to replace petroleum products as fuel for processing furnaces in the refinery or it may be upgraded by further hydrogenation or conventional refining.

Every year after 1985 the quota will change to 2, 3, 5, 7, and 10 percent in the succeeding years, ending at 10 percent in 1990.

I would not favor trying to go beyond 10 percent if the idea has not produced a synthetic fuel industry by the time 10 percent is reached. If synthetic crude is still more expensive than OPEC

crude, 10 percent is a reasonable point at which to stop operation of the mandate concept.

You can see that my time scale is stretched out much further than the present one.

As to the details of the mandate scheme I am in disagreement with several features of H.R. 4345. Some of my 10 arguments in support of mandate are inapplicable to that bill. I shall mention but two of our differences.

One, bill H.R. 4345 is keyed to motor fuel production and thereby puts a major constraint on overall refinery operation. The balancing of refinery operation, the optimizing of how much gasoline, diesel fuel, jet fuel, and heating oil to obtain from different syn-crudes, the decision on relative amounts of different qualities of gasoline is a complex consequence of refinery know-how. It is distorted by a law that relates mandate penalty to gasoline yield, and the continuously changing response that there should be to the change in our life style that we are bound to face in an energy-deficient world would be frozen by such legislation.

Two, the expectation of anything happening that significantly affects gasoline yield through replacement fuel production in the next 3 or 4 years is unrealistic. Grain alcohol plants will constitute an added farm subsidy but they will not affect the nation's motor fuel supply significantly.

I know I am not agreed with by everyone on that strong statement.

I believe it is possible to prepare a mandate scheme which though not satisfying its critics on all counts will constitute the best basis for Federal action to get a synfuel industry going.

Mr. DINGELL. Thank you very much, sir. Mr. Ottinger?

Mr. OTTINGER. We have heard considerable testimony both in this subcommittee and in my own subcommittee of the Science and Technology Committee about the technical limits on production of synthetic fuels from coal and shale oil as well as the price constraints and environmental constraints and the disadvantages to the development of the industry of trying to push this too fast.

Mr. Hottel, at the outset of your remarks you acknowledged this by saying we would be better off putting up pilot plants and learning some of the problems and resolving some of these difficulties rather than going to a commercial demonstration module.

It seems to me that is one of the key problems that we have to address. Does it make sense for the country to push us into commercial production this rapidly?

Mr. Hottel, since you kind of spoke on both sides of the question I wonder if you could comment further?

Mr. HOTTEL. I do not think I have. My comment about pilot plants was where I had several examples of know how that included shale oil and Sasol and I had a group of things that I said looked promising. EDS looks very promising but Exxon insists they are not ready to accept money for a full scale plant.

It can be that belief that they are not ready is related to the market. There is not that strength of assurance that what they will have will be profitable.

There are not many advantages to being old but one of them is you can call up early experience. In the 1920's, around 1928 or

1929, we thought we were running out of oil and we were going to have to go to very heavy crude. Esso cross-licensed with another industry on berginization of coal in Germany and heavy oil in America. Haslam left MIT as a professor and became manager of Esso and pushed through three plants. By the time they were built we found we were not about to run out of oil in 1930. There was a large loss. He was referred to as the kind of man who went on to become senior vice president of the holding company in spite of that mistaken early step.

There has been reference to the fact that it has been 10 years since there has been talk about building these plants and they have not been built. We know the gas industry has pulled back several times on gas from coal and Lurgi-related processes.

This statement that we are not really ready is very difficult to interpret. Does it mean that we do not know enough or does it mean that our financial department is unwilling to bet on something when they do not know about the market?

My belief is that if I guarantee industry a market for synfuel in 5 years and tell them that if there is not sufficient synfuel in 5 years money is going to come out of the pockets of those prospective synfuel industries who are saying we really are not now ready and we do not know enough, there will be action. I think enough is known. There is no doubt gasoline from coal will take 5 years even if it is a proven process.

Mr. OTTINGER. Related to what you have been saying, you were aware that the price of synthetic fuels has managed to stay just out of reach even during the dramatic jump in the price of oil and without any relationship at all to the cost.

Mr. HOTTEL. I have noticed the same thing. Every time OPEC goes up the estimated cost of a substitute goes up about the same amount. The same thing has happened in the gas industry.

Mr. OTTINGER. Is that because the major oil companies really want to get the most money possible out of their oil resources and do not really want to see a substitute developed that could affect the price leverage they have?

