AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

RENEWABLE ENERGY OPPORTUNITIES AND ISSUES ON THE OUTER CONTINENTAL SHELF

JOINT OVERSIGHT HEARING

BEFORE THE

SUBCOMMITTEE ON FISHERIES, WILDLIFE AND OCEANS

JOINT WITH THE

SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

OF THE

COMMITTEE ON NATURAL RESOURCES
U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

Tuesday, April 24, 2007

Serial No. 110-19

Printed for the use of the Committee on Natural Resources

Available via the World Wide Web: http://www.gpoaccess.gov/congress/index.html
or
Committee address: http://resourcescommittee.house.gov

U.S. GOVERNMENT PRINTING OFFICE

34-981 PDF WASHINGTON : 2007

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

COMMITTEE ON NATURAL RESOURCES

NICK J. RAHALL II, West Virginia, *Chairman*
DON YOUNG, Alaska, *Ranking Republican Member*

Dale E. Kildee, Michigan
Eni F.H. Faleomavaega, American Samoa
Neil Abercrombie, Hawaii
Solomon P. Ortiz, Texas
Frank Pallone, Jr., New Jersey
Donna M. Christensen, Virgin Islands
Grace F. Napolitano, California
Rush D. Holt, New Jersey
Raúl M. Grijalva, Arizona
Madeleine Z. Bordallo, Guam
Jim Costa, California
Dan Boren, Oklahoma
John P. Sarbanes, Maryland
George Miller, California
Edward J. Markey, Massachusetts
Peter A. DeFazio, Oregon
Maurice D. Hinchey, New York
Patrick J. Kennedy, Rhode Island
Ron Kind, Wisconsin
Lois Capps, California
Jay Inslee, Washington
Mark Udall, Colorado
Joe Baca, California
Hilda L. Solis, California
Stephanie Herseth Sandlin, South Dakota
Heath Shuler, North Carolina

Jim Saxton, New Jersey
Elton Gallegly, California
John J. Duncan, Jr., Tennessee
Wayne T. Gilchrest, Maryland
Ken Calvert, California
Chris Cannon, Utah
Thomas G. Tancredo, Colorado
Jeff Flake, Arizona
Rick Renzi, Arizona
Stevan Pearce, New Mexico
Henry E. Brown, Jr., South Carolina
Luis G. Fortuño, Puerto Rico
Cathy McMorris Rodgers, Washington
Bobby Jindal, Louisiana
Louie Gohmert, Texas
Tom Cole, Oklahoma
Rob Bishop, Utah
Bill Shuster, Pennsylvania
Dean Heller, Nevada
Bill Sali, Idaho
Doug Lamborn, Colorado

James H. Zoia, *Chief of Staff*
Jeffrey P. Petrich, *Chief Counsel*
Lloyd Jones, *Republican Staff Director*
Lisa Pittman, *Republican Chief Counsel*

SUBCOMMITTEE ON FISHERIES, WILDLIFE AND OCEANS

MADELEINE Z. BORDALLO, Guam, *Chairwoman*
HENRY E. BROWN, JR., South Carolina, *Ranking Republican Member*

Dale E. Kildee, Michigan
Eni F.H. Faleomavaega, American Samoa
Neil Abercrombie, Hawaii
Solomon P. Ortiz, Texas
Frank Pallone, Jr., New Jersey
Patrick J. Kennedy, Rhode Island
Ron Kind, Wisconsin
Lois Capps, California
Nick J. Rahall II, West Virginia, *ex officio*

Jim Saxton, New Jersey
Wayne T. Gilchrest, Maryland
Cathy McMorris Rodgers, Washington
Bobby Jindal, Louisiana
Tom Cole, Oklahoma
Bill Sali, Idaho
Don Young, Alaska, *ex officio*

SUBCOMMITTEE ON ENERGY AND MINERAL RESOURCES

JIM COSTA, California, *Chairman*
STEVAN PEARCE, New Mexico, *Ranking Republican Member*

Eni F.H. Faleomavaega, American Samoa
Solomon P. Ortiz, Texas
Rush D. Holt, New Jersey
Dan Boren, Oklahoma
Maurice D. Hinchey, New York
Patrick J. Kennedy, Rhode Island
Hilda L. Solis, California
Nick J. Rahall II, West Virginia, *ex officio*

Bobby Jindal, Louisiana
Louie Gohmert, Texas
Bill Shuster, Pennsylvania
Dean Heller, Nevada
Bill Sali, Idaho
Don Young, Alaska *ex officio*

CONTENTS

	Page
Hearing held on Tuesday, April 24, 2007	1
Statement of Members:	
Bordallo, Hon. Madeleine Z., a Delegate in Congress from Guam	3
Brown, Hon. Henry E., Jr., a Representative in Congress from the State of South Carolina	4
Costa, Hon. Jim, a Representative in Congress from the State of California	2
Pallone, Hon. Frank, Jr., a Representative in Congress from the State of New Jersey	5
Pearce, Hon. Stevan, a Representative in Congress from the State of New Mexico	3
Statement of Witnesses:	
Bak, Jason, Chief Executive Officer, Finavera Renewables	54
Prepared statement of	56
Response to questions submitted for the record	65
Diers, Ted, Program Manager, New Hampshire Coastal Program, New Hampshire Department of Environmental Services	28
Prepared statement of	29
Response to questions submitted for the record	34
Grader, W.F. "Zeke", Jr., Executive Director, Pacific Coast Federation of Fishermen's Associations	68
Prepared statement of	69
Response to questions submitted for the record	72
Hagerman, George M., Jr., Senior Research Associate, Virginia Tech Advanced Research Institute	81
Prepared statement of	83
Hoagland, Porter, Ph.D., Marine Policy Center, Woods Hole Oceanographic Institution	86
Prepared statement of	88
Keeney, Timothy R.E., Deputy Assistant Secretary for Oceans and Atmosphere, National Oceanic and Atmospheric Administration, U.S. Department of Commerce	23
Prepared statement of	25
Miles, Ann F., Director, Division of Hydropower Licensing, Federal Energy Regulatory Commission	16
Prepared statement of	18
Olsen, Michael D., Deputy Assistant Secretary for Land and Minerals Management, U.S. Department of the Interior	6
Prepared statement of	8
Response to questions submitted for the record	12
O'Neill, Sean, President, Ocean Renewable Energy Coalition	48
Prepared statement of	50
Rader, Douglas N., Ph.D., Principal Scientist for Oceans and Estuaries, Environmental Defense	76
Prepared statement of	77
Additional materials supplied:	
Duff, John, J.D., LL.M., Assistant Professor, University of Massachusetts/Boston, Letter and article submitted for the record	101

OVERSIGHT HEARING ON RENEWABLE ENERGY OPPORTUNITIES AND ISSUES ON THE OUTER CONTINENTAL SHELF

Tuesday, April 24, 2007
U.S. House of Representatives
Subcommittee on Fisheries, Wildlife and Oceans, joint with the Subcommittee on Energy and Mineral Resources
Committee on Natural Resources
Washington, D.C.

The Subcommittees met, pursuant to call, at 3:18 p.m. in Room 1324, Longworth House Office Building, Hon. Jim Costa, [Chairman of the Subcommittee on Energy and Mineral Resources] presiding.

Present: Representatives Costa, Pearce, Brown and McMorris Rodgers, Bordallo, Pallone and Capps.

Mr. COSTA. All right. The Subcommittee on Energy and Mineral Resources will now come to order. This is a joint hearing that we are now holding with the House Subcommittee on Fisheries, Wildlife and Oceans.

We are very pleased that our colleagues from the Subcommittee on Fisheries, Wildlife and Oceans are here this afternoon and that we could be doing this together, Chairwoman Bordallo from the wonderful area of Guam, and certainly we have our other Members from both Subcommittees here.

The efforts that we will look at today are on renewable energy opportunities and the issues surrounding those renewable energy opportunities on the Outer Continental Shelf.

We are looking forward to hearing from our panels and to getting their perspective on the role that renewable energy opportunities may play and the issues that we may have to contend with as it relates to the Outer Continental Shelf.

I want to apologize to the witnesses and those in the audience for our delay. We don't have a schedule for when votes are cast on the House Floor, and unfortunately those votes were called and we had to make them and it just happened to coincide with a fire drill.

I want you all to understand. We had nothing to do with the fire drill. We do have some fires around this area. This isn't one we started. Anyway, as a result of all of that we are delayed about an hour and 15 minutes.

It is the Chair's intention to try to be focused. Customarily what we like to do is have each panel make their presentation. You are

allotted five minutes. We go through the panel, and then we provide opportunities for questions among the Majority and Minority Members of the two Subcommittees.

There will be an opportunity for me and my colleagues to make opening statements—the Subcommittee Chair on Fisheries, Wildlife and Oceans, as well as the Ranking Members on both Subcommittees. With that, we will get started.

STATEMENT OF THE HONORABLE JIM COSTA, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. COSTA. As Sergeant Friday once said, and now I am dating myself, just the facts, ma'am. The Outer Continental Shelf, I think as most of us are aware, consists of submerged lands, subsoil and seabed that are seaward of our coastal lands throughout our coastal areas in the United States.

The Outer Continental Shelf is otherwise referred to as the OCS—but, as some of you know, I don't like using these acronyms. The Outer Continental Shelf begins roughly at three nautical miles from the shore and extends 200 nautical miles or more offshore from the U.S. coast.

The Outer Continental Shelf, as we know, is important for its nonrenewable and renewable energy resources and for its important environmental and social values that involve fisheries, transportation and recreation, but not limited to these.

About a quarter of the oil and gas production in the United States comes from offshore areas. The Minerals Management Service within the Department of Interior manages the energy and mineral resources on the Outer Continental Shelf, approximately some 1.76 billion acres. There are over 8,500 oil and gas leases on 47 million acres, and there are 4,000 production platforms that provide an important needed source of energy.

The Subcommittee on Energy and Minerals and the Subcommittee on Fisheries, Wildlife and Oceans are conducting this hearing because we have shared interests. We have shared interests in renewable energy and how we do that in a way that is efficient, environmentally responsible and how we coordinate the various affected Federal agencies that have a role in that area, have a role as it relates to the issue of greenhouse gases, have a role as it relates to new technologies, as a role in terms of balancing the sources for domestic energy.

The jurisdiction under which these two Subcommittees operate involve Section 388 of the Energy Policy Act of 2005. That Act provided an initiative to facilitate increased renewable production on the Outer Continental Shelf in several different ways that I believe most of you are familiar with.

In addition to that, we will be talking this afternoon about wind, waves and ocean currents, among other potential sources of alternative energy, that may provide additional resources on our Outer Continental Shelf.

There is estimated to be much wind potential. I am not talking about the wind here in Washington, but an estimated 900,000 megawatts on our coasts. Currently there is U.S. electrical capacity that has been cited both by a combination of states as they do the due diligence and research. We also have technology in hand to

capture approximately 10 percent of that potential energy in what we refer to as relatively shallow areas of the coastal plains.

Not only do we have data showing offshore wind projects in Europe that currently provide 600 to 800 megawatts of power, but there are lots of larger scale projects that are proposed in the United States. As we know, none yet have been installed.

Finally, we will have testimony as it relates to the potential technology of ocean and wave current energy technologies. These are still in the prototype developmental stages, but there is belief that they offer tremendous potential.

One estimate suggests that harnessing one-fifth of the annual wave energy off the nation's coast could—could if the technology proves feasible—provide up to maybe 50 percent of our energy. That would be comparable to all the hydropower of the dams in the United States.

A lot of potential, a lot of focus, and that is what these two Subcommittees are attempting to do. I will now yield to my colleague, who is the Chairwoman of the Subcommittee on Fisheries, Wildlife and Oceans, the gentlewoman from Guam, Ms. Bordallo.

STATEMENT OF THE HONORABLE MADELEINE Z. BORDALLO, A DELEGATE IN CONGRESS FROM GUAM

Ms. BORDALLO. Thank you very much, Chairman Costa. It is a pleasure to hold this joint hearing between our committees, the Subcommittee on Fisheries, Wildlife and Oceans and the Subcommittee on Energy and Mineral Resources.

Last week the Subcommittee on Fisheries, Wildlife and Oceans held a hearing on the impacts that climate change is having on our oceans and wildlife. We learned we can expect significant coral loss and more species extinctions unless we make significant changes.

One partial response requires us to use cleaner fuels, including renewable energy technologies, capturing the energy from wind, waves and currents on our oceans. This is truly an exciting new field, especially in this country.

There are no projects operating in Federal waters today. We have the opportunity to ensure that projects are planned appropriately and in a manner that promotes a sustainable use of our oceans.

We also have a difficult challenge. We need to develop a regulatory climate that is workable for the industry. We must also address the impacts renewable energy products can have on marine mammals, endangered species, fisheries and other ocean resources.

So it is my hope today that this hearing will shed light on what the Congress can do to encourage renewable energy projects that address environmental impacts in the exclusive economic zone. I do look forward to hearing the testimony from our many witnesses and appreciate their participation in today's hearing.

Mr. COSTA. Thank you for your statement.

I will now defer to the Ranking Member, the gentleman from New Mexico, Mr. Pearce.

STATEMENT OF THE HONORABLE STEVAN PEARCE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW MEXICO

Mr. PEARCE. Thank you, Mr. Chairman.

In one of our recent Energy Policy Act of 2005 hearings, we learned that increased natural gas prices have cost the American consumer $65 billion more per year for electricity than they paid in 2000.

We also learned that because of higher natural gas prices we lost three million manufacturing jobs—that is 18 percent of our manufacturing jobs—since 2000. These are jobs that have left for China and India, and they are not coming back.

Unfortunately, with our people and businesses starved for more natural gas, less than three percent of our Outer Continental Shelf is being leased for oil and gas production. This is true access denied to energy.

Today's hearing focuses on renewable energy opportunities on the Outer Continental Shelf. I welcome the hearing, and I welcome the opportunity to have renewable and alternative sources of energy play a larger role in our nation's economy as I think our nation's oceans are filled with untapped renewable energy resources.

I hope that the purpose of this hearing is to make sure that access to these renewable energy sources is not also denied as we need a diverse supply of energy to keep our economy strong, keep our people safe and keep our way of life.

Some of the technologies we will hear about today, like tidal energy and wave energy, are in the early stages of development and I suspect years from true large-scale commercialization. In contrast, other technologies like wind energy are known and nearly commercial in other areas of the world.

The mission is for OCS renewable energy projects to become a reality in this country. The Federal government should not and cannot be the hang up. Rather, it should be the facilitator and the assistor.

As lead agency pursuant to the Energy Policy Act of 2005, I expect the Department of Interior to work diligently to lease and regulate these projects in an environmentally sound way. I also expect the Department to work collaboratively and effectively with its sister agency, the Federal Energy Regulatory Commission, to regulate these projects.

The policy objectives of these two agencies is to regulate and oversee energy industries in the economic, environmental and safety interests of the American public. Their mission is to make energy projects happen, and I am looking forward to seeing progress on OCS renewable energy projects.

Again, I look forward to the testimony and discussion. I just ask that all things be put in perspective. Welcome to you all. Thank you very much for being here, and I thank you again, Mr. Chairman.

Mr. COSTA. Thank you very much, Mr. Pearce.

The Ranking Member from the Subcommittee on Fisheries, Wildlife and Oceans is the gentleman from South Carolina, Mr. Brown.

STATEMENT OF THE HONORABLE HENRY E. BROWN, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF SOUTH CAROLINA

Mr. BROWN. Thank you, Mr. Chairman, and good afternoon.

As most of you know, I represent over 75 percent of the coastline of South Carolina. My district includes places such as Myrtle Beach, Charleston, Kiawah Island, and the tourist industry is a major part of my district's economy, as well as a major part of the economy of the State of South Carolina.

A major part of the tourism industry in South Carolina involves the recreational fishing and boating communities. I am very concerned about how underwater turbines, above water windmills and wave technology will affect the recreational fishing in border communities, as well as the commercial fishing industry.

As you can imagine, offshore drilling is a very controversial subject in coastal South Carolina. I would never do anything that I thought would harm the tourism industry or my district or the beauty of coastal Carolina.

With that being said, I am supportive of drilling off the Continental Shelf because I believe that it is the right thing to do. I believe that offshore drilling is an important part of the solution to fix the energy crisis that we are all facing today in America.

It is also an important step to stop America's dependency on foreign sources of energy. Becoming more energy self-sufficient is not only an economic issue, but also an issue of national security. We must examine measures that will wean this country from its dependency on foreign energy and establish a new level of independence by utilizing natural resources that we have here in America.

In the last Congress I was fortunate to attend a Resource Committee field hearing on renewable ocean energy in Congresswoman Thelma Drake's congressional district in Norfolk, Virginia. I was impressed with the potential of ocean wave and tide energy, but I am concerned at the cost and the practicality of using exclusive renewable ocean energy without incorporating natural gas development off the Continental Shelf into an overall national strategy for the future of energy development for our nation.

I strongly believe the research and development of renewable energy is an important tool for our nation's future energy needs. The problem is that currently the United States imports around 62 percent of its energy from foreign and sometimes unfriendly sources.

We must develop an energy plan similar to other nations such as Canada and Norway that utilizes all of their nation's energy resources, including natural gas, as well as renewable sources of energy.

I thank you all for being here today, and I look forward to hearing the testimony.

Mr. COSTA. Thank you very much, Mr. Brown, for your comments. I believe we need to explore all of our options and alternatives. I think that is correct.

Mr. Pallone, the gentleman from New Jersey, has a statement he would like to make. It is good to see you.

STATEMENT OF THE HONORABLE FRANK PALLONE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. PALLONE. Thank you, and I apologize for going out of order, but because of the lateness and I have another meeting I have to

go to, I was just going to ask you if I could take a minute. I thank both of you.

I represent a portion of the New Jersey coastline that is heavily dependent on clean beaches and oceans to support a tourism economy that generates about $31 billion in spending and provides more than 836,000 jobs every year in the state.