Mr. HOTTEL. I am not close enough to the top of large oil companies to know and if I were I would not have the right to say. But I think the answer is "No."

Mr. DINGELL. Would the gentleman yield?

Mr. OTTINGER. Yes, Mr. Chairman.

Mr. DINGELL. We are saying today the cost of synthetic fuels and let's say we are saying today the cost of oil is somewhere between \$18 and \$35 and the cost of a synthetic replacement for it is something on the order of \$5 above some point in that area. We are figuring those on today's dollars and the dollars of 5 to 7 years from now when the plant goes on scale or on line.

Are we not making essentially a judgment that we ought not proceed when we are actually maybe buying cheaper synthetics at some time in the future?

Mr. HAMMESFAHR. We have done a fair number of these cost studies. All of the cost studies I have seen show there is a tradeoff point on synfuels based upon the best current guess as to inflation. The tradeoff point will come in the 1987, give or take a bit, range.

Mr. DINGELL. Provided we start construction now.

Mr. HAMMESFAHR. Yes. As a matter of fact all of these presume certain rates of inflation of OPEC prices. Everything that has yet happened says OPEC is not reading those charts and is going much faster. I think the cost of the synfuel is going up not because of any linkage. There are too many oil companies involved. They could not all get together. The cost of construction has skyrocketed. The cost of coal and the cost of labor have equally skyrocketed.

When you go back and take a look at what has happened to the three things that make up the cost, capital, labor, and coal, those prices have not been staying constant. They have been skyrocketing up. You can say coal may be linked. Construction and labor surely are not linked to anything that happens in an oil company office.

Mr. OTTINGER. They have not gone up anywhere near the rate oil has gone up.

Mr. HAMMESFAHR. I think they have done very well by themselves, I could not answer the relative question but construction labor has been very dramatic.

Mr. OTTINGER. Let me raise one other factor and I will probably have more than used my time. A number of us from my Science and Technology Subcommittee were at the Hudson Institute recently. I think Mr. Jawetz said he was involved in that. They just completed an extensive study which shows the historic pattern with respect to oil supply will in fact continue. The current shortages are an aberration in what has been a long term trend.

You referred to anticipation, starting way back, Mr. Hottel, that we were going to run out of oil and every time we ended up with oil surpluses.

They showed that non-OPEC production, based on present investments and drilling, is going to go up between 1.3 and 2 million barrels a day in the next 10 years including increases in production in the United States of 4 to 6 percent.

If that happens, does that not drastically alter the need for investment in much more expensive synthetics technology?

Mr. HAMMESFAHR. Is it not like any insurance program? You buy insurance hoping your house does not burn down. If it does burn down you are glad you have it. I think we have an insurance program and whether the oil is here in the United States or not only the good Lord knows but not many others.

If that oil is not here and so far no one has found it in great quantity in recent years, there is serious trouble afoot. If it is there, then this is an insurance program. If it is not there we will need this insurance very badly indeed.

Mr. HOTTEL. I feel that very same way. I have moments saying I bet there is a lot more oil there than we think. I lectured to a graduate class on combustion and I always took the first hour of the term talking about energy resources, and this meant going to the library and seeing what had happened. The oil geologists would estimate how much oil there was and when the accumulated oil production got to the point of crossing the asymptote it was time to write another article, saying there is more oil than the author thought.

I have said that to geologists in the last few years and they say, "Yes, but we know more than we did then," and that is what they

have always said. One whom I heard recently said that in our possible resource calculations we ignore the base of the Continental Shelf because it is too far down, but that is where there really ought to be a lot of oil, and we do not even bother to mention it in unproved resources.

I agree with Dr. Hammesfahr. It is worthwhile to say we are running out of oil and do something about it.

Mr. OTTINGER. Does the Hudson Institute analysis assume U.S. production on the basis of the biggest oil engineering company in the United States saying it would be far cheaper to drill the periphery of existing fields at the present time as opposed to going into a synthetic program? I think it also says that we really ought to be going for a synthetic fuel insurance program by building a number of commercial demonstrations so that we have the technology rather than speeding ahead with actual production.

Mr. HAMMESFAHR. I am not sure I understand the difference between commercial and demonstration and speeding ahead. You cannot go to speeding ahead as I would understand it without building as is called for by this bill, whatever the number is, is this not a commercial demonstration?

Mr. OTTINGER. I think 10 plants being built in the various technologies makes some sense, but that building a good many more plants on a vastly accelerated basis may be unwise.

Mr. HOTEL. One mandate scheme has said we must have 1 percent by 1985. One percent is about 200,000 gallons. That is four 50,000 barrels per day plants. Let's say four more the next year. Under the mandate scheme that is paid for by private industry. You are a little more certain that they use their best know-how and keep their costs down to a minimum when anything they can save on construction is money in their pocket rather than knowing the Government will pay the bill under the other schemes. The consumer pays for it. The consumer has to buy the gasoline and the seller has a right to charge what it costs him, and it will cost more. It will not be an awfully expensive experiment if the limit is 10 percent.

Mr. OTTINGER. I thank you, Mr. Chairman.

Mr. DINGELL. The Chair thanks the gentleman.

Mr. Jeffords?

Mr. JEFFORDS. I believe from listening to the testimony that everybody agrees that such an mandate ought not be limited only to gasoline but should at least go beyond. There was a mention that it ought to include diesel.

My question is do you get into an enforcement problem when you assure that it was used for diesel or whether it goes to home heating fuel? Is that a breaking point which is unforceable? Can you really trace the difference between what is used for diesel fuel or home heating fuel or whatever the use would be put to?

Mr. HAMMESFAHR. I do not know the answer to that question. The data base and statistical base of the oil industry is pretty good. I would think you would have a good chance of finding it.

Your objective in this bill and I think a national need is the transportation fuels. Unless a regulatory problem came up as you mentioned, I would keep it as simple as I could and orient it to the transportation fuels.

Mr. JEFFORDS. Mr. Hottel suggested going the whole range. Some of the others have said the motor fuels area. Mr. Hammesfahr has suggested you give credit for the production of others and I assume you mean if you can demonstrate that is necessary in order to accommodate the production of the motor fuels aspect or would you go beyond that in your type of credit for the production of other fuels when you are producing motor fuels?

Mr. HAMMESFAHR. If the national need is the transportation fuels which is my personal perception of what we have, I would then orient the program to get what I wanted. I do not think we have the same critical need for boiler fuels and for the other kinds of fuels and I therefore would not confuse the program. I would rather keep it targeted on what the Nation really needs. I think it could be done.

Mr. JEFFORDS. Perhaps I did not phrase my question correctly. As I remember talking with you one of the suggestions you had was it is sometimes cheaper in the production of motor fuels to produce something else along with it out of the crude and you ought to get credit for the utilization of that part of the crude as well as the motor fuels part. Am I correct in that understanding?

Mr. HAMMESFAHR. Yes. When we were talking together we were talking of gasoline as motor fuel. I would therefore give credit for diesel and jet engine fuels and transportation fuels in general whether they were used in a train or truck or a bus. I would give credit on those. I think there are a number of practical ways of assigning the credits.

Mr. JEFFORDS. I am trying to figure out how you would put in the bill credit for substituting an additive and the impact that would have on the utilization of less crude for the production of the present system of additives. How would you work that into the legislation?

Mr. JAWETZ. I am looking upon the way fuel is being distributed at the pumps. You have regular and high test and you have unleaded and some have high test unleaded. If by regulation you would define that high test unleaded gasoline has to be made in a certain way which includes ethanol, you will not have to increase the number of lines for distributing the product.

You have the pumps. You would sell it at the same pumps and by doing this you do not just replace the certain amount of gasoline that you have replaced with ethanol but you have also replaced the need for making the booster which needs an additional quantity of crude.

Our eventual goal is to decrease imports and I think that is what the name of the game is. If we manage to back out a certain amount of gasoline from the needed products from a refinery we could actually change the process in the refinery, that is have the refiners produce more heating oil and less motor fuel. If we could back out some of the gasoline in a larger scheme we actually would increase the production of the other types of fuel.

When one looks upon this whole program in the holistic way the details start falling into place.

Mr. DINGELL. We have a vote that will be occurring in 2 minutes. We need 5 minutes to get there for the vote. We will apportion the time accordingly.

I think you have all contributed greatly toward our deliberations. Mr. JAWETZ. The question was dealing with the comparison of the two different fuels.

Mr. DINGELL. Maybe all you gentlemen can give us your thoughts on that particular point but I suggest it be done in haste.

Mr. JAWETZ. As an applied physical chemist, theory is no substitute for experiment. You take different kinds of fuels and you put them into the same engine. Your final measurement is how many miles per gallon you obtain from these fuels with that engine. If after that you wanted to take several Ph. D. students and allow them to work out why it happened, that is another thing. That means we are used to measuring the efficiency of the fuel in Btu's and we determine coefficients of efficiency.