Coastal tourism is New Jersey's second largest industry and is closely linked to the state of our marine and coastal environment. This is an environment that could be seriously impacted not only by industrial energy generation facilities of any type, but also by the continued effects of global warming.

Given these effects, I have some concern about the regulatory framework being developed by MMS for nonextractive energy uses of the Outer Continental Shelf and for the lack of a clearly defined scope of use. While it is in everyone's interest to promote clean energy solutions, siting regulations should be as protective as possible of the marine and coastal environment and recognize the potential economic impacts of industrial accidents or other pollution.

In that light I have some questions that—I hope I will be here—I can ask of the panel later, but just in the event I don't have that opportunity, Mr. Chairman and Madam Chairwoman, I appreciate the opportunity to make a statement now. Thank you.

Mr. COSTA. You are welcome, and we will be happy to allow you the opportunity to submit those questions for the record so that you can get responses back to them.

We know about the New Jersey shores, and we appreciate your participation. You are always welcome.

Let us begin now with our panel, our first panel. We have a group of folks that are going to be talking about their perspective.

We will begin first with Mike Olsen. He is the Deputy Assistant Secretary for Land and Minerals Management within the Department. Mr. Olsen, it is good to have you here.

STATEMENT OF THE HONORABLE MICHAEL D. OLSEN, DEPUTY ASSISTANT SECRETARY FOR LAND AND MINERALS MANAGEMENT, U.S. DEPARTMENT OF THE INTERIOR

Mr. OLSEN. Thank you. It is good to be here, Mr. Chairman, Madam Chairwoman, Members of the Subcommittees. Thank you for this opportunity to appear here today to discuss with you the Minerals Management Service's alternative energy and alternative use program.

The Department of the Interior appreciates the leadership that the Committee on Natural Resources has demonstrated in looking to the Federal Outer Continental Shelf as a source of alternative energy and in providing the legislative means to allow the Nation to tap into that energy.

The Administration believes that renewable and other alternative sources are integral components of our nation's energy future. While the quantity of domestic energy produced from renewable resources is small in comparison to conventional resources, the growing cost of conventional energy resources and the need to diversify our energy portfolio has spurred an increased interest and growth in renewable energy development.

The Energy Information Administration estimates that in 2030 renewable energy will account for over 10 percent of our domestic energy production and about 7 percent of our consumption. The Department of the Interior, as the manager of over one-fifth of the nation's land, has a significant role in play in this projected increase in domestic renewable energy production.

The Administration first proposed legislation to establish an OCS alternative energy program in June of 2002, and the legislation was first introduced as H.R. 5156 in July of 2002. The bill represented the results of more than six months of extensive discussions and collaboration with all Federal agencies having permitting responsibilities on the OCS, as well as the President's Task Force on Energy Project Streamlining.

The legislation reflected the best efforts of the Administration to address the array of issues associated with permitting various OCS energy-related projects that were not covered under existing statutes. Those projects included wind, wave, ocean current and solar energy.

After careful analysis of the mechanisms that were currently in place to handle requests for innovative, nontraditional, energy-related projects on the Federal offshore lands, it became clear that with limited exceptions there existed no clear authority within the Federal government to comprehensively review, permit and provide appropriate regulatory oversight for such projects.

Since the proposed legislation pertained to the permitting and oversight of energy uses on offshore Federal lands, it was only logical that any new legislative authority that was enacted remain with the department already entrusted with the overall responsibility.

Section 388 of the Energy Policy Act of 2005 amended the OCS Lands Act and granted the Department the discretionary authority to grant leases, easements or rights-of-way for activities on the OCS that produce or support production, transportation or transmission of energy from sources other than oil and gas.

It is important to note that while the Department is a lead agency for this program, MMS continues to work with the sister agencies to ensure that the unique roles they each have are addressed in order to ensure that the Federal government's myriad interests in such projects are fully considered and that the nation's economic, environmental and land use interests are adequately protected.

MMS is working diligently to develop a regulatory program to authorize offshore alternative energy proposals. The renewal energy and alternative use draft programmatic environmental impact statement developed by MMS is currently open for public comment.

This document is a high level analysis of the potential impacts of the activities that could result in establishment of an OCS alternative energy and alternate use program and regulations under MMS' new authority from initial site characterization through decommissioning.

The EIS will form the foundation for the new alternative energy program and for future applications. The final programmatic EIS is on schedule for publication in late summer of 2007. MMS is also

developing regulations to implement the new EPAct or Environmental Policy Act authority and expects to publish a proposed rule in late summer of 2007 and a final rule in early 2008.

Producing energy from renewable and other alternative domestic resources is a critical component of the nation's energy portfolio. Lands managed by the Department have a major role to play in the diversification of the nation's energy sources. The Department stands ready to respond to the ever increasing need for energy development from the resources we manage on behalf of the nation.

Thank you for the opportunity to highlight a few of the steps MMS has taken to encourage the development of renewable and other alternative energy resources on the OCS public lands.

This concludes my testimony, and I would be happy to answer any of your questions.

[The prepared statement of Mr. Olsen follows:]

Statement of Michael D. Olsen, Deputy Assistant Secretary for Land and Minerals Management, U.S. Department of the Interior

Mr. Chairman and Members of the Subcommittees, thank you for the opportunity to appear here today to discuss with you the Minerals Management Service's (MMS) alternative energy and alternate use program.

The Department of the Interior appreciates the leadership that the Committee on Natural Resources has demonstrated in looking to the Federal Outer Continental Shelf (OCS) as a source of alternative energy and in providing the legislative means to allow the Nation to tap into that energy. The Administration first proposed legislation to establish an OCS alternative energy program in June 2002, and the legislation was first introduced as H.R. 5156 in July 2002. The Administration supported that bill and worked diligently with the Committee and others to bring the proposed legislation to fruition as part of the Energy Policy Act of 2005 (EPAct).

Energy is vital to expanding our economy and enhancing Americans' quality of life. However, the Administration continues to be concerned with the imbalance that exists between our energy consumption and domestic energy production, and has been working to find ways to narrow the gap between the amount of energy used and the amount domestically produced. In his State of the Union Message on January 23, 2007, President Bush asked Congress and America's scientists, farmers, industry leaders, and entrepreneurs to join him in pursuing the goal of reducing U.S. gasoline usage by 20 percent in the next ten years—Twenty in Ten. One key component of the strategy to meet this goal is to increase the supply of renewable and alternative fuels. There is no single solution, but the Administration believes that renewable and other alternative sources are integral components of our Nation's energy future.

While the quantity of domestic energy produced from renewable resources is small in comparison to conventional resources, the growing cost of conventional energy resources and the need to diversify our Nation's energy portfolio has spurred an increased interest and growth in renewable energy development. The Energy Information Administration's (EIA) 2007 Annual Energy Outlook estimates that consumption of renewable fuels will grow from 6.5 quadrillion BTUs in 2005 to 10.2 quadrillion BTUs in 2030. This growth will be a result of advancements in renewable energy technologies, higher fossil fuel prices, state requirements to produce renewable energy, and incentives provided under EPAct. This is an increase of about 1 quadrillion BTUs more than EIA estimated in its 2005 Annual Energy Outlook. The EIA estimates that in 2030, renewable energy will account for over ten percent of our domestic energy production and about seven percent of our consumption.

The EPAct encourages the development of renewable energy resources as part of an overall strategy to develop a diverse portfolio of domestic energy supplies for our future. In fact, according to EIA's 2007 Annual Energy Outlook, public and private wind and other renewable energy generating sectors of our economy are the fastest growing energy sources in the United States.

The quantity of domestic renewable energy produced on Federal lands is small in comparison to conventional resources. However, the growing cost of conventional energy resources and the need to diversify our energy portfolio has spurred an increased interest in renewable energy development on federal lands both onshore and offshore.

The Department of the Interior (Department), as the manager of over one fifth of the Nation's land, has a significant role to play in this projected increase in domestic renewable energy production. Lands managed by the Bureau of Land Management (BLM) currently supply almost half of the nation's geothermal generation and approximately 4 percent of domestically installed wind capacity. EPAct gave the Department's bureaus, specifically the Minerals Management Service (MMS), the BLM, and the United States Geological Survey (USGS), new authorities for encouraging and facilitating the development of promising new energy sources such as onshore and offshore wind, solar, and biomass energy and to assist in ensuring these technologies are developed in an environmentally responsible manner.

Today, you have requested that I discuss with you the MMS's OCS Alternative Energy Program. The Administration first proposed legislation to establish an OCS alternative energy program in June 2002, and the legislation was first introduced as H.R. 5156 in July 2002. That bill represented the results of more than six months of extensive discussions and collaboration with all Federal agencies having permitting responsibilities on the OCS, as well as the President's Task Force on Energy Project Streamlining. More important, the legislation was developed in a consensus with MMS' sister agencies and reflected the best efforts of the Administration to address the array of issues associated with permitting various OCS energy-related projects that were not currently covered under existing statutes. Those projects included renewable energy projects such as wind, wave, ocean current and solar energy.

After careful analysis of the mechanisms that were currently in place to handle requests for innovative, non-traditional energy-related projects on the Federal offshore lands, it became clear that—with limited exceptions—there existed no clear authority within the Federal government to comprehensively review, permit, and provide appropriate regulatory oversight for such projects. The exceptions to this general rule included oil, gas and other mineral activities permitted under the OCS Lands Act (43 U.S.C. 1301 et seq., Department of the Interior); offshore oil terminals permitted under the Deep Water Ports Act (33 U.S.C. 1501 et seq., Department of Transportation); and projects permitted under the Ocean Thermal Energy Conversion Act (42 U.S.C. 9101 et seq., Department of Commerce).

This meant that the vast majority of OCS alternate energy-related projects that were being, or which may be contemplated in the future, by the private sector had no clearly defined permitting process. There was no single agency with an overarching role to coordinate that process. Instead, various Federal agencies with different responsibilities were responsible for permitting a specific part of a proposed project. As the Federal Government's "land manager" and since the proposed legislation pertained to the permitting and oversight of energy uses on offshore Federal lands, it was only logical that any new legislative authority that was enacted remain with the Department already entrusted with that overall responsibility.

Congress recognized that management of alternative energy and alternate use activities would require comprehensive authority to permit access in a fair and equitable manner, to ensure environmental and operational compliance, and to achieve a fair return to the Nation. The Administration worked closely with the Committee to include the Administration's legislative proposal as part of the Energy Policy Act of 2005 (EPAct).

Section 388 of the EPAct amended the OCS Lands Act, and granted the Department discretionary authority to grant leases, easements or rights-of-way for activities on the OCS that produce or support production, transportation, or transmission of energy from sources other than oil and gas. Simply put, the new authorities under EPAct gave the Department the ability to explore the future development of promising new ocean energy sources in the OCS such as wind, wave, ocean current, and solar energy. Additionally, the Department was given the authority to grant leases, easements, or rights-of-way for other OCS activities that make alternate use of existing OCS facilities. These other uses would be limited to energy-related and authorized marine-related purposes, such as offshore research, recreation and support for offshore operations to the extent that those activities are not authorized by other applicable law.

It is important to note that while the Department is the lead agency for this program, the MMS continues to work with its sister agencies to ensure that the unique roles they each have is considered and addressed in order to ensure that the Federal Government's myriad interests in such projects are fully considered and that the Nation's economic, environmental and land use interests are adequately protected. The Department's new EPAct jurisdiction does not supersede or modify existing Federal authority; all activities permitted must adhere to existing Federal law, including the National Environmental Policy, Coastal Zone Management, Endangered

Species, Marine Mammal Protection, Magnuson-Stevens Fishery Conservation and Management, and the Migratory Bird Treaty Acts.

The MMS is working diligently to develop a regulatory program to authorize offshore alternative energy proposals, such as wind, solar, wave, and ocean current technologies. The renewable energy and alternate use draft programmatic environmental impact study (EIS), developed by the MMS, is currently open for public comment. The EIS will form the foundation for the new alternative energy program and for future applications. The MMS is developing regulations to implement the new EPAct authority and expects to publish a proposed rule in late summer of 2007 and a final rule in early 2008.

Interest in OCS-based alternative energy development in the United States is growing, particularly in the Northeast and along the West Coast. Many of these coastal states have put in place renewable energy portfolio standards (RPS) requiring utilities to substantially increase their reliance on renewable energy sources. For example, in the Northeast, New York has set a goal for public utilities to achieve a 25% share by 2013, one of the most aggressive targets in the country. In the Pacific West, Oregon has instituted a plan that calls for renewable energy to account for a 25% share, approximately 1,600 megawatts (MW) by 2025, while California has codified a renewable energy target of 20%, approximately 5,500 MW, by 2010. To put this into perspective, according to the Edison Electric Institute, based on 2005 average annual usage by U.S. residential customers, one megawatt of electricity powered roughly 790 homes. The OCS can provide clean sources of energy and has a role in helping states and the Federal Government meet their renewable energy targets.

Government resource estimates and industry interest indicate that the OCS provides several significant sources of alternative energy. According to estimates provided to the MMS by the Department of Energy (DOE), the potential offshore wind resource, excluding Alaska and Hawaii, is 2,500 gigawatts (GW), ocean waves 240 GW, ocean tides 7.5 GW, and ocean currents 2.5 GW. Since the enactment of EPAct, the MMS has spoken to several companies and become aware of dozens of potential development proposals involving offshore wind off the east coast from Virginia, north to Massachusetts.

The strongest wave energy resources are located on the West Coast, where there is already substantial interest in wave energy development, particularly offshore Northern California and Oregon. Currently, the MMS is working with the Federal Energy Regulatory Commission (FERC) on a Memorandum of Understanding (MOU) to coordinate Federal efforts in reviewing and authorizing these exciting new proposals. The goal of this MOU will be to provide an efficient and effective process for reviewing and overseeing wave and current energy proposals in the OCS.

Alternative Energy and Alternate Use on the Outer Continental Shelf

The Department and MMS decided that to facilitate the orderly development of the new programmatic responsibilities and associated rulemaking, we would not entertain for review any new applications relating to alternative energy or alternate use on the OCS until the program is in place.

As the first step in the rulemaking and program development process, the MMS on December 30, 2005, published an Advance Notice of Proposed Rulemaking (ANPR) to solicit comments from all interested and affected parties. The ANPR sought comments on five major program areas: (1) access to OCS lands and resources; (2) environmental information, management, and compliance; (3) operations; (4) payments and revenues; and (5) coordination and consultation. We received a total of 149 comments originating from 26 states and the District of Columbia. These comments were submitted by private citizens, alternative energy industries and associations, environmental organizations, State and local governments, Federal agencies, nongovernmental organizations, universities, Members of Congress, small business, and the oil and gas industry. In general, the ANPR comments were supportive of renewable/alternative energy developments on the OCS and reuse of existing OCS facilities. Some comments received advised the MMS to proceed with caution as it develops the program and supporting regulations and advocated early stakeholder involvement with both the program and the individual project permitting. Many commenters who were familiar with the MMS OCS oil and gas program suggested that MMS use the offshore program as a model for consultation and environmental compliance. The renewable energy industry and environmental groups suggested that MMS establish a structured, rigid process, citing the need for predictability and for compliance and timeliness in reviews. Others, noting the up-and-coming nature of the renewables industry, advocated that MMS remain flexible in our program approach and address each project on a case-by-case basis.

A majority of comments identified preparation of a programmatic environmental impact statement as a first step.

Currently, the MMS is preparing rules to guide the development of the program activities. At the same time, MMS is accepting comments on a draft programmatic EIS to examine the potential environmental consequences of implementing the program. However, the innovative and evolving nature of the offshore renewable technologies; the nascent industry; the need to acquire environmental and economic baseline information; and, the location of the promising resources in OCS frontier areas have all presented challenges to the program's regulatory development.

Despite these challenges, the MMS is proceeding in a deliberate and diligent manner in developing this important new regulatory program. The Agency has been working with many of the same agencies involved in activities already authorized under the OCS Lands Act, such as the Army Corps of Engineers, the National Oceanic and Atmospheric Administration, the Environmental Protection Agency, the U.S. Coast Guard, and the Fish and Wildlife Service, to establish new "renewable energy" interfaces with each agency's existing Federal statutory requirements and responsibilities. The MMS has also begun to forge new partnerships with the DOE and FERC and we are actively working on agreements with each agency.

On March 21, 2007, the MMS announced the availability of the draft programmatic EIS and the opportunity for public comment. This document is a high level analysis of the potential impacts of the activities that could result from establishment of an OCS alternative energy and alternate use program and regulations under MMS' new authority, from initial site characterization through decommissioning. The analysis looks at three alternatives: (1) establishment of a nationwide OCS program and regulations (the proposed action); (2) case-by-case authorization of activities; and (3) no authorization of activities authorized under section 388. The programmatic EIS does not evaluate specific sites on the OCS as to their suitability for alternative energy activities. Thus, MMS will analyze siting issues as it considers specific project proposals. Written comments on the draft programmatic EIS will be accepted through May 21, 2007 and MMS will hold public hearings on the document in April and May of 2007. The final programmatic EIS is on schedule for publication in late summer 2007.

Currently the proposed rule is undergoing internal Departmental review in accordance with Departmental and the Office of Management and Budget guidelines. Major components of the alternative energy portion of the rule include, but are not limited to what rights will be associated with leases, rights-of-way, rights-of-use and easements; financial terms such as financial assurance (bonding); rentals before production begins and operating fees when production commences; process for site assessment, construction and operation plans; environmental and safety management, inspections and facility assessments; and, end of life decommissioning.

The EPAct requires the Department to grant a lease, easement, or right-of-way on a competitive basis unless, after public notice, it is determined that there is no competitive interest. If there is no competitive interest, many of these initial applications may be issued noncompetitively, requiring the applicant to bear the cost of proposal-specific studies. However, based on the state-initiated renewable energy portfolio standards and interest from industry, it is expected that MMS will offer a competitive lease sale in the next 3 to 5 years most likely in the North Atlantic or the North Pacific.

MMS recently conducted a series of regional stakeholder meetings in several coastal states to assist in preparing the new rule. The purpose of these meetings was to identify and explore stakeholder issues and concerns; to discuss the various ocean energy technologies and economics; and, to identify state energy profiles and renewable energy portfolio standards.

Several coastal states (i.e., New Jersey, California, Washington, and Oregon) have approached MMS about partnering to efficiently evaluate and offer prospective OCS areas for lease on a regional basis. The U.S. Commission on Ocean Policy, the Pew Oceans Commission, and the Joint Ocean Commission Initiative, made similar recommendations concerning federal-state partnering to improve ocean governance in general. To promote such cooperation and coordination, the MMS proposes to establish federal/state task forces—a concept that has been used successfully in MMS's Marine Minerals Program—and to begin assessing potential development and environmental implications.

Cape Wind and Long Island Offshore Wind Projects

The EPAct also gave the Department and MMS responsibility for two existing offshore alternative energy proposals, the Cape Wind Energy and the Long Island Offshore Wind Park projects. The MMS is reviewing each proposal and supporting information, and is preparing project-specific environmental analyses.

Cape Wind Associates has proposed to construct an offshore wind facility located on Horseshoe Shoal in Nantucket Sound covering 24 square miles in federal waters and located 4.7 miles offshore Massachusetts. The proposal entails 130 offshore wind turbine generators to produce about 460 MW of electricity. The MMS anticipates publishing the draft EIS in late summer 2007. Because offshore wind is a new resource and technology for the Nation and Cape Wind is one of the first OCS alternative energy projects under review by MMS, the agency is proceeding with the review of the proposal and associated EIS in an appropriately deliberate and diligent manner.

The Long Island Power Authority and Florida Power and Light Energy have proposed an offshore wind project covering eight square miles in Federal waters, located between three and four miles off the south shore of Long Island, New York. The proposed wind project would entail installation of 40 offshore wind turbine generators with a capacity of 140 MW of electricity for use in Long Island communities. The timeline for the project is being revised and should be available in the near future.

Conclusion

In conclusion, energy is vital to expanding our economy and enhancing Americans' quality of life. Producing energy from renewable and other alternative domestic resources is a critical component of the Nation's energy portfolio. Lands managed by the Department have a major role to play in the diversification of the Nation's energy sources. The Department has been working with other agencies and has taken steps in a variety of scientific endeavors to understand renewable and other alternative energy resources and to help bring them to a place where they may contribute to the energy mix of the country in an environmentally friendly way. The MMS has been working on a variety of fronts, both onshore and offshore, to meet the demand for renewable and other alternative sources of energy. We stand ready to respond to the ever-increasing need for energy development from the resources we manage on behalf of the Nation.

Thank you for the opportunity to highlight a few of the steps MMS has taken to encourage the development of renewable and other alternative energy resources on the OCS public lands. This concludes my testimony. I would be happy to answer any questions you have.

Response to questions submitted for the record by Mike Olsen, Minerals Management Service, DOI

Questions from Chairwoman Bordallo (Subcommittee on Fisheries, Wildlife and Oceans):

NOAA's Role. What role, if any, do you envision the National Oceanic and Atmospheric Administration (NOAA) will play with respect to renewable energy projects on the Outer Continental Shelf? For example, do you expect NOAA to be the lead agency responsible for coordinating and preparing the documentation for the environmental impact analysis required by the National Environmental Policy Act (NEPA) prior to permitting individual renewable energy projects?

Answer: The Department of the Interior, and by delegation the Minerals Management Service (MMS), is the lead agency for alternative energy projects on the Outer Continental Shelf (OCS) and will therefore coordinate the National Environmental Policy Act (NEPA) analysis work. Many agencies, including NOAA, have unique roles that must be considered and addressed to ensure that the Federal Government's myriad interests in such projects are fully considered and that the Nation's economic, environmental and land use interests are adequately protected. These agencies have been, and will continue to have the opportunity to be engaged as cooperating agencies under the NEPA in the development of any proposal to produce alternative energy from the OCS. NOAA will continue to implement other required review processes such as the Federal consistency reviews under the Coastal Zone Management Act (CZMA) essential fish habitat consultations under the Magnuson-Stevens Fishery Conservation and Management Act, fish passage needs under the Federal Power Act, endangered species consultations under the Endangered Species Act (ESA) and consultations under the National Marine Sanctuaries Act.

Sensitive Marine Habitats. There are currently 14 National Marine Sanctuaries and one National Marine Monument which cover over 200,000 sq. nautical miles of the U.S. Exclusive Economic Zone (EEZ). Does the MMS intend to prohibit the development of alternative energy projects in these nationally-significant marine environments? What about other Federal, State or local marine protected areas set aside in the EEZ or State waters to protect important natural and cultural submerged resources?

Answer: The MMS has no authority to allow any alternative energy development in these specially-designated areas. Authorities granted by Section 388 of the Energy Policy Act of 2005 EPAct do not apply to any area within the exterior boundaries of a National Park, National Wildlife Refuge, National Marine Sanctuary, or National Monument. Nor does the MMS have authority over state waters.

In areas where alternative energy projects may be permitted, MMS will conduct a NEPA review of each proposed alternative energy project under its jurisdiction in coordination with other Federal, state, and local agencies and the public. The review will include an assessment of alternative locations for the proposed action and will identify appropriate mitigation measures to protect sensitive marine habitats.

State Role. The Coastal Zone Management Act (CZMA) recognizes the authority and primacy of the States with regard to activities in coastal areas. Mr. Diers recommended that the Federal permit for a project include approval from the affected state. What is your reaction to his recommendation? How will you coordinate the States' interests during the project approval process?

Answer: The Administration does not believe there is a need for changes to the CZMA review process for alternative energy projects on the OCS. Any EPAct section 388-authorized activity will comply with the Federal consistency provisions of the CZMA. As provided by the CZMA, coastal states can review alternative energy project plans and permits for consistency with its coastal management plan's enforceable policies. Over the years, the MMS has established a close working relationship with many of the coastal state governments. To develop working partnerships with coastal states such as New York, Oregon, Washington, Massachusetts, and New Jersey, the MMS hosted a series of stakeholders meetings to further its understanding about each locality's unique alternative energy issues, needs and concerns. In addition, we envision convening Federal/State task forces, which have been successfully used in the marine mineral program (i.e. the sand and gravel program), to assist in any phase of the OCS Alternative Energy Program from preliminary studies and lease sale formulation through site assessment and construction to decommissioning.

National Academy study requirement Section of 1833 of the Energy Policy Act of 2005 required MMS, within 90 days, to contract with the National Academy of Sciences (NAS) to conduct a study of the alternative energy potential in the outer continental shelf; assess federal laws—including environmental laws—that would relate to the development of those resources; and to recommend statutory and regulatory mechanisms for developing those resources.

What is the status of that study and recommendations by NAS? If it was never started, please explain why not?

Answer: The study called for in Section 1833 of EPAct was unfunded by the legislation. The study was to look at renewable energy issues on Federal lands both onshore and offshore. Following several informal staff-to-staff discussions, the NAS submitted a proposal to the Department at an estimated cost of $875,000. The study would have required 20 months of work through the formation of a 16-member committee. The committee would have been comprised of a mix of public and private sector expertise in renewable energy technologies. However, the Department suggested to NAS that a regulatory review of other agencies with offshore jurisdiction, and possible overlap of jurisdiction or conflicts, would be useful. NAS declined due to what it considered to be too modest a scope for an NAS study.

Given current budget constraints, prioritization of needs, and a review of the information already available in Bureau of Land Management and MMS, the NAS study proposal would have been duplicative and provided little, if any, new information.

Mapping. The MMS has been mapping the oceans for years. But this mapping has focused on mineral and fuel extraction products. Do you plan to develop maps showing good wind sites, or other attributes applicable to the renewable energy industry? Does the MMS have the capability to do this work?

Answer: The MMS is leading an interagency cooperative effort with NOAA, Fish and Wildlife Service, Federal Communications Commission, National Park Service and, to the extent possible, Department of Defense and Department of Homeland Security to develop the Multipurpose Marine Cadastre (MMC). The MMC is a digital mapping viewer which utilizes geographic information systems (GIS) technology to display the location and pertinent data related to uses and physical attributes of the OCS (e.g., navigation and shipping lanes, whale migration routes, essential fish habitat, oil and gas platforms, pipelines, sand borrow sites, trans-Atlantic communication cables, topographic features, hazardous waste sites, weather buoys, bathymetry/water depth).

While the MMS does not contemplate classifying offshore areas based on alternative/renewable energy attributes, given the broad spectrum of potential activities, the MMC will provide a single location where managers (without GIS training or software) can go to view all existing activities and infrastructure features needed for decision making in any U.S. OCS area. The digital mapping viewer is expected to be available online in FY 08 pending availability of resources. The MMS plans to incorporate additional data layers from other Federal and state agencies and private parties that meet Federal Geographic Data Committee (FGDC) metadata standards as they become available. For example, there are individual private and joint private/public ventures underway, such as those underway at the Department of Energy, to gather OCS wind and wave data. MMS will work to incorporate that information into the Multipurpose Marine Cadastre. MMS has meteorologists and physical oceanographers on staff who can interpret that data to understand its applicability to energy development. Additionally where there is interest, MMS is partnering with coastal states such as California, Oregon, Washington, and New Jersey to work together to understand the environmental implications of and to assess the potential for renewable energy resource technology testing and development to meet the needs of those states.

Migratory Birds. How are we going to make sure that the Migratory Bird Treaty Act is enforced and that migratory birds are not incidentally caught in offshore wind farms? What role will the U.S. Fish and Wildlife Service (FWS) have in the permitting of offshore wind energy facilities?

Answer: The MMS's authorities under EPAct 2005 do not supersede the statutory responsibilities of any Federal agency, including those of the U.S. Fish and Wildlife Service (FWS). All OCS alternative energy proposals must comply with relevant Federal statutes including the Migratory Bird Act and the Endangered Species Act. Currently, the FWS is a cooperating agency on the Cape Wind Energy and the Long Island Offshore Wind Park proposals providing MMS with expertise on avian issues involving both protected and migratory species and helping us to identify potential mitigation measures. The MMS will continue to work cooperatively with FWS on migratory bird issues to minimize risks to populations.

Birds. Many species of pelagic birds depend on isolated, unpopulated rock outcroppings and small islands, such as along the coast of Maine, for rookeries vital to their successful reproduction. Does the MMS intend to prohibit the development of alternative energy projects at areas where migratory birds congregate or seasonally utilize these habitats?

Answer: The siting of alternative energy projects is a key factor in providing mitigation and protection to avian resources. An assessment of environmental impacts associated with an OCS alternative energy proposal would be a critical element in understanding potential effects to birds and in MMS decision-making. The assessment would describe how the area surrounding the proposed site is used by resident and migratory birds, would evaluate whether the birds' movement patterns would put their populations at risk, and identify stipulations or conditions to minimize any potential adverse impact.

Questions from Chairman Costa

Please describe how you are ensuring that adequate planning occurs to accomplish the goals of increasing our supply of off-shore renewable energy while also avoiding sensitive areas or other permitting challenges, such as those facing the Cape Wind Energy project.

Are you proactively identifying off-shore areas that may present thorny environmental or social issues for renewable project siting (or areas where conflicting interests are minimal)?

Answer: As part of the development of a new program for OCS alternative energy, the MMS is preparing a programmatic Environmental Impact Statement (EIS). The programmatic EIS generally identifies the potentially affected environmental resources on the OCS and describes generic impacts that could result from each of the alternative energy technologies (e.g., wind, wave, ocean current). MMS will continue to work on these issues on a regional basis as we move forward with the new program.

The goal of the OCS Mapping Initiative (also referred to as the Multipurpose Marine Cadastre) is the identification of OCS locations of Federally-permitted activities; obstructions to navigation; submerged cultural resources; undersea cables; offshore aquaculture projects; and any area designated for the purpose of safety, national security, environmental protection, or conservation and management of living marine resources. The Multipurpose Marine Cadastre web viewer, which is currently under development, will provide the user the ability to view the official data provided by the agency of responsibility associated with the themes to assist in decision making related to alternative energy uses on the OCS.

How are you assessing and integrating information about the on-shore infrastructure necessary to transport energy with any analysis of potential areas or projects for renewable generation on the OCS?

Answer: The MMS will assess onshore infrastructure information on a regional and/or a project-specific basis as we move forward with the new program.

Your written testimony mentions that MMS might establish federal/state task forces to promote coordination and cooperation. When might these task forces be up and running, and how would you describe their specific goals? Will they help with improved planning?

Answer: Over the years, the MMS has established a close working relationship with many of the coastal states governments. To develop working partnerships with coastal states like New York, Oregon, Washington, Massachusetts, and New Jersey, the MMS hosted a series of stakeholder meetings to further its understanding about each locality's unique alternative energy issues, needs and concerns. In addition, we envision convening Federal/State task forces, which have been successfully used in the marine mineral program (sand), to assist in any phase of the OCS Alternative Energy Program from preliminary studies and lease sale formulation through site assessment and construction to decommissioning. As an example, the MMS has recently supported participation in a joint Federal - Tri-State Task Force with California, Oregon, and Washington to address regional ocean planning issues related to the OCS Alternative Energy program on the West Coast. This task force should be up and running this fall.

The MMS was directed to prepare a marine cadastre—an integrated submerged lands mapping analysis—-as a requirement under the Energy Policy Act of 2005. What is the status of this initiative? When might the results be available to inform renewable energy development and related issues on the OCS?

Answer: To accomplish the directives of EPAct, the MMS and NOAA are taking the lead to create an online interactive map that will utilize web map services from Agencies of Responsibility (AOR's) for the various offshore features to be mapped. These agencies will include MMS, National Oceanic and Atmospheric Administration (NOAA), Department of Defense (DOD), National Park Service (NPS), Federal Communications Commission (FCC), Department of Homeland Security (DHS), and others. This service will provide a single location where managers (without GIS training or software) can go to view all existing activities and infrastructure features needed for decision making in any U.S. OCS area.

The Marine Boundary Working Group (MBWG), a subcommittee of the Federal Geographic Data Committee, co-chaired by MMS and NOAA, is developing and implementing the Multipurpose Marine Cadastre (MMC). A subset of the MBWG has agreed to take the next steps in defining the Web interface and Internet mapping

component of the multi-purpose marine cadastre. As part of the FY 07 work plan, the MBWG is in the process of:

1. Developing a comprehensive list of marine boundary data, restrictions and encumbrances, agencies of responsibility, and associated legislation and regulations.
2. Making data and information accessible through the Web and the E-Gov Geospatial One-Stop Portal.
3. Coordinating with the Marine Protected Areas (MPA) Initiative to ensure that marine boundary source data are accessible through their inventory.
4. Developing minimum requirements for accessible data.
5. Developing and implementing a project plan for the digital mapping component of the multipurpose marine cadastre initiative.

Presently, a prototype web site has been developed at NOAA Coastal Services Center. This website is a concept evaluation, using a limited set of data layers from participating partners. During the next few months, we will be testing and evaluating the website, as well as soliciting input from agencies that could potentially participate, which will be vital to building the project. In the future, we envision a more robust version of the viewer, with GIS analysis tools. We also will include more data download options, such as exporting KML files for Google Earth viewing. Permanent hosting, as well as staffing, will need to be identified. More partners will be encouraged to participate as the project grows.

Please describe the needs you envision in terms of new staff, technical expertise, and internal systems to support the permitting and review process for off-shore renewable energy development in the next two-three years.

Answer: The MMS is comprised of multi-disciplined staffs of marine and coastal scientists, geologists, geophysicists, engineers, economists, social scientists, and inspectors who conduct environmental and engineering evaluations of hundreds of offshore oil and gas activity plans. The agency's expertise and experience gained in managing such complex marine-based energy operations will serve the Nation well in managing and regulating alternative energy opportunities on the OCS. Depending upon industry's level of interest in acquiring OCS lands for renewable energy development and coastal states' interest in partnering with us, MMS may require additional funding in the future to augment its staff and studies program. If appropriate, MMS will include any such additional resources in its future budget requests to Congress.

Mr. COSTA. Thank you very much, Mr. Olsen. You were actually ahead of time by 19 seconds. You will get a good mark.

Mr. OLSEN. Thank you very much.

Mr. COSTA. Yes. Well, we want to encourage people to do the right thing.

Our next witness is Ann F. Miles, who is the Director of the Division of Hydropower Licensing for the Office of Energy Projects for the Federal Energy Regulatory Commission, otherwise known as FERC, but I like the Federal Energy Regulatory Commission.

Ms. Miles, would you please open?

STATEMENT OF ANN F. MILES, DIRECTOR, DIVISION OF HYDROPOWER LICENSING, OFFICE OF ENERGY PROJECTS, FEDERAL ENERGY REGULATORY COMMISSION

Ms. MILES. Thank you, Mr. Chairman, Madam Chairwoman and Members of the committee. I hope I can meet Mike Olsen's——

Mr. COSTA. We hope you can too.

Ms. MILES. I appreciate the opportunity to appear before you today to discuss ocean energy on the Outer Continental Shelf. Before addressing your questions, I would like to make some introductory comments.

First, we expect at least initially the majority of the new technology projects will be located in state waters rather than on the OCS. Of the 23 preliminary permit applications for ocean energy

projects that are pending at the Commission, only four would be located on the OCS.

This distribution of proposals reflects the fact that the cumulative cost of development, including the cost of the transmission cable needed to bring power on shore, make it advantageous to locate projects nearer to shore.

For those projects located wholly or partially on the OCS, the Commission will actively work with the Minerals Management Service, which has the responsibility to issue leases for these projects.