Each energy content the way it is measured in calorimetry has to be multiplied by coefficients which we determine by experiments and then we get numbers that can make sense and can compare different fuels to each other. By doing this we determine the amount of fuels that one substitution backs out to the other.

Mr. DINGELL. Mr. Hammesfahr, what do you have to say about this?

Mr. HAMMESFAHR. On this particular question, I am not an engine expert or a car design expert. I do not follow this area very closely. I have seen data on both sides of the fence. I could not select between them.

Mr. DINGELL. Mr. Pollaert?

Mr. POLLAERT. This is a very controversial subject. I am not an expert on gasohol at all. Offhand if I hear how much better ethanol is supposed to be by multiplying all these figures I would say it is a lot simpler to do it on Btu content and a lot less controversial and if the ethanol is so much more attractive than the other synthetic fuels it will get a chance in the marketplace anyway.

Mr. DINGELL. You will have a pull from the marketplace.

Mr. POLLAERT. That is right.

If I get for the same Btu cost three times the advantage, people will take the advantage. If I can get all these beautiful characteristics and the costs that I have seen for gasohol are not so that they fall out of line with those for other synthetic fuels and now it is established it is two or three times as good, people will automatically go to the gasohol and you do not have to legislate it and then close off all the competitive products.

Mr. JAWETZ. Not if you have oil companies that do not want to have any part of ethanol. We are talking theoretically but in real life ethanol is fighting the nonsense which I have included in my attachments. When the president of such an organization like Mobil Research and Development writes such nonsense and the Department of Energy produces reports that do not stand any scrutiny by the minimum level of scientists, where do we go from there?

Mr. DINGELL. One of the things we are doing is groping for the best way to do this. I do not want you to think that we have made up our mind.

Mr. Hottel?

Mr. HOTTEL. I feel we would get the furthest if we do not focus on motor fuel but on the total refinery operation. A refinery can

then allow for the fact, that if one of the synthetic fuels purchased to satisfy the 10 percent quota is something which more easily yields No. 2 fuel oil, the refinery can change the cut point between gasoline and No. 2 fuel oil by doing more reforming and more catalytic cracking.

I can move No. 2 fuel oil into the gasoline range. To legislate against these complex technological solutions to a problem in my opinion is all wrong. If I design legislation that is intended to support the introduction of alcohol or is focused on motor fuel alone, I am ignoring the fact that motor fuel in relation to other uses of petroleum can change over the years. We do not want a frozen system. Legislation should be on the broad principle, not on how you achieve your answer.

Mr. DINGELL. Gentlemen, the Chair with regrets is going to advise that we are just about to be called for the vote. I want to thank you all for your testimony.

The committee stands adjourned.

[The following statement was subsequently received for the record:]

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CLARIFICATION FOR THE RECORD OF THE
HEARINGS ON H.R. 4345 - THE "REPLACEMENT
MOTOR FUEL ACT OF 1979".

This statement is intended to ascertain that my testimony at the hearings, October 10, 1979, should not be viewed as an expression of opposition to the development of such replacement fuels as liquids from coal or shale oil. My position is rather that the only replacement fuel that can be produced for the immediate future is fermentation alcohols. Such a program could produce fuels for the replacement of gasoline at the rate of 1% in 1980, 2% in 1981 ... up to 6% in 1986. The lead time for the construction of coal liquification plants or oil shale retorts is 5-7 years, and thus no fuels could be produced using those methods alone before 1986 anyway; during 1986-1987 one could produce - that is in the medium terms - fuels equivalent to 4% of the need of gasoline.

This position should be interpreted as one that backs the construction of oil shale retorts and coal liquification plants; one plant per each discernible technology - not more than 10 plants in total.

In effect this opinion is in complete agreement with the other witnesses' testimonies in what concerns the estimate of the potential to produce coal liquids. As the witnesses pointed out the technologies for coal liquification cannot produce replacement fuels for the immediate term. The inclusion of my suggested amendments would make it imperative to include fermentation alcohols as the only way to satisfy this requirement. The Departments of Energy and Agriculture have been slow in forthcoming with ideas in this area and therefore I would hesitate to leave the final decision on this subject in the hands of the departments concerned and I would rather see the progression in percentages of replacement fixed by law.

[Whereupon, at 3:55 p.m. the hearing was adjourned.]