Second, the Commission has seen a surge in applications for preliminary permits for these ocean technologies. Preliminary permits give application priority to permittees while they study the technological, economic and environmental feasibility of a project. They do not give any authority to construct any facilities.

Before 2004, the Commission had received no preliminary permits for ocean energy projects. In 2004 and 2005, the Commission received 11 permits and in 2006 over 40. Since 2005, the Commission has issued 32 permits, 21 for tidal projects, eight for ocean current projects and three for wave projects.

The Commission has received one license application for an ocean energy project. It is for the one megawatt Makah Bay wave energy project proposed to be located off Washington state.

Besides responding to filed applications, the Commission has also been proactive in addressing issues related to processing ocean energy projects. In July 2005, the Commission issued an order that allowed the Verdant Project to install a six turbine demonstration project in the East River without holding a FERC license.

In December 2006, the Commission hosted a technical conference to discuss the status of ocean technologies and to explore the environmental, financial and regulatory issues pertaining to their development. The Commission has adapted its approach to handling preliminary permits in response to comments from conference participants.

Now let me turn to your questions. You first asked what Congress should do to clarify the Federal government's role, particularly the authority of the MMS and FERC. I do not believe that clarification of the government's role is necessary. The Commission is committed to achieving a fair and predictable regulatory program that allows orderly development of hydropower projects to be located on the OCS while considering existing uses and resources.

In fact, we are already working cooperatively on a memorandum of understanding with MMS and have offered creative ideas on how to weave the MMS and FERC processes together for the benefit of applicants, stakeholders and the two agencies.

The Commission's licensing process is transparent. It provides a timely review of projects and affords applicants, agencies, Native American tribes, nongovernmental organizations and members of the public numerous opportunities to participate and represent their interests. Both we and MMS have experience and expertise to offer in an ocean energy program that will undoubtedly cover both state waters and the OCS.

Your second question was what role, if any, should the National Oceanic and Atmospheric Administration play in reviewing renew-

able energy proposals on the OCS. The National Marine Fisheries Service with NOAA is one of the Federal agencies that has been actively involved in the Commission's licensing process for conventional hydropower projects, and we expect they would be similarly involved in the ocean.

They bring considerable expertise and experience to review of ocean energy projects and have a strong role to play in the protection of ocean resources, including their authorities under the Endangered Species Act, Marine Mammal Protection Act, Magnuson-Stevens Fisheries Act and the administration of the Coastal Zone Management Program.

Your third question was what role, if any, should the states have in planning for renewable energy projects, and how could the Federal government improve that role. The state and Federal agencies play a central role in the Commission's existing hydropower licensing process. This role will continue to be essential as we address ocean projects.

The Commission has several licensing processes, including our most recent integrated licensing process, which requires involvement of Commission staff in discussions with all stakeholders to projects. The process was developed collaboratively with all hydro licensing stakeholders, including state and Federal agencies, and includes the opportunity for consulting with agencies to determine the studies needed for an environmental analysis of the proposed project.

The Commission's licensing process and supporting analysis incorporates other statutes in which Congress has given important authority to states such as the Coastal Zone Management Act and National Historic Preservation Act.

Your last question was how should the Congress address environmental impacts associated with renewable energy projects on the OCS. The existing laws, including the National Environmental Policy Act and the Commission's regulations, provide ample opportunity to address environmental effects, and the Commission staff has many years of experience doing so. I believe this is a good foundation to adequately address the environmental effects.

In summary, we are committed to working with the MMS to develop a program for the OCS that makes the best and most efficient use of our respective resources and provides a thorough analysis of environmental impacts, and we will continue to cooperate and consult with Federal agencies and individual states in licensing ocean projects.

This concludes my remarks, and I would be pleased to answer questions.

[The prepared statement of Ms. Miles follows:]

Statement of Ann F. Miles, Director, Division of Hydropower Licensing, Federal Energy Regulatory Commission

Madame Chairwoman, Mr. Chairman, and Members of the Committee:

INTRODUCTION

My name is Ann Miles and I am the Director of the Division of Hydropower Licensing, Office of Energy Projects at the Federal Energy Regulatory Commission (Commission). I appreciate the opportunity to appear before you to discuss the Commission's growing involvement with hydropower using new technologies and to respond to your questions. I use the term "new technologies" to mean mechanisms to

produce hydropower from ocean currents, tides, and wave action, without the use of a dam. Today I will speak mainly about energy derived from waves in the ocean, as your focus is the Outer Continental Shelf (OCS), but I will also include some of our experience with ocean currents and tidal rivers projects, as applications before the Commission cover these areas. As a member of the Commission's staff, the views I express in this testimony are my own, and not those of the Commission or of any individual Commissioner.

Before I present the Commission's regulatory program for new technology projects in general, I want to make several specific points regarding how these projects may affect the OCS. First, we expect that the majority of new technology projects will not be located on the OCS, but in State waters. Of the 23 preliminary permit applications currently pending at the Commission and proposing projects to be located in the ocean, only four would be located on the OCS. This distribution of proposals reflects the fact that the cumulative costs of development which include the costs associated with purchasing and installing transmission cable needed to bring project power onshore, make it advantageous to locate projects nearer to the shore. Second, for those projects located wholly or partially on the OCS, the Commission will actively work with the Minerals Management Service of the U.S. Department of the Interior (MMS) which has the responsibility to issue leases for these projects. Third, we are already working cooperatively on a Memorandum of Agreement with MMS and have offered creative ideas on how to weave the MMS and FERC processes together for the benefit of applicants, other stakeholders, and the two agencies. I will discuss our interactions with MMS in more detail, later in my testimony. Now I will turn to the Commission's regulatory program for new technology projects.

The Commission regulates over 1,600 hydroelectric projects at over 2,000 dams pursuant to Part I of the Federal Power Act (FPA). Together, these projects represent 57 gigawatts of hydroelectric capacity, more than half of all the hydropower in the United States, and over five percent of all electric generating capacity in the United States. Hydropower is an essential part of the Nation's energy mix and offers the benefits of an emission-free, renewable, domestic energy source with public and private capacity together totaling about ten percent of U.S. capacity. Today we are looking at development of a new source of hydropower that has the potential to add a substantial amount of power to the nation's generation capacity, particularly in the area of renewable energy.

The Commission's existing procedures are well established and well suited to address this expansion of conventional hydropower with new technologies, and we are prepared to learn from experience in this rapidly evolving area and to make whatever regulatory adjustments are appropriate in order to help realize the potential of this renewable energy resource.

First, I will give you some background on the industry in general and describe the level of application activity that the Commission has seen. Then I will describe 1) the compatibility of the Commission's existing program with the new technologies, 2) alterations the Commission is making to address the concerns of stakeholders about specific aspects of that compatibility, 3) the Commission's efforts to work with the MMS to weave together an efficient program for new technology projects to be located outside state waters on the OCS, and 4) the Commission's coordination and cooperation with federal and state agencies in the licensing process.

Ocean-Based Hydropower Technology

In the past, efficient and reliable conversion of kinetic energy from water has proven elusive, but with recent advances in technology, rising fuel cost, and a growing demand for renewable energy, the potential for hydropower using new technologies is on the rise. An Electrical Power Research Institute (EPRI) study estimated the potential for wave and current power in our nation's oceans to be over 350 billion kilowatt hours per year, which would equal the output of traditional hydropower in its most productive years. In other words, ocean-based hydropower using new technologies could double hydropower production going from 10% to 20% of the national total. At present, however, the development and commercialization of the new technologies are just beginning.

The wave energy technologies include a range of designs including buoys, barge-like devices, and small floating reservoirs. Designs for harnessing tidal and current energy generally are variations on traditional turbines, often using underwater "propellers." In both cases, the energy of the moving water or wave is converted into electricity within each unit, making each device a small powerhouse. The current stage of technological development ranges from concept sketches to pilot demonstration projects.

Wave energy can be harnessed in locations that range from at the shoreline to many miles off shore, while tidal energy is limited to tidal rivers and narrows asso-

ciated with coastal bays and estuaries, and ocean currents are located mainly in offshore locations such as the Gulf Stream. Tidal power has substantial hourly variations during the day but the pattern tends to be very predictable across seasons and years, while wave power is much steadier on an hourly basis but shows more seasonal variation.

Ultimately, whether the source is wave, tide, or current, it likely will take clusters or fields of devices to generate utility-scale power from the new technologies. The electricity from the devices will in most cases be connected by an underwater cable to the shore and then continue onshore to connect with the interstate transmission grid.

OCEAN ENERGY ACTIVITY BEFORE THE COMMISSION

Applications for ocean-based hydropower projects can potentially go through three stages at the Commission. First, developers can apply for preliminary permits. Preliminary permits maintain priority of application for license for a site for up to three years while a developer researches site feasibility and makes financial arrangements. Second, developers can apply for a hydropower license. (A preliminary permit is not required prior to applying for a license.) By statute the Commission can issue a license for a term of up to 50 years. Third, if licensed, the developer must operate the project in compliance with the terms of the Commission's license order. Throughout the term of the license, the Commission monitors the project to assure compliance with the license.

Recently, the Commission has seen a surge in applications for preliminary permits for the new technologies. Before 2004, the Commission had received no recent preliminary permit applications for projects using ocean technologies. We received 11 permit applications in calendar years 2004 and 2005 combined and over 40 permit applications in 2006 alone. We have received four more permit applications so far in 2007. In 2005 and 2006, the Commission issued 11 preliminary permits, three for proposed tidal energy projects, and eight for proposed ocean current energy projects. So far in 2007, the Commission issued 19 permits, 16 for proposed tidal energy projects and three for proposed ocean wave energy projects.

The Commission received the first license application for a wave energy hydropower project from AquaEnergy, Inc. in November 2006. The Makah Bay Offshore Wave Energy Project is proposed for Makah Bay in Clallam County, Washington. Part of the project would be located on lands of the Makah Nation Indian Reservation. The project would consist of four buoys moored 3.2 nautical miles offshore in the Olympic Coast National Marine Sanctuary. Together, the buoys would generate up to 1 megawatt (MW), with an average of about 200 kilowatts (kW), through relative motion created by waves, which drives an internal pump that would force pressurized water through a closed-loop hose and a turbine.

In the tidal hydropower arena, Commission staff has been working with Verdant Power, LLC, a permit holder seeking to develop a license application for the Roosevelt Island Tidal Energy Hydropower Project. The project ultimately would consist of as many as 494 free-flowing turbine generator units (about 10.3 MW total), located below the water surface in the East River in Queens County, New York.

In addition, the Commission has been proactive in addressing the new issues unique to this nascent industry. In 2005, as activity in the field of new hydropower technologies began to increase, the Commission's Office of Energy Projects formed a committee of technical and legal staff to initiate research on the regulatory, environmental, and developmental aspects of these new technologies. On December 6, 2006, the Commission hosted a technical conference to discuss the status of new technologies in hydroelectric generation from ocean waves, tides, and currents and from free-flowing rivers, and to explore the environmental, financial, and regulatory issues pertaining to the development of these technologies. Conference participants included ocean energy developers and consultants, trade associations, representatives from state and federal agencies, non-governmental organizations, and members of the public. Following the conference, the Commission solicited and received written comments from the participants.

COMPATIBILITY OF THE COMMISSION'S EXISTING PROCESS WITH THE NEW TECHNOLOGIES

Projects using new technologies are compatible with the Commission's well-tested regulatory process that has been refined continuously since the original passage of the Federal Water Power Act of 1920. Regulating the development of power generation from the nation's waters is a primary role of the Commission. We analyze developers' proposals for energy generation from navigable and Commerce Clause waters, along with interests expressed by other stakeholders, and comprehensively balance the benefit of power generation with environmental protection and other values

as directed by statute. After years of collaboration with other agencies and parties we have achieved a high level of regulatory efficiency. Over the years, we have improved our licensing process to include early engagement with the applicant and other stakeholders, earlier and more predictable study requirements, more certain timeframes, and overall reduced processing time.

In reviewing a license application for a project, the Commission integrates and weighs the concerns of the licensee, federal and state resource agencies, tribes, and other members of the public. We do so through an information-gathering process and technical analysis that enables a fully informed Commission decision while complying with the mandates of the Federal Power Act, the National Environmental Policy Act, the Endangered Species Act, and other applicable laws.

Within our established process, significant flexibility exists to implement innovative approaches when appropriate. For instance, in the Makah Bay and Roosevelt Island cases, Commission staff has allowed the use of different license processes that better fit the applicants' needs. This flexibility has enabled 1) the inclusion of Commission staff and stakeholders in the study development and implementation and 2) for much of the National Environmental Policy Act information to be developed parallel to the project's license application development. In the Roosevelt Island case, the process may also encourage negotiation of a settlement.

CHANGES IN COMMISSION PROCESSES TO IMPROVE COMPATIBILITY WITH THE NEW TECHNOLOGIES

Where the needs of the industry have raised new issues, not within the scope of our standard procedures, the Commission has shown the maximum flexibility allowed by the statute. For example, the Commission determined that Verdant Power could install its six-turbine demonstration project in the East River without applying for a Commission license. In a July 27, 2005, Order on Clarification, the Commission concluded that Verdant's activities effectively would have no net impact on the interstate electric power grid or on interstate commerce. This determination established a policy that allows experimentation without a license when 1) the technology in question is experimental; 2) the proposed facilities are to be used for a short period and for the purpose of developing a hydropower license application; and 3) power generated from the test project will not be transmitted into, or displaced from, the national electric energy grid. In addition to testing power generation, Verdant will carry out extensive monitoring of fishery impacts as part of the experimental deployment. Although not required to be licensed during its testing phase, Verdant was of course obligated to obtain necessary approvals under other existing state and federal statutes.

In order to respond to industry concerns about the applicability of the existing preliminary permit system to new technology projects, the filing of a large number of recent applications for preliminary permits using "new technology", and to follow up on the Hydroelectric Infrastructure Technical Conference, the Commission on March 1, 2007, issued a notice in the Federal Register seeking comments on how the Commission should treat applications for and regulate preliminary permits for hydropower projects involving wave, current, and instream technologies. The notice sets an interim policy for reviewing such applications, proposing to scrutinize them strictly by imposing requirements on any permits issued, such as the submission of progress reports, the development of study plans, and the establishment of deadlines to file a subsequent license application. Alternative policies would either: (1) continue the standard policy for processing applications for hydropower permits, by not subjecting them to extensive scrutiny and not imposing additional requirements on permit holders; or (2) decline to issue any preliminary permits for projects involving new technology, in which case applicants could only pursue such projects directly through the licensing process. Comments on the Notice of Inquiry are due by April 30, 2007.

In applying the interim policy, the Commission will ensure that permit holders are actively pursuing studies and consultations that may lead to development of a license application in hopes of preventing site-banking, the practice of reserving potential project sites without intent to develop projects. The Commission will carefully scrutinize the reports that permit holders are required to file on a semi-annual basis, and will, where sufficient progress is not shown, consider canceling the permit. Stricter scrutiny will entail requirements such as reports on public outreach and agency consultation, development of study plans, and deadlines for initiating the formal license application process. The Commission will process preliminary permit applications with a view toward limiting the boundaries of the permits. This approach should provide a disincentive for developers to seek permits for projects that they are not ready to pursue.

In the area of licensing, the Commission staff considers our well-tested existing procedures to work well, yet to be sufficiently flexible to address the licensing of projects using the new technologies. Where appropriate, Commission staff will investigate making improvements to the current process to the extent consistent with existing law. We will continue to use our substantial experience and expertise in bringing other agencies together in determining appropriate studies and complying with all existing statutes and to make the regulatory process for agencies, applicants, and parties as efficient as possible. To address a concern about a lack of information about the environmental effects of these technologies, Commission staff has been gathering information and studies on the environmental effects of ocean energy and, in coordination with other agencies, will be making this information available as a service to developers as well as using it to accelerate our reviews. We also plan to provide outreach on our program to clarify our process for the industry and stakeholders, many of whom are new to it.

WORKING WITH THE MINERALS MANAGEMENT SERVICE ON THE OCS

The Commission is committed to achieving a fair and predictable regulatory program that allows orderly development of new technology projects to be located on the OCS while considering environmental, recreational, cultural, and other uses of the resource. To this end, both staff and Chairman Kelliher have met with representatives of the Department of the Interior. I am happy to report that the two agencies are working together to develop a Memorandum of Agreement that will apply the best resources and authorities of both agencies to develop an efficient and effective program for promoting and regulating the development of hydropower in all offshore areas, including the OCS. We believe that the Commission brings several resources to the negotiating table. First, the Commission is uniquely positioned under the FPA and its regulations to give equal consideration to developmental and non-developmental resources and to assure that any project licensed will be best adapted to a comprehensive plan for development of the water resource in the public interest. Second, the Commission has many years experience in hydropower licensing. The Commission's licensing process is transparent, provides timely review of projects, and affords applicants, agencies, Native American Tribes, Non-governmental organizations and members of the public numerous opportunities to effectively participate and represent their interests.

COOPERATION AND CONSULTATION WITH STATE AND FEDERAL AGENCIES

State and other federal agencies (agencies) play a central role in the Commission's existing hydropower licensing process. This role will continue to be essential as we address the new hydropower technologies. The National Marine Fisheries Service (NMFS) within the National Oceanic and Atmospheric Administration of the U.S. Department of Commerce is one of the federal agencies that has been actively involved in the Commission's licensing process for conventional hydropower projects and we expect that they would be similarly involved in new technology projects. The Commission staff works closely with the agencies to address their interests and concerns and to tap their expertise with "on the ground" management of the resource. Cooperation and consultation with the agencies begins early in application development and continues throughout the licensing process.

The Commission requires that applicants consult with agencies in the process of preparing an application. The application must include the results of this consultation with a description of agency recommendations and the applicant's response to the recommendations. The Commission's Integrated Licensing Process regulations require early involvement of Commission staff in pre-application phase discussions with agencies and the applicant. The process includes a formal procedure for consulting with the agencies to determine the studies needed for licensing and includes both an informal and formal dispute resolution process. Under the Federal Power Act, Congress assigned the state and federal fish and wildlife agencies specific authority in hydropower licensing. Essentially, the Commission is to accept state and federal fish and wildlife agency recommendations unless they clearly are in conflict with another part of the statute. These recommendations contribute to the comprehensive balancing of energy development and the protection of fish, wildlife, recreation, and other resources. Finally, the Commission's licensing process and supporting analysis incorporates other statutes in which Congress has given important authorities to the states such as the Coastal Zone Management Act of 1972 and the National Historic Preservation Act of 1966. Together, these statutory, regulatory, and informal relationships have supported good coordination and cooperation with the states that will extend to the new technologies.

In addition, Section 10(a)(2)(A) of the FPA authorizes states and federal agencies to file Comprehensive Plans that address one or more beneficial uses of a waterway. The Commission takes these Comprehensive Plans into account when determining whether and under what conditions a project should be licensed. These plans enable state and federal agencies to have a substantial role in the Commission's public interest determination.

Finally, I would suggest that the Commission's many years of experience in analyzing the environmental effects of hydropower projects under existing statutes, including NEPA, and implementing regulations provide an ample foundation to adequately address the environmental effects of new technology projects.

CONCLUSION

In closing, the Commissioners have stated publicly their interest in promoting the development of this potentially important source of renewable energy. They also have expressed their desire to reduce regulatory barriers to the development of new technologies, where possible.

We are confident that under the Commission's statutory structure, refined over almost a century, hydropower resources using new technologies can be developed in an orderly way while protecting other beneficial public uses, such as fish and wildlife, and meeting the requirements of other federal statutes and state interests. As experience is gained in the area of new hydropower technologies, we will make appropriate regulatory adjustments as we have in response to other technology changes in the past. We will work with the Minerals Management Service to develop a program for the OCS that makes the best and most efficient use of our respective resources and provides thorough analysis of environmental impacts, and we will continue to cooperate and consult with other federal agencies, including NMFS, and individual states in the licensing of new technology projects. We look forward to continuing to carry out the Congressional mandate in the Federal Power Act and performing our regulatory duties fairly, openly, and efficiently to realize the potential of this promising renewable energy resource.

That concludes my remarks and I would be pleased to answer any questions you may have.

Mr. COSTA. Thank you very much, Ms. Miles. I am sorry. A minute 40 over. I can't give you the mark you were looking for.

Ms. MILES. Sorry.

Mr. COSTA. Well, we are being patient here today.

Our next witness is Mr. Tim Keeney. He is the Deputy Assistant Secretary for Oceans and Atmosphere with the National Oceanic and Atmospheric Administration within the Department of Commerce.

We are very interested in hearing your comments, especially queued off the last comments of the previous witness.

See if you can stay within the five minutes.

STATEMENT OF TIMOTHY R.E. KEENEY, DEPUTY ASSISTANT SECRETARY FOR OCEANS AND ATMOSPHERE, NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, U.S. DEPARTMENT OF COMMERCE

Mr. KEENEY. Mr. Chairman, Madam Chairwoman, Members of the committee, thank you for inviting me to appear before you today. I am Tim Keeney, Deputy Assistant Secretary for Oceans and Atmosphere at NOAA. I am pleased to be here to discuss NOAA's interest and role in alternate energy and related uses in the Outer Continental Shelf.

NOAA takes our stewardship responsibilities very seriously and recognizes the need for a safe and environmentally sound supply of energy. Section 388 of the Energy Policy Act places jurisdiction over alternate energy related uses on the Outer Continental Shelf with the Minerals Management Service, Department of Interior.

As you have already heard from Mr. Mike Olsen, MMS is currently in the midst of mapping out a regulatory process in consultation with the Department of Commerce and other agencies and state governments. MMS has recently published a draft programmatic environmental impact statement or DEIS which is currently out for public review and comment. NOAA's National Marine Fisheries Service and National Ocean Service are in the process of reviewing the DEIS and will be providing comments in the near future.

Section 388 also referenced the Deepwater Port Act and the Ocean Thermal Energy Conversion Act. I would like to highlight the active role NOAA has played in each of these two regulatory schemes.

The Deepwater Port Act allows for the licensing of deepwater ports in EEZ along our maritime coasts. Numerous energy corporations have submitted applications or have announced their intentions to apply for deepwater port licenses primarily for liquefied natural gas.

In 2004, consistent with Executive Order 13212 and cooperation necessary by the DPA, NOAA joined other Federal agencies with regulatory responsibilities relevant to deepwater ports in developing and signing an MOU. The MOU is designed to expedite actions on pending and future applications for licensing deepwater ports.

NOAA's National Marine Fisheries Service is responsible for a variety of activities and marine and coastal ecosystems as mandated by several statutes and authorities. These activities include managing protected species, managing commercial and recreational fisheries, protecting marine and coastal habitats.

These activities are conducted pursuant to a number of environmental laws, including the Endangered Species Act, Marine Mammal Protection Act, Magnuson-Stevens Fisheries Conservation and Management Act and the Fish and Wildlife Coordination Act.

Deepwater port construction and operation may overlap with several NOAA responsibilities depending on the location and type of project proposed. Federal agencies authorizing activities that may affect any of these resources are required to consult with NMFS regarding adverse effects to these resources and habitats upon which they depend.

NOS is responsible for various coastal and ocean programs that may be relevant to deepwater ports, Coastal Zone Management Act or CZMA. NOS provides and works with states to implement comprehensive coastal zone management programs and national estuarine research reserves and mediates disputes regarding CZMA issues.

Under the Coastal Zone Management Act, affected states must concur with consistency certifications submitted with deepwater port applications before Federal agencies can issue permits. NOS also manages designated national marine sanctuaries, as well as provides for coastal protection and restoration activities.

While oil and gas activities are mostly prohibited within the sanctuaries under the National Marine Sanctuaries Act, Federal actions near the sanctuaries may require consultation with the Secretary of Commerce.

NOS also provides technical assistance related to nautical charts, coastal observing stations, geographical information systems capabilities and tide and current information.

The DPA sets forth the criteria that the Secretary of Transportation should use to permit a facility located in the EEZ and includes a requirement to consult with NOAA on the potential environmental impacts.

The environmental stewardship statutes referenced above required Federal departments to consult with NOAA on Federal actions that could affect protected species and resources. The purpose of these laws is to ensure that the proper balance is given to issues such as energy security, economic matters, navigational safety and protection of trust resources and environment.

In this interagency process, NOAA makes recommendations and provides comments on potential effects to protected resources and possible mitigation measures and works closely with the Department of Transportation's Maritime Administration and the Coast Guard to develop measures the applicant must adopt in order to mitigate potential effects on protected species and resources.

In the late 1970s, there was also a period of interest in alternate energy sources. One of these alternatives, ocean thermal energy conversion or OTEC, is a process that uses the heat energy stored in the warm surface waters and through a temperature differential can produce electricity and other energy intensive products.

The Ocean Thermal Energy Conversion Act gave NOAA lead responsibility for licensing the construction, ownership, location and commercial operations of OTEC plants. Following NOAA's initial environmental studies and implementation of a licensing program, NOAA has yet to receive a license application for OTEC facilities or plantships.

NOAA has a well established history of working with agency partners. I look forward to continuing our close collaboration with MMS and other participating Federal agencies in developing this process.

Thank you for your time and consideration. I would be happy to answer any questions you might have.

[The prepared statement of Mr. Keeney follows:]

Statement of Timothy R.E. Keeney, Deputy Assistant Secretary for Oceans and Atmosphere, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

Madam Chairwoman and Members of the Committee, thank you for inviting me to appear before you today. I am Timothy Keeney, Deputy Assistant Secretary for Oceans and Atmosphere at the National Oceanic and Atmospheric Administration (NOAA), in the Department of Commerce. I am pleased to be here today to discuss with you NOAA's interest and roles in alternate energy and related uses in the outer continental shelf (OCS). NOAA and the Department of Commerce take our stewardship responsibilities very seriously, and we also recognize the need for an environmentally safe supply of energy. Per Executive Order 13212, it is Administration policy for agencies to "take appropriate actions, to the extent consistent with applicable law, to expedite projects that will increase the production, transmission, or conservation of energy."

Energy Policy Act of 2005, Section 388:

As you are aware, Section 388 of the Energy Policy Act of 2005 (EPAct) placed jurisdiction over "Alternate Energy-Related Uses of the Outer Continental Shelf" with the Minerals Management Service (MMS) of the Department of Interior. As you have heard [will hear] from my friend from the Department of the Interior,

MMS is currently in the process of mapping out a regulatory process, in consultation with the Department of Commerce and other agencies and state governments. MMS has recently published in the Federal Register a Draft Programmatic Environmental Impact Statement (DEIS), which is currently out for public review and comment. NOAA's National Marine Fisheries Service (NMFS) and National Ocean Service (NOS) are in the process of reviewing the DEIS and will be providing comments in the near future. NOAA also is an ex officio member of the MMS Outer Continental Shelf Policy Committee, and its Alternate Use of the OCS Subcommittee, so we are in close consultation with our colleagues at MMS as they develop a regulatory scheme for alternate energy and related use of the OCS.

To illustrate NOAA's important role in the regulation of offshore activities, it may be useful to describe existing interagency efforts. Section 388 of EPAct, referred to above, gave the Secretary of the Interior discretionary authority over energy-related and other authorized marine-related activities not otherwise authorized in the OCS Lands Act, the Deepwater Ports Act of 1974 (DPA), or the Ocean Thermal Energy Conversion Act of 1980 (OTEC). As I will outline in my testimony, NOAA has an active role in each of these two regulatory schemes.

Deepwater Ports Act of 1974:

The DPA allows for the licensing of deepwater ports in the Exclusive Economic Zone (EEZ) along all maritime coasts of the United States. Numerous energy corporations have submitted applications or have announced their intentions to apply for deepwater port licenses, primarily for liquefied natural gas. In 2004, consistent with Executive Order 13212 and cooperation necessitated by the DPA, NOAA joined other agencies with regulatory responsibilities relevant to deepwater ports in developing and signing an MOU to expedite actions on pending and future applications for licensing deepwater ports.

To describe NOAA's regulatory interests in deepwater facilities, I will very briefly discuss some of the authorities NOAA is charged with executing. NMFS is responsible for a variety of activities in marine and coastal ecosystems as mandated by several statutes and authorities. These activities include managing protected species, managing commercial and recreational fisheries, and protecting marine and coastal habitats. These activities are conducted pursuant to a number of environmental laws including the Endangered Species Act, Marine Mammal Protection Act, Magnuson-Stevens Fishery Conservation and Management Act, and the Fish and Wildlife Coordination Act. Deepwater port construction and operation in coastal and/or ocean areas may overlap with several NOAA responsibilities depending on the location and type of project proposed. Federal agencies authorizing activities that may affect any of these resources are required to consult with NOAA Fisheries regarding adverse affects to these resources and habitats upon which they depend.

NOS is responsible for various coastal and ocean programs that may be relevant to deepwater ports. NOS administers the Coastal Zone Management Act (CZMA) and approves and works with states to implement comprehensive Coastal Management Programs and National Estuarine Research Reserves and mediates disputes regarding CZMA issues. Under CZMA Section 307(c)(3)(A), affected states must concur with consistency certifications submitted with deepwater port applications before federal agencies can issue their permits. NOS also manages designated National Marine Sanctuaries (NMS) and coastal protection and restoration activities. While oil and gas activities are mostly prohibited within NMS, pursuant to Section 304(d) of the National Marine Sanctuaries Act, federal actions near NMS may require consultation with the Secretary of Commerce. NOS also may be able to provide technical assistance related to nautical charts, coastal observing stations, geographic information systems capabilities, and tide and current information.

The DPA sets forth the criteria that the Secretary of Transportation should use to permit a facility located in the EEZ, and includes a requirement to consult with NOAA on the potential environmental impacts. Additionally, the environmental stewardship statutes referenced above require federal departments to consult with NOAA on federal actions that could impact protected species and resources. The purpose of these laws is to ensure that proper balance is given to issues such as energy security and regional and national economic matters and issues such as navigational safety and the protection of trust resources and the environment.

In this interagency process, NOAA makes recommendations and provides comments on potential effects to protected resources, as well as possible mitigation measures. The Department of Transportation, through the Maritime Administration (MARAD), has the policy and legal discretion to give appropriate weight to the environmental recommendations of NOAA and to permit the facility when the Secretary "determines that the construction and operation of the deepwater port will be in the

national interest and consistent with national security and other national policy goals and objectives, including energy sufficiency and environmental quality."

NOAA works closely with MARAD and the U.S. Coast Guard to develop measures the applicant must adopt in order to mitigate potential effects on protected species and resources. This interagency process is fairly new, and is not without challenges, but it is a process that provides some illumination to the various and often complex statutes taken into consideration when licensing new offshore activities.

Ocean Thermal Energy Conversion Act of 1980:

In the late seventies, there was also a period of interest in alternative energy sources. One of those alternatives—ocean thermal energy conversion (OTEC)—is a process that uses the heat energy stored in the warm surface waters of the world's oceans to produce electricity or other energy-intensive products. The Ocean Thermal Energy Conversion Act of 1980 (OTEC Act), gave NOAA lead responsibility for licensing the construction, ownership, location and commercial operation of OTEC plants.

The OTEC Act directed the administrator of NOAA to establish a stable legal regime to foster commercial development of OTEC. In addition, the OTEC Act directed the secretary of the department in which the U.S. Coast Guard is operating to promote safety of life and property at sea for OTEC operations, prevent pollution of the marine environment, clean up any discharged pollutants, and prevent or minimize any adverse impacts from the construction and operation of OTEC plants. In addition, the Act was designed to ensure that the thermal plume of an OTEC plantship does not unreasonably impinge on, and thus degrade, the thermal gradient used by any other OTEC plantship or facility, the territorial sea, or an area of national resource jurisdiction of any other nation. An exception would be made, however, if the Secretary of State had approved such an impingement after consultation with a nation. The OTEC Act also assigns responsibilities to the Secretary of State and the Secretary of Energy regarding OTEC plants.

There has been a low level of activity under the OTEC Act since its passage in 1980. Following NOAA's initial environmental studies and implementation of a licensing program, NOAA has not received any license applications for OTEC facilities or plantships. The availability and the relatively low prices of fossil fuels, coupled with the risks to potential investors, have limited the interest in commercial development of OTEC projects. The need to protect the environmental quality of ocean resources and ecosystems may outweigh the benefits of constructing OTEC facilities in certain areas. Moreover, OTEC projects have offered an unclear return on a significant investment. (Source: Year of the Ocean Discussion Papers, 1998)

Conclusion

NOAA has a well-established history of working with agency partners to ensure our ocean and coastal resources receive due consideration in the development of regulatory regimes for emerging and existing technologies that are in our nation's best interest. I look forward to continuing our close collaboration with MMS and other participating federal agencies in developing this process. Thank you for your time and consideration. I would be happy to answer any questions you might have.

Mr. COSTA. Thank you very much, Mr. Keeney, for your testimony. We will be looking forward to asking questions. You did go a little over your time though.

Without objection, the Chair, the Chairs I should say, would like to ask unanimous consent to allow Mr. Inslee, the gentleman from Washington, to sit in the two Subcommittees. He is a Member of the Natural Resources Committee, but not on either of these two Subcommittees. We are pleased to have you here.

[No response.]

Mr. COSTA. Hearing no objection, all right.

Our last witness on this panel is Mr. Ted Diers, who represents Coastal States Organization.

As we know, our states have responsibilities within three miles of the coastal line there for states throughout the coastal perimeter, so I suspect that that is the perspective we will get from Mr. Diers, and we will look forward to your testimony.

STATEMENT OF TED DIERS, COASTAL STATES ORGANIZATION

Mr. DIERS. Thank you very much, Chairman and Madam Chairwoman. Thank you very much for allowing me to be here today.

My name is Ted Diers, and I am the program manager of the New Hampshire Coastal Program, but today I am serving in my capacity as Vice Chair of the Coastal States Organization. The Coastal States Organization serves as a voice in Washington and elsewhere for the states and of course the territories.

My testimony today will cover three points, and those are 1) that the states, territories and tribes should be partners with the Federal government in relation to Outer Continental Shelf issues; 2) that much more information is needed as we approach thoughtful management of the Outer Continental Shelf; and 3) that we really need to contemplate the big picture of how we are doing management of our marine waters.

So in terms of states and territories being partners with the Federal government, I would like to highlight three reasons why a strong partnership is needed from the states' perspective. The first is the dynamic nature of the ocean and coasts. There are lots of things that interact between the OCS and within the state waters.

Second of all, there is infrastructure issues. Whatever energy is created on the Outer Continental Shelf has to get onto the land somehow, so there is infrastructure issues.

One interesting example that we are going through right now in New England, and this is not necessarily a renewable energy example, but with liquefied natural gas. There is an application in downeast Maine, which is some 200 miles away from New Hampshire, yet in order to get that gas to the market which exists in Massachusetts and Connecticut additional pipeline capacity is going to have to be built through our coastal zone, so there are a lot of interrelated issues when it comes to infrastructure with offshore projects.

Finally, affected states and local communities that are involved with siting of different structures really ought to have a voice in these decisions. The Energy Policy Act of 2005, there were some preemptions that were made in that Act as they related to liquefied natural gas. I think that the loud cry from the states is that we would really prefer not to see any more preemptions in this area.

In fact, the National Governors Association has a policy out, and I have that here which can be entered into the record, Policy NR-10, which is relative to ocean and coastal zone management.

My second point today is that a lot more information is really needed for thoughtful management of the Outer Continental Shelf. First of all, mapping and observation I think are really key. As you have probably heard Dr. Robert Ballard, the undersea explorer, say, we have better maps of Mars than we have of the bottom of the Pacific Ocean.

We need to really be thinking about how we do our mapping. The MMS has already started a cadastre map. This is a mapping of the locations of boundaries and overlapping jurisdictions. That needs to be funded.

We need additional mapping such as some of the regional mapping that is going on through the Gulf of Maine Mapping Initiative and others like it which have already showed their importance in

helping with siting decisions, especially in the area of cables. If it can work for cables, it can work for other things.

Observation. You have probably heard about the Integrated Ocean Observation System, the IOOS. We are trying to make use of the IOOS by trying to get that data. In fact, last week we had a serious nor'easter in New England, and I was immediately onto the website for those buoys that were off our shore looking at what the wave heights were, looking at what the barometric pressures were. It told us we were going to have a doozie, and we did. We had massive destruction last week.

All the mapping and observation needs to come together in assessments. The Ocean Commission report calls on NOAA and EPA to develop a system of ecosystem assessment. We feel that that is an excellent approach to be able to guide some of its siting decisions that will happen.

My final point is that really a new management regime needs to be examined. You will hear on Thursday at a hearing about the advances in regional ocean governance. The coastal states are committed to regional ocean governance. We are pulling it together with our Federal partners, and we are making these efforts work.

The West Coast has an effort, the Gulf of Mexico of course, the Great Lakes and now the northeast with the Northeast Regional Ocean Council. Energy issues are high among the priorities amongst those regional organizations.

Finally, at the end I would just like to make one recommendation, and that is to look at Recommendation 24-5 of the U.S. Ocean Commission report which calls for a new comprehensive management regime looking at the oceans are a public resource, that we streamline the process for licensing and permitting, that we subsume some of the existing statutes to make it simpler and that we ensure that the public receives fair return on the use of the resources.

If I could add one more bullet to that list that came from the ocean report it would be that the states and territories be full partners and that regional interests be taken into consideration as these move forward.

Thank you very much for your time and the opportunity to speak here today.

[The prepared statement of Mr. Diers follows:]

Statement of Ted Diers, Program Manager, New Hampshire Coastal Program, New Hampshire Department of Environmental Services

Representatives Bordallo and Costa, and Members of the Subcommittee on Fisheries, Wildlife and Oceans and Subcommittee on Energy and Mineral Resources; thank you for the opportunity to appear before you today to discuss renewable energy opportunities and issues on the outer continental shelf (OCS).

My name is Ted Diers, I am the program manager of the New Hampshire Coastal Program in the Department of Environmental Services. I am here today on behalf of the Coastal States Organization, where I serve as vice-chair. My comments here today reflect both the New Hampshire experience with renewable energy as well as the experience in many other states. As such, I will identify issues on which there is broad national consensus from coastal zone managers. Before I begin, I request that my written testimony be included in the record.

This testimony will cover three main points:

1. States and territories should be partners with the federal government;
2. Much more information is needed for thoughtful management of OCS; and
3. A new management regime for our nation's marine waters is needed.

First of all, I would like to thank you for taking the issues of ocean energy and global climate change to heart. It is gratifying to see the policies needed to create a climate of change beginning to take shape.

Energy and reducing greenhouse gas emissions are both critical national needs, which make the possibilities of alternative energy so promising. This is a local and state phenomenon as well as a federal one. The State of New Hampshire is taking this issue seriously. At this Spring's town meetings, 157 towns passed resolutions. That resolution is as follows:

"New Hampshire Climate Change Resolution

To see if the town will go on record in support of effective actions by the President and the Congress to address the issue of climate change which is increasingly harmful to the environment and economy of New Hampshire and to the future well being of the people of our town. These actions include:

1. Establishment of a national program requiring reductions of U.S. greenhouse gas emissions while protecting the U.S. economy.
2. Creation of a major national research initiative to foster rapid development of sustainable energy technologies thereby stimulating new jobs and investment.

In addition, our town encourages New Hampshire citizens to work for emission reductions within their communities, and we ask our Selectmen to consider the appointment of a voluntary energy committee to recommend local steps to save energy and reduce emissions."

This resolution and much of Congress' work on climate change is focused on reducing greenhouse gases, which is a critical thing to do. I urge you to also include the issues of adaptation and mitigation in your legislative deliberations. Even if all greenhouses gases emissions were stopped tomorrow, the effects of climate change would continue for decades. Coastal states are literally on the front lines of sea level rise and we need more resources and tools to conduct assessments and develop models of the potential future impacts; develop adaptation and response strategies; and increase the resilience of coastal communities.

Concerning greenhouse gas reduction at the state level, Governor John Lynch has endorsed the "25 by 25" initiative—that is 25% of our energy will be produced from renewable sources by 2025. New Hampshire already obtains 14% of its energy from renewable sources. We will accomplish the 25% goal in a variety of ways, some of which are already well underway. Given that our state is 80% forested, wood power is a viable source of energy, and a new facility was just build on our shore. Last week, the Town of Salem planning board approved the first in the state biofuel plant. The first land-based wind power facility is likely to be constructed this year. And, importantly, Renewable Portfolio Standards for the state are working their way through the Legislature. This will require all power producers to include a certain percentage of renewables to make up energy portfolio. Finally, New Hampshire exports about twice as much power as we use so energy is an important commodity to the state.

We may be able to achieve our 25% renewable target within the bounds of our small state, however, it is clear that achieving that sort of goal on the national scale will likely require a significant ocean based component. And, the likely place for that power generation is the last frontier for America—the outer continental shelf.

However, alternative energy development on the OCS needs to be done thoughtfully and in coordination with other programs, activities and resources. The U.S. Ocean Commission report, "An Ocean Blueprint for the 21st Century," has a number of recommendations that are germane to this subject. I will refer often to that report because, as the report titles itself, it is a blueprint for moving forward.

I hope that this hearing will be the start of an intense process to act on those relevant recommendations. As mentioned above, I will cover three main points as they relate to creation of a comprehensive policy for renewable energy on the OCS.

I. States and territories should be partners with the federal government.

As Congress determines the regulatory structure for alternative energy and other development on the OCS, it is imperative that the states have a meaningful voice in how these decisions are made. I would like to highlight three reasons for a strong partnership between the states and the federal government regarding activities in the OCS.

First, what happens on the OCS can impact state resources. As you are all well aware the ocean is a dynamic place where species can travel over long distances and the currents and tides can carry things hundreds of miles, often coming to rest onshore in a state. Given the dynamic nature of the ocean and coast, we strongly rec-

ommend that Congress consider all potential impacts and not just impacts to an individual site. With the knowledge of their coastal waters, the states can aid the federal government in ensuring that all potential impacts are taken into account.

A second reason for ensuring a strong state partnership is that eventually the coastal states will have to address the impacts of infrastructure that will deliver the energy onshore. If the federal government sites facilities on the OCS without having considered the entire scope of all infrastructure then unintended consequences could result, such as the applicant encountering difficulties in obtaining the necessary state permits even with their federal permits in hand. An example from New Hampshire illustrated how infrastructure issues can be quite complicated. The recent application of the LNG facility in Quoddy Bay in downeast Maine may provide needed natural gas to New England. However, Quoddy Bay is a long way from the people who need the gas down in Massachusetts and Connecticut. Thus, the gas must be piped across four states, including New Hampshire. So, additional pipeline capacity with all of its accompanying impacts will be installed through our coastal communities. Any alternative energy development on the OCS should require that the land-based component be included in the federal permit and that state approval is necessary for portions of the project in the state or potentially affecting state resources.

Third, we believe that affected states and local communities should be involved and have a voice in these decisions. The coastal states do not want to see a repeat of the provisions in the Energy Policy Act of 2005, where state sovereignty was preempted by the Federal Energy Regulatory Commission (FERC). In the Energy Policy Act, FERC was given "exclusive authority" to approve or deny permits for the siting of LNG facilities. Congress also included a saving clause for states' authority of the Coastal Zone Management Act, which should have required that FERC be consistent with state enforceable policy in the coastal zone. Unfortunately, federal courts are reading the law to say states cannot explicitly place conditions on the siting of LNG facilities. Under this interpretation, local communities' voices and opinions concerning the siting of LNG facilities in their neighborhoods have largely been silenced. The states believe that local communities deserve to be heard on these issues. The Governors recently reiterated their support of maintaining state sovereignty in decisions regarding energy siting when they passed their Ocean and Coastal Policy (NR-10) at their Winter meeting in February of this year. I would request that this policy be incorporated into the record.

II. Much more information is needed for thoughtful management of the OCS.

When I go to work in the morning, and an issue comes up regarding the siting of any type of facility on the land, I can sit down at my computer and have immediate access to dozens of map products, hundreds of environmental monitoring datasets, and detailed photography and visualization tools. That allows for informed decision-making. As soon as a similar issue leaves the shoreline, those dozens of map products are reduced to a handful, the datasets can be measured in dozens, and I have precious few ways to visualize offshore resources. Last Tuesday, the Federal Energy Regulatory Commission (FERC) approved two preliminary permits for tidal energy turbines in New Hampshire waters. There is great interest in tidal energy in the Piscataqua River, which has some of the fastest currents of any river in America. However, we lack much of the necessary information to make a thoughtful decision, especially as it pertains to natural resources and how they are impacted by new technology. We do not know if these turbines are a largely benign source of consistent, dependable energy, or have the potential to create a puree out of migrating fish. While this is not an OCS application, the point is that we do not have the information for project siting adjacent to shore; the difficulties 100 miles offshore are much greater.

The key components of the information needs for OCS management include—mapping, observation, technology and assessment. These components are discussed below:

Mapping

There is a strong need for proactive thinking and resolution of spatial planning, especially as it pertains to jurisdictions. I note that the Minerals Management Service (MMS) has started a marine cadastre initiative as a requirement under the Energy Policy Act of 2005. It is defined as "a system to enable the boundaries of marine rights and interests, to be recorded, spatially managed, and physically defined in relationship to the boundaries of other neighboring or underlying rights and interests", with the goal of the "Identification of OCS locations of Federally permitted activities; obstructions to navigation; submerged cultural resources; undersea

cables; offshore aquaculture projects; and any area designated for the purpose of safety, national security, environmental protection, or conservation and management of living marine resources." See http://www.mms.gov/ld/PDFs/Mapping Initiative.pdf. This is critical and should be given the resources to be competed quickly.

As Dr. Robert Ballard, the deep sea explorer, has stated many times, "We have better maps of Mars than we do of the Pacific Ocean." As renewable energy projects in the OCS begin to take shape, we need a great deal more information to inform the siting and decision-making process.

The Minerals Management Service has been mapping the OCS for many decades. However, that mapping has been focused on the extraction of minerals and fuel products. In addition, the intensity and accuracy of mapping is greatest in those areas which currently have production. We need planning that is not solely focused on one type of natural resource.

There are numerous national efforts to conduct mapping of our oceans. One such effort is the Gulf of Maine Mapping Initiative (GOMMI), a U.S.-Canadian partnership of government and nongovernment organizations to conduct comprehensive seafloor imaging, mapping, and biological and geological surveys. GOMMI grew out of a mapping workshop in October 2001 that was sponsored by the Gulf of Maine Council on the Marine Environment and the National Oceanic and Atmospheric Administration. The Gulf of Maine Council endorses GOMMI, and the GOMMI Steering Committee is a subcommittee of the Council. Currently, GOMMI is working to secure funding and conduct a mapping program of areas in the Gulf of Maine not already mapped by multibeam sonar surveys. The key data products that will emerge from GOMMI are habitat maps that interpret biological and geological data to show types of sediment and animals in a particular area. These data products have already resulted in some victories, such as the successful routing of an underwater cable to avoid key aquatic habitats off the coast of Massachusetts—a result that is good for the environment and good for commerce. And it all started with good information

Observation

Mapping refers to data about things that change relatively slowly or not at all. Observation refers to the condition of those things and about changes over time. As you are well aware, the science of observation has and is changing rapidly. From satellites to buoys to volunteer water quality monitoring, our ability to monitor the environment is improving rapidly. One such area is the Integrated Ocean Observation System (IOOS). IOOS, once completed, will be a "system of systems" that routinely and continuously provides quality controlled data and information on current and future states of the oceans and Great Lakes from the global scale of ocean basins to local scales of coastal ecosystems. It is a multidisciplinary system designed to provide data in forms and at rates required by decision makers to address seven societal goals, which are:

1. Improve predictions of climate change and weather and their effects on coastal communities and the nation;
2. Improve the safety and efficiency of maritime operations;
3. Mitigate the effects of natural hazards more effectively;
4. Improve national and homeland security;
5. Reduce public health risks;
6. Protect and restore healthy coastal ecosystems more effectively; and
7. Enable the sustained use of ocean and coastal resources. (Source: www.ocean.us)

The real point of the IOOS is not to float a bunch of buoys around in the ocean, rather it is to make sense of all the mapping and observation data that is collected from a variety of sources. I am a user of IOOS data, as delivered by the Gulf of Maine Ocean Observing System (GOMOOS). Last week as our coast was beaten by a significant Nor'easter, my first stop to look at the storm was the GOMOOS website to look at the current ocean conditions. What the buoys showed were 30 foot waves. GOMOOS makes sense of that data relative to other data, such as barometric pressure, which was as intense as in a hurricane. Based on that information, we knew that this storm was going to do a number of our shoreline. And it did.

Technology

One of the reasons we are all gathered here today is because technology is progressing faster than policy. The point is not to slow down the technology but to create policy that can keep up with it.

We need more information on new and changing technologies. Wind is a good example. Most of you are probably familiar with the proposed Cape Wind project in

the waters south of Massachusetts. In the more than 5 years it has taken for Cape Wind to get through the state regulatory process, technology advancements have allowed them to reduce the number of towers, shrink the height and increase energy output. Much of the controversy around this project is because the towers are to be located in relatively shallow water. Getting information about new technologies is also tricky, as many of the new ocean-based renewable energy technologies are either in preliminary development or are continually being refined. We are told that deep water wind technology is still years away, but how many years? Will we have the time to create a better regulatory regime before those applications come streaming in?

Finally, there are technologies that we can barely imagine that could end up in the ocean. It should be clear from the rapid changes in the past decade that future ocean energy technologies may look very different than the structures we are discussing today. And, the regulatory regime needs to be adaptable to that uncertainty.

Assessment

Mapping, observation and understanding technology is meaningless without translating that information into understandable assessments of ocean resources. One key method for that is Ecosystem Based Management (EBM), a management approach that:

- Integrates ecological, social, and economic goals and recognizes humans as key components of the ecosystem.
- Considers ecological—not just political—boundaries.
- Addresses the complexity of natural processes and social systems and uses an adaptive management approach in the face of resulting uncertainties.
- Engages multiple stakeholders in a collaborative process to define problems and find solutions.
- Incorporates understanding of ecosystem processes and how ecosystems respond to environmental perturbations.
- Is concerned with the ecological integrity of coastal-marine systems and the sustainability of both human and ecological systems. (Source: www.ebmtools.org)

Ecosystem Based Management should be a component of any ocean management regime. However, it requires excellent information and analysis to make it work. One suggestion for moving the ideals of EBM forward was made in the U.S. Ocean Commission report.

Recommendation 5-5 from that report calls on the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Environmental Protection Agency (EPA), working with other appropriate federal and regional entities, to coordinate the development of regional ecosystem assessments. These assessments would be invaluable for comprehensive OCS resource planning.

Good information will allow us to be proactive and get ahead of the curve, instead of simply reacting to a permit when it comes in the door. I urge to you to take these recommendations under serious consideration as you ponder the future of the OCS. Good mapping, observational data and assessment is absolutely critical to the long-term health of our managed ocean ecosystems.

III. A new management regime for the OCS is needed.

As your Subcommittees take up the issue of OCS development, I would ask that you also take a step back and fit the program into a broader framework. As the U.S. Ocean Commission recognized in its final report, a coordinated, integrated management regime for our oceans is sorely needed. (See Recommendations 6-1 and 6-2), and alternative energy needs to be part of that regime (Recommendation 24-5). Currently, the uses of our ocean are all regulated separately, fisheries in one agency, energy in another, sediment management in another, shipping and maritime activities in another. No government agency or body is charged with looking across the stovepipes of programs to see how all of the different uses of our oceans fit together. This needs to change.

To improve coordination and management of the nation's ocean resources, the U.S. Ocean Commission recommended a framework for regional ocean governance (See Chapter 5). The states have taken up the challenge and are leading the way in trying to improve the coordination of government activities in our marine waters. Don't take our word for it; The Joint Ocean Commission Initiative's Report Card issued in January of 2007 gave the states and regional efforts the highest grade: an A minus.

Since the release of the Commission report, the Governors of the five Gulf of Mexico states have released a plan to improve the health and resilience of the Gulf coast, The three West Coast Governors of California, Oregon and Washington, have signed the West Coast Governors Agreement for Ocean Health and plan to have an

action plan completed by the end of this year. The Great Lakes have developed the Great Lakes Regional Collaboration Strategy, which involved hundred of stakeholders from around the region. In my home region, the Northeast Governors have created the Northeast Regional Ocean Council. NROC will work to harmonize subregional ocean initiatives, identify shared priorities, promote regional solutions and to raise ocean awareness. NROC identified four core ocean management areas for a regional management:

- Ocean energy resource planning and management
- Ocean and coastal ecosystem health
- Maritime security
- Coastal hazard response and resiliency

New Hampshire is hosting a Regional Ocean Congress in May. At that meeting we will be to define our priorities within each those core management areas. Similarly the West Coast Governor's Agreement also names energy siting and renewable development as one of their seven priorities. The regional councils are learning from each other as they move forward.

The states believe that federal legislation would be helpful to advance these regional efforts. Such legislation should codify these regional efforts as coordinating bodies that are supported with federal resources. The coastal states have specific recommendations concerning principles and provisions that we believe should be included in regional legislation and many of them are outlined in the National Governors Association's Ocean and Coastal Policy I referenced earlier. NOAA should be one of the lead federal agencies in all of these regional governance efforts.

I would like to end by focusing on one of the recommendations from the U.S. Ocean Commission Report. Recommendation 24-5 states that Congress, with input from the National Ocean Council, should enact legislation providing for the comprehensive management of offshore renewable energy development as part of a coordinated offshore management regime. Specifically, this legislation should:

- be based on the premise that the oceans are a public resource.
- streamline the process for licensing, leasing, and permitting renewable energy facilities in U.S. waters.
- subsume existing statutes, such as the Ocean Thermal Energy Conversion Act.
- ensure that the public receives a fair return from the use of the resource and that development rights are allocated through an open, transparent process that considers state, local, and public concerns.

And if I may add one more bullet to that list, to involve states and regional interests as full partners in the discussion. While this ends my testimony, I hope it will be a starting point for your deliberation.

Response to questions submitted for the record by Ted Diers, Coastal States Organization

Questions from Chairman Costa:

Your testimony makes the excellent point that we need good information to make good decisions. You note that the Energy Policy Act of 2005 directed the Minerals Management Service to undertake a mapping exercise to guide our federal permitting activities on the Outer Continental Shelf, to gain increased awareness of key marine habitat and aquaculture projects, among other information. Two questions:

Would you recommend a different mapping approach, something similar to the Gulf of Maine mapping project that you mention?

More mapping is critically needed, particularly bottom habitat mapping. There really should be a partnership between federal agencies, states and NGOs, and federal funds should be made available for coordinated efforts like the Gulf of Maine Mapping Initiative (GOMMI) to help move mapping along more efficiently. The GOMMI is a good model for getting those types of maps, but what is also needed is interpretation of the maps into map products that can be used by a variety of constituent groups. This interpretation/translation step is often missed when creating mapping initiatives. Also, cadastral mapping that is currently being conducted by MMS is part of the needed approach.

Do you think we should slow progress toward renewable energy development on the Outer Continental Shelf until that mapping endeavor is further advanced, or we have better baseline data—or should we in other ways try to ensure that better mapping is factored into siting, review, permitting/management decisions?

I do not think that we should slow progress on renewable development, rather we should rapidly increase the pace of mapping. Moving forward, sites (lease blocks) proposed for leases should be mapped and inventoried but this should not hold up projects already in application stage. In addition, until we have a better documentation of the undersea resources, experts at NOAA, the states and regional entities need to have a higher profile in the siting process.

Your testimony looks ahead to the likely time when technologies are advancing even more quickly for ocean-based renewable technologies, and you underscore that our federal policies will need to be able to keep up with those rapid changes. How would you recommend that we make our regulatory regime adaptable to such change and uncertainty?

We need more formalized governance structures for federal and state interagency efforts so alternative energy projects can be looked at with all the other competing uses on the outer continental shelf. We also need an information revolution for our coastal and offshore waters so we can eventually be proactive in the siting of these projects instead of simply reacting to each individual permit.

Other ideas include close coordination with the industry and states to help track technological advances. The regulatory structure should have a route for smaller scale pilot or test projects of new technology to enable further testing in situ and an opportunity to identify the potential environmental impacts in large scale deployments.

Mr. COSTA. Thank you very much, Mr. Diers. How many states are included in your organization?

Mr. DIERS. Thirty-five states and territories, sir.

Mr. COSTA. OK. That is a lot of coastline.

Mr. DIERS. That is a lot of coastline, sir.

Mr. COSTA. Mr. Olsen, you talked about this process that you have been engaged in now with regards to developing the various efforts for the progress on the programmatic EIS for the renewable energy on the Outer Shelf.

I thought you referenced a timetable on the rules and the final environmental impact statement, but could you restate them for me?

Mr. OLSEN. Sure. Let me just make sure that I get my facts straight here. The numbers that I gave you are the final programmatic EIS is on schedule for publication toward the end of this summer of 2007, and then we are also——

Mr. COSTA. August? September?

Mr. OLSEN. I would say August probably.

Mr. COSTA. OK.

Mr. OLSEN. We are also developing regulations to implement the new Environmental Policy Act authority.

Mr. COSTA. That will go through the timelines through the Federal Register and be published for comments and all of that?

Mr. OLSEN. Exactly.

Mr. COSTA. OK.

Mr. OLSEN. Yes, sir.

Mr. COSTA. So based on that timeframe, when do you expect to begin issuing permits for some of these projects on the Outer Continental Shelf?

Mr. OLSEN. Well, I don't know. I don't know.

Mr. COSTA. That is sort of an answer. You don't know, meaning I suspect there will be applications?

Mr. OLSEN. It depends on the applications. It depends on the applications that we have. Based on the rough timeline, we would hope to be issuing them as soon as possible.

Mr. COSTA. The end of this year? Next year?

Mr. OLSEN. I don't have——

Mr. COSTA. I mean, do you have an idea of how long that time process will take once the first permits are applied for?

Mr. OLSEN. Off the top of my head I don't.

Mr. COSTA. OK. Do you envision any new staff for support? I mean, let us say you get 50 or 100 of these permits for wind or some efforts on pilot projects on wave projects.

Mr. OLSEN. In terms of staffing, I would say that we would do the best with the resources that we have. If there are a number of applications and there is a workload that comes in that requires additional staff then we would certainly look at putting on more staff.

Mr. COSTA. My concern is that you are being anticipatory in this effort. I mean, I appreciate your candidness that you don't have answers, but it seems to me that what you are saying is that based upon what happens later this year or next year you may come to us and say we have all of a sudden 100 or 200 permits, and we don't have enough people. It will take us two and a half years to process them. You don't know?

Mr. OLSEN. I don't know.

Mr. COSTA. OK. Duly noted.

Ms. Miles, you talked about the flexible approach, and you used as your pilot project those in Makah Bay and Roosevelt Island. Those are interesting I think, and maybe they serve as a good starting point.

Can you provide some examples on how FERC, the Federal Energy Regulatory Commission, may establish additional flexibility and creativity regarding the new technologies for both hydropower as you deal with your cooperation or your collaboration, I should say, with the other agencies?

Ms. MILES. Well, I think we have already established our flexibility in seeking out comments from all state and Federal agencies and all stakeholders about——

Mr. COSTA. The states? Have all 35 states commented?

Ms. MILES. No. No, not all states participated in our conference, but they all had the opportunity to participate.

Mr. COSTA. Could you for the record give us an indication of those who actually did participate, please?

Ms. MILES. Yes, I would be happy to do that.

Mr. COSTA. Thank you.

Ms. MILES. As a result of comments that we received, we have changed our preliminary permit program to provide stricter scrutiny and to actually issue a policy of inquiry—comments are due by the end of this week—to solicit more input on how that could be adapted better for ocean energy projects.

Mr. COSTA. OK. My time is running out. Mr. Keeney, with the scope of the committee's jurisdiction here can you summarize your

concerns regarding the expected process for the siting and regulating of these various projects on the Outer Continental Shelf?

Mr. KEENEY. Mr. Chairman, we comment through the licensing agency on areas of natural resources.

Mr. COSTA. And so your criteria is based upon ecosystem functionality and assessment, monitoring and those kinds of things?

Mr. KEENEY. Yes. It all depends on to what extent the resources——

Mr. COSTA. Have you developed that criteria?

Mr. KEENEY. The criteria for review?

Mr. COSTA. Yes.

Mr. KEENEY. We have been involved in it for years.

Mr. COSTA. And so you know precisely where you are going to focus on your assessment and your monitoring?

Mr. KEENEY. Well, assuming we have investigated the area that is being impacted, which again assumes that we have a model.

Mr. COSTA. It is safe to assume?

Mr. KEENEY. I think it is fairly safe. We have a pretty good idea. If it is a marine sanctuary, if it is an estuarine research reserve, we have a pretty good idea what is in there.

Mr. COSTA. All right. My time has expired, and I will recognize the gentleman from New Mexico, Mr. Pearce.

Mr. PEARCE. Thank you, Mr. Chairman.

Ms. Miles, we have heard some of the problems that existed between MMS and FERC. Now it is my understanding from the testimony that you all probably have resolved those in trying to coordinate. You basically have the memorandum of understanding as described by Mr. Olsen. Is that correct?

Ms. MILES. We are in the process of working out a memorandum of understanding. It is going quite well right now from our perspective, and we expect something in the near term.

Mr. PEARCE. OK. Now, Mr. Diers has commented that states and other stakeholders are not involved in your process. Do you take comments from all the stakeholders?

Ms. MILES. In both the licensing and the natural gas LNG process, all stakeholders have several opportunities to comment both before the application is filed and afterwards.

Mr. PEARCE. How would you rate your agency, Ms. Miles, as far as getting the permits done? In other words, not to get them accomplished, but to give an answer yes, they are suitable, or, no, there are problems to the environment. How do you rate your agency?

Ms. MILES. I think we are doing an excellent job right now. We were a bit slow on hydropower probably four or five years ago. We have done a number of things to try to get at those issues which we had, which was not enough information in the application when it was filed, and coordination with the other Federal and state agencies that have to issue permits.

Our new process has everybody at the table at the beginning, and it is working very well. We expect that we will be processing applications in 18 months.

Mr. PEARCE. Thank you.

Mr. Keeney, you refer to the OTEC. Do you perceive that the OTEC is in conflict with the Energy Policy Act as far as describing the agency of jurisdiction? How do you all perceive that as far as energy projects?

Mr. KEENEY. We don't perceive any conflict there.

Mr. PEARCE. In other words, you are an agency of record. I am not sure if I am using the right terminology, but under the OTEC you are the agency?

Mr. KEENEY. We are the permitting agency under the OTEC.

Mr. PEARCE. But you are not the permitting agency under the Energy Policy Act, and you don't find that to be a conflict?

Mr. KEENEY. No, we don't.

Mr. PEARCE. I was curious because you described that not many projects have occurred under OTEC since the 1980s, page four of your testimony.

Mr. KEENEY. Right.

Mr. PEARCE. And yet when I hear Ms. Miles, she describes 20 and 30 and 40 and 11, you know, so I feel the sense of a flurry of activity from Ms. Miles.

Do these projects have any similarity at all? In other words, yours involve energy production from the ocean and so what is the difference there that she describes a flurry of activity and you describe almost no activity?

Mr. KEENEY. Well, what I said was that we have had no applications before us yet, even though we have had regulations that we put in place years ago, which are no longer current, by the way.

There is an application I understand that is developing in the Pacific, but we have yet to see it.

Mr. PEARCE. But you heard the testimony of Ms. Miles. It sounded like several, 11 one year, 44 in another two-year period. Are these comparable? Am I hearing different things?

Ms. Miles, would you like to address that?

Ms. MILES. The projects that we have before us recently are the wave energy projects, primarily tidal. That technology is somewhat more developed than the wave energy itself. I can't comment on the disparity.

Mr. PEARCE. OK.

Ms. MILES. I can only tell you what we do.

Mr. PEARCE. That is fine.

Mr. Keeney, in your testimony on page 4 again you declare that the reason that you don't have many projects is the low price of fossil fuels now.

In 2003, the price began to move toward $70, and I will tell you if anything is going to be economic, it is going to get economic at $70 a barrel of oil. What do you think is the impediment at this point?

Mr. KEENEY. I think there is a science part of it with regards to actually how do you produce the energy. Price obviously is a factor.

Mr. PEARCE. OK.

Mr. KEENEY. But also experience is another one.

Mr. PEARCE. So we are quite a ways away, in other words? The technology doesn't exist to draw much energy from these?

There is a lot of potential or kinetic—I don't remember exactly; I didn't study that part of science class very well—which has a lot

of action going on out there, but not much way to convert it. Is that it?

Mr. KEENEY. Right. There has been talk about it for about 35 years.

Mr. PEARCE. OK.

Mr. KEENEY. There has been more talk recently, but it is still talk.

Mr. PEARCE. OK. Thank you, Mr. Chairman. I see my time has elapsed. Madam Chair. Excuse me.

Ms. BORDALLO. [Presiding.] Thank you very much, Mr. Pearce.

I would like to just state that the Co-Chair here had a meeting to attend to, so Mr. Costa will be out for some time and I will take over.

Mr. PEARCE. The improvement is obvious from the beginning, Madam Chair.

Ms. BORDALLO. Mr. Mike Olsen, I have a question for you. The Energy Policy Act of 2005 gave the Minerals Management Service the authority to regulate marine related activities authorized by Congress.

Now, the draft environmental impact analysis released by MMS has a large section discussing aquaculture. Is MMS planning on developing an aquaculture program?

Mr. OLSEN. The authority given to the Department of the Interior through the Energy Policy Act, Section 388 of the Energy Policy Act, deals with not only alternative energy, but alternative uses of existing energy facilities, rigs, things that are already in place.

One of the programs that we contemplate as being looked at as part of that would be the examination of aquaculture type projects.

Ms. BORDALLO. Aquaculture. Is the Commerce Department doing much the same?

Mr. KEENEY. I can answer for that, Madam Chair.

Ms. BORDALLO. Yes? Please.

Mr. KEENEY. We are very much involved with aquaculture and very interested in using offshore facilities to support aquaculture and have been in discussion with your counsel's office and other regulatory folks within MMS about that very subject so that NOAA and MMS are working together on this. We are not working against each other.

Ms. BORDALLO. You wouldn't say it is a duplication?

Mr. KEENEY. Not at all.

Ms. BORDALLO. All right. The next question I have is for Mr. Keeney.

NOAA's role. Of all the agencies at the witness table today, NOAA is the clear leader in terms of marine resource expertise. How are we going to ensure that NOAA's expertise is considered during the project approval process?

What role do you envision for NOAA to ensure compliance with the Endangered Species Act, the Marine Mammal Protection Act and the Magnuson-Stevens Act and other marine laws? Has NOAA discussed with MMS how the conservation requirements of living resources will be addressed, and what do you contemplate?

Mr. KEENEY. NOAA reviews projects to help minimize impacts on living marine resources and their habitats. Since the year 2002, we have also been involved with wind and LNG; since 2004,

hydrokinetics; since 2005 with the alternative energy uses on the OCS.

NOAA's habitat programs give substantial attention to ocean, coastal and marine energy development. All NOAA programs work together to develop consistent and integrated messages.

We have had no problem at all in our consultation role. However, NOAA is not in approving or denying OCS proposals. I mean, that is not our function, but it is really one of conducting consultation with the licensing agencies to ensure that NOAA entrusted resources are conserved.

We believe that the lines of communication there are open. We have good abilities to discuss with our licensing agencies and co-agencies, the Federal agencies who have the responsibility to provide the license. We have open lines of communication with regards to providing our concerns, and our job is to make sure that they be addressed in the balance of trying to determine how to go forward.

Ms. BORDALLO. Do you feel they are going to be active?

Mr. KEENEY. We are very active, yes. In fact, I daresay we are probably the most active of all the agencies providing consultation, consultative services.

Ms. BORDALLO. Good. I would like to also comment on Mr. Ted Diers' Coastal States Organization.

I was very pleased that you mentioned states and territories. You know, it is very seldom in the U.S. Congress when they mention the states they ever mention territories, and we are very much a part of the U.S. family.

I am curious. Your Coastal States Organization, what territories belong?

Mr. DIERS. We have American Samoa, Hawaii. Well, Hawaii is a state. Sorry. I was just thinking Pacific. We have the North Marianas, of course Guam, Puerto Rico and the Virgin Islands I believe rounds out the group.

Ms. BORDALLO. You have made my day. That is all of them.

Mr. DIERS. Thank you.

Ms. BORDALLO. Thank you very much.

I would like now to recognize Mr. Frank Pallone, the gentleman from New Jersey and to remind him that Committee Rule 3[c] imposes a five minute limit on questions.

Mr. PALLONE. Thank you, Madam Chairwoman.

I wanted to ask Mr. Olsen my questions just because I only have the five minutes. These alternate energy-related uses being considered for the Outer Continental Shelf involve the installation of industrial facilities in many cases.

You know, there is particularly concern in New Jersey over the windmills; that they might provide clean power, but if they are large, stationary, moving parts, you have lubricants, oil, other substances that might pollute the environment.

First of all, when you talk about alternate energy-related uses what kinds of industrial facilities or structures would that entail? If you could tell me briefly what kinds of things? I know windmills, but what else?

Mr. OLSEN. Now, do you mean alternate use, or are we talking alternative energy structures?

Mr. PALLONE. Alternative energy structures.

Mr. OLSEN. Structures. Well, windmills of course. There are devices that go out offshore—I don't know how best to explain it—that capture wave motion. There are turbines that go out underneath the water, under the surface of the water, that turn and capture the motion of the ocean current.

Mr. PALLONE. What do we know about the impacts of those facilities on marine life in the OCS region? Has any work been done on that, or is that what you are working on right now?

Mr. OLSEN. That is what we are looking at now with our programmatic EIS, as well as our examination of the broad program or looking at the environmental stuff, as well as the promulgation of our rules.

Mr. PALLONE. Are there any plans to study how the facilities would affect fisheries and how fisheries management processes should adapt?

Mr. OLSEN. Are there studies being done?

Mr. PALLONE. What you are looking at now.

Mr. OLSEN. Yes.

Mr. PALLONE. To what extent would they look at the impact on fisheries?

Mr. OLSEN. I don't know. I don't have a specific number or figure for you, but I know that the scope of the EIS is quite broad, looking at everything from environmental effects to socioeconomic effects to effects on view sheds, everything from——

Mr. PALLONE. Can I ask Mr. Keeney of NOAA? Would you be able to answer that or give me more specifics?

Mr. KEENEY. Well, I am not sure about the specifics, but I can tell you that the NOAA terms and conditions that are provided address monitoring for marine mammal, seabird, marine debris entanglement, anchoring system, transmission cable integrity and seabed impacts and initial measurement of noise levels and electromagnetic fields with monitoring required if known disturbance levels were exceeded.

A unique aspect of this project, and I am talking about the Makah project here, the Finavera Aqua Energy Project, which is the one that we are looking at right now. The unique aspect of this project is the absence of precedent and environmental assessment from other wave energy or similar projects.

Mr. PALLONE. Let me ask you this, because I know I don't have much time. Going back to Mr. Olsen, do you have any application pending from off the coast of New Jersey? I know there is at least one out that has been pending from other states. Is there anything from New Jersey?

Mr. OLSEN. Let me see. No, not that I am aware of.

Mr. PALLONE. OK. What about the CZMA Act that gives the coastal states authority and primacy with regard to activities, the consistency determination?

Mr. Diers recommended that the Federal permit for alternative energy projects include approval from the affected state. What is your reaction to that recommendation, or how would you coordinate with states to approve a project?

Mr. OLSEN. Well, currently as we go through this process of promulgating regulations and working on this programmatic EIS we

have been working quite extensively with the coastal states, participating in meetings and——

Mr. PALLONE. But I mean in terms of the approval process, because my time is running out. Will the states have the ability to veto it? What would be their role in terms of approving a project?

Mr. OLSEN. I think that would depend on what we come up with in terms of regulations. I don't think we have come to that. I don't think we have made that determination at this point.

Mr. PALLONE. So the consistency determination under the CZMA, would that kick in for like an offshore windmill, for example?

Mr. OLSEN. I am not an expert on the CZMA. I am not.

Mr. PALLONE. Sure. If you want to answer?

Ms. MILES. I can speak to it for a hydropower project. It would be necessary before we could issue any kind of a license would be a determination under the Coastal Zone Management Act of consistency with——

Mr. PALLONE. Do you think that would be true of a windmill too?

Ms. MILES. I don't know about windmills. No.

Mr. PALLONE. But it might be for some of these industrial uses, for some of these industrial facilities possibly. All right. Thank you.

Ms. BORDALLO. Thank you. Thank you very much.

The Chair now recognizes the gentleman from Washington, Mr. Inslee.

Mr. INSLEE. Thank you. Madam Chair, thank you for allowing me to participate.

I just want to note that we will be introducing today the Marine and Hydrokinetic Renewable Energy Promotion Act of 2007, which is going to help this industry get going in a variety of ways with some tax credits and the like, so we are very interested in the regulatory structure to allow that to blossom. I believe there is a real future off our coastlines, and I look forward to working with any of you to try to see that come to fruition.

Just a first question to those on the panel. Can you give us some just broad brush what assessment you have of the potential off of our coastline for wave and/or tidal energy or current energy? Can you give us any assessment at all?

Ms. MILES. I can give you a percent. I think the EPRI, Electric Power Research Institute, has done a number of studies and with some expectation that over time as the technology becomes more developed that there is the potential to double the existing hydropower, which is a little under 10 percent, so to double it to say 20 percent.

Mr. INSLEE. So do you mean that off our coastlines we have a potential to have 20 percent of our electric needs then?

Ms. MILES. That is a rough estimate that is done as people are looking at what is possible out there.

Mr. INSLEE. Right.

Ms. MILES. Now, the technology is evolving so that that could change over time with more knowledge.

Mr. INSLEE. Would anyone else like to address that issue?

Mr. OLSEN. I have some numbers, Congressman. This is in our written testimony as well.

According to estimates provided by the Department of Energy, the potential offshore, and you had asked I think specifically about

wave. Across the board I will give you the numbers. For offshore wind resource, excluding Alaska and Hawaii, is 2,500 gigawatts; ocean waves is approximately 240; ocean tides, 7.5; and ocean currents, 2.5.

Mr. INSLEE. Do you know how that works out in a percentage number? I should, but I don't.

Mr. OLSEN. I don't do math. I don't know, but we can certainly get that back to you if you would like.

Mr. INSLEE. Well, it is kind of a rhetorical question. It appears to me like there is very significant energy potential off of our coastlines, and I for one, and this is why we are introducing this bill, believe that we ought to put the pedal to the metal to try to expand the horizon of this.

I look at this industry like where wind was maybe 20 years ago. They both involve moving currents of liquid in this case rather than gas, but a liquid has somewhere between 800 and 1,000 times more energy per volume than moving wind, so we have the most concentrated energy possible to tap into.

I mention that because I hope frankly that you all take into your personal kind of goals to try to help this industry develop, and I hope you become as excited about it as they are and I am because I think you have in your responsibilities a significant part of the potential to deal with global warming.

I have been sitting in quite a number of hearings, and there has not been a table who are as important to the development, to our response to global warming as you four sitting there right now and your ability to help this industry become fully mature. I just hope that you will look at that with the same level of enthusiasm that some of us do in discharging your responsibilities.

Question. Is there anything you would suggest to us as far as coordinating your respective agencies' regulatory response to the development of this industry? Are there any glitches that need to be ironed out? Is there any conflict between your respective responsibilities that need to be resolved?

Mr. OLSEN. I will go ahead and weigh in here. One of the things that Ms. Miles and I had talked about is the relationship between the responsibilities of the Federal Energy Regulatory Commission and the Minerals Management Service and I guess our respective roles in permitting and oversight regulation of these types of projects.

As I mentioned in my testimony, the Department of the Interior feels that MMS plays a lead or the lead role in these projects, but at the same time we take seriously the expertise and responsibility missions of other agencies, including FERC and NOAA, and currently we are working with FERC to put together a memorandum of understanding that would resolve any outstanding issues with respect to regulation and oversight permitting of these types of projects.

Ms. MILES. The only thing I would add to that is that what we are looking at is how we can have a simple, nonredundant process so it serves the needs of all the stakeholders, applicants and others for good government. That is what we are after.

Mr. KEENEY. I would just like to add that as many of these technologies are in their early stages of development, Congress should

consider mechanisms to broaden the understanding of how new ocean energy technologies can be developed in an environmentally sound manner.

NOAA would benefit from increased research on the environmental impacts of these technologies. However, in the meantime an adaptable management approach for the permitting and licensing of both prototype and full-scale energy production projects is necessary so that existing uses and natural resources are not compromised.

Such an approach would allow OCS renewable energy efforts to proceed in a precautionary fashion.

Mr. DIERS. If I could just add one thing from the states' perspective is that essentially all of the answers that you get are essentially reactive answers. Something comes up. You react to it.

I think from the states' perspective one of the things we would like to see is a little bit more advanced planning. Where are the best areas for these sorts of things? What are the real opportunities out there? Let us look at a comprehensive management regime. Let us look at what are the resources and observations needed in order to make those kinds of determinations.

I think that that is one of the issues that really needs to be taken up in any kind of new legislation is figuring that out not just from a reactive mode, but from a proactive mode because I think that that will help us to move forward better.

Mr. INSLEE. We will work on that. I just wanted to welcome Alla Weinstein and Jason Bak from my neck of the woods with Finavera. I may not get to hear your testimony because I am going over to Ways and Means to try to get a tax break for this industry. Thank you.

Ms. BORDALLO. I thank the gentleman from Washington, Mr. Inslee, and now the Chair recognizes the gentlelady from California, Mrs. Capps.

Mrs. CAPPS. Thank you, Madam Chair, for having this hearing and to our witnesses for your testimony.

I noticed that our Chairwoman brought up the issue of artificial reefs and mariculture during your questioning. I want to follow along that line and turn to you, Mr. Olsen, with a question regarding the draft PEIS, which states that MMS considers an artificial reef an alternate use of energy platforms.

My question is does the Department plan to change its current regulations that require platforms to be removed or decommissioned after they stop producing oil and gas so that they can be turned into artificial reefs? In other words, are you going to change the existing policy?

Mr. OLSEN. I am not aware that we are changing an existing policy. We are looking at though as the authority that we have been given under the Energy Policy Act to use, for example, an existing platform as something as an alternate use for recreation, for——

Mrs. CAPPS. Let me ask it a different way.

Mr. OLSEN. OK.

Mrs. CAPPS. I don't mean to interrupt you, but I am mindful of the clock ticking.

Does the Energy Policy Act gives MMS the authority to change its current decommissioning regulations? That is another way of asking that question.

Mr. OLSEN. I am not certain.

Mrs. CAPPS. You are not certain about this?

Mr. OLSEN. I don't know for sure, but MMS is and has been an agency that will permit and regulate and decommission projects. It is a cradle to the grave approach.

In terms of decommissioning, when a facility has come to the end of its life we will continue in our role as an agency that will decommission that particular facility.

Mrs. CAPPS. All right. I just want to go along this line. I would love to have time to ask other people to comment.

The current regulations stipulate that MMS can grant an exemption from its platform removal requirements if the structure becomes part of a state rigs to reef program. Isn't that correct?

Only a few states have such programs, however. My home state, California, has remained adamantly opposed, and so again my question. Is MMS planning to create a Federal rig abandonment program that would preempt state rigs to reefs programs?

Mr. OLSEN. I honestly couldn't tell you whether we are or not, but we will certainly take that and provide you an answer.

Mrs. CAPPS. All right. I would like to have that in writing. I would request it because if a state has no rig abandonment program such as California, my question remains will MMS allow for the disposal of old energy platforms at sea.

Mr. OLSEN. OK

Ms. BORDALLO. No objection.

Mrs. CAPPS. All right. I will turn to you briefly, but I have something I want to make sure is on the record. Go ahead, Mr. Keeney.

Mr. KEENEY. I just wanted to mention that I have been involved in this personally for several years, and NOAA's involvement is because of the potential value of the habitat.

Mrs. CAPPS. Yes.

Mr. KEENEY. The existing habitat on those reefs, particularly with regards to depleted stocks of like, for instance, rockfish.

Mrs. CAPPS. Right.

Mr. KEENEY. So we have been investigating the importance of the existing habitat on those reefs, and we have been working with MMS, and that would require an amendment to their regulations——

Mrs. CAPPS. I hear you.

Mr. KEENEY.—to allow for subsequent ownership.

Mrs. CAPPS. I would like to share with you if I could the way this appears to us in California, at least on the central coast where we have 20 platforms in the Santa Barbara Channel producing oil and gas right off my congressional district, though oil and gas industries have been trying to avoid its legal obligations to remove platforms and restore marine environment for years.

These platforms that I referred to, many of them are nearing the end of production. My state has repeatedly, as I said, rejected proposed legislation that would allow oil platforms to be left in the ocean. As part of their contract, it is stipulated that they remove them after they cease production. That is my understanding.

A blue ribbon panel of University of California scientists has concluded that oil platforms do not provide fish habitat, and I believe NOAA reached the same conclusion in response to a proposal to designate platforms as essential fish habitat.

Leaving platforms in the ocean for my constituents present significant risks to human health and the environment with all of the pollution that is at their base. I hope the Department will consider these comments as it considers programs dealing with rig abandonment.

If I have a little bit of time left, Mr. Diers, I wanted to ask a question regarding CZMA because we came to terms with that in an LNG siting proposal just a couple weeks ago. I just want to ask if it is not helpful to all stakeholders to have certainty on location, project specifics, early in the process and how you feel CZMA has a role to play there.

Mr. DIERS. My perspective on that is that CZMA is an excellent tool for helping to coordinate the various opinions of all the agencies that are associated with the project. That is the way we use it in my state, and that is the way I think a lot of people use it. We use it as our ticket to the dance.

Mrs. CAPPS. Yes.

Mr. DIERS. And so when we are able to go in and then be able to facilitate a discussion about how does this particular project meet with both the laws, as well as the intent of the laws within our jurisdictions as they pertain to these Federal permits.

I think it is a fairly good process. There are very few times when it doesn't work, and I think that that is probably testimony to this is a good model to be used for ironing out these differences before they get too far down the road.

Mrs. CAPPS. Exactly. As I said, we have been through this process just in the last few weeks of siting an applicant, bringing an application for an LNG facility right off our coastline.

The CZMA provided the only way for local constituents to have a say to what would be so directly affecting their air quality, their quality of life in so many years.

I have run the time. I am sorry, but I appreciate all the testimony that all of you have brought to us, and I would appreciate hearing back from the Department of the Interior.

Mr. OLSEN. Certainly.

Mrs. CAPPS. Thank you.

Ms. BORDALLO. I thank the gentlelady from California, and now the Chair would recognize for the second round of questioning Mr. Pearce from New Mexico.

Mr. PEARCE. Thank you, Madam Chair.

Ms. Miles, in following up on Mr. Inslee's question about the potential size of input for this wave energy and offshore energy, so we get a number of about 20 percent maybe.

Can you give us a timeline on about when we could expect that scientifically?

Ms. MILES. It is very hard to tell, but it——

Mr. PEARCE. Is your mic on?

Ms. MILES. I am sorry. Thank you. It is hard to tell because the technologies are at different stages of development with the closer

in tidal being more developed and the potential to be on-line with that earlier.

The greater potential, however, is in the waves, and that technology is not as sophisticated yet. It hasn't been tested quite as much as the other. I have heard said 15 to 20 years out. It is really a hard thing to tell at this point.

Mr. PEARCE. It surely is. It is a long way away and then somewhat unpredictable. Economics could change or whatever.

If we are looking at the cost per kW to build either kind of plant, and I have a list of costs. A coal plant costs about $1,290 per kW, a hydropower plant about $1,500 per kW to build it. A photovoltaic is $4,751 per kW.

Do you have any ideas on wave energy, about how much per kW those things will run, or is it still way too early?

Ms. MILES. It is way too early.

Mr. PEARCE. OK.

Ms. MILES. Again, I have heard some numbers. They were along the lines of wave from 10 to 32 cents per kilowatt hour.

Mr. PEARCE. All right.

Ms. MILES. And tidal from four to 12 cents per kilowatt hour.

Mr. PEARCE. Right.

Ms. MILES. But those are estimates that people are making. They are not anything that we are aware of at this time.

Mr. PEARCE. Still modeling and predicting and predicting without much conversion?

Ms. MILES. Yes.

Mr. PEARCE. OK. If you could hold that chart up there?

These structures that we are decommissioning offshore, what if someone came to FERC and said we would like to use this platform? In other words, it costs about $1 billion to build, and rather than destroy and take it loose they are saying would you just let us use it free of charge and if we got concession from the oil companies to do that.

Is that something that you all would approve in order to hasten the move to the market, some of these technologies that are really in the developmental phase? Is that something? How would you all deal with that request?

Ms. MILES. Is your question would this be valuable in the wave——

Mr. PEARCE. No. It is not is it valuable. It is if someone found a value and said we would like to keep that up, it is decommissioned from oil and gas use, but rather than destroy it let us use it.

It will save us about $1 billion in investment, and we could get to market sooner with a lower cost of energy. It would allow us to do a lot of projects. Is that something that you all would consider?

Ms. MILES. It is not something that I have thought about, so I would like to get back to you on that.

Mr. PEARCE. If you could, because, as a business guy will tell you, any time you see assets that are paid for and about to be disrupted or destroyed it makes sense that if someone else can use it free before it is torn up.

Mr. Keeney, do you have an opinion on this?

Mr. KEENEY. It depends on what you want to use it for. Again, the interest that NOAA has is the benefit that it provides to the marine environment.

There is an awful lot of soft corals and algae and other things that have built up on those rigs over the 30 years they have been there that we believe have some value to the marine environment.

Mr. PEARCE. OK. Mr. Diers, you had mentioned that you feel that states should become full partners. Does that mean that states should be able to—you can put the poster down now—invalidate or void a project, just keep it from moving forward? Is that what you mean by full partner?

Mr. DIERS. Well, sir, I think that it would really depend on the direct impacts of that project to the coast.

Mr. PEARCE. OK.

Mr. DIERS. That I think is the ultimate measure to the states is are there direct impacts and how do we evaluate that and can we make sure that those aren't going to be detrimental to the long-term health of our coast, so I guess my answer is it depends.

Mr. PEARCE. OK. You are somewhat critical of the process. Would you favor another bureaucracy that would handle the permitting of these kinds of projects?

Mr. DIERS. I am not sure I would favor any new bureaucracies.

Mr. PEARCE. Thank you. Thank you, Madam Chair.

Ms. BORDALLO. I thank the gentleman, and I do thank the witnesses for their valuable testimony and the Members for their questions.

The Members of the Subcommittee may have some additional questions for the witnesses, and we will ask you to respond to these in writing. The hearing record will be open for 10 days for these responses.

I would like now to recognize the second panel of witnesses, and the Chair would like to announce that we are in the process of having two votes, five minutes each, but I am going to keep the committee hearing going since I don't have the privilege of voting except in the committee of the whole.

At this time I would like to recognize the second panel of witnesses, Mr. Sean O'Neill, president of the Ocean Renewable Energy Coalition; Mr. Jason Bak, Chief Executive Officer of Finavera Renewables; Zeke Grader, Pacific Coast Federation of Fishermen's Associations;

Dr. Doug Rader, Principal Scientist for Oceans and Estuaries, Environmental Defense; George Hagerman, Senior Research Associate, Virginia Tech Advanced Research Institute; and Dr. Porter Hoagland, Research Specialist, Woods Hole Oceanographic Institute.

The Chair now recognizes Mr. Sean O'Neill to testify for five minutes. The timing lights on the table will indicate when your time is concluded.

All witness statements will be submitted for the hearing record.

STATEMENT OF SEAN O'NEILL, PRESIDENT, OCEAN RENEWABLE ENERGY COALITION

Mr. O'NEILL. Thank you, Madam Chairman. Is the mic on here?

I thank you and your colleagues for devoting your time and resources to this topic. It is a topic near and dear to the members of the Ocean Renewable Coalition, the national trade association for ocean renewables, including wave, tidal, offshore, wind and the potential for offshore biomass and other new technologies as they come down the pike.

We are made up of 32 companies ranging from technology and project developers, including Finavera Renewables, represented today by Mr. Bak to my left. We also have large investment firms, investor owned utilities, public owned utilities, legal and other firms located in the United States, Canada, Scotland, Denmark and Ireland.

Our number one goal in talking with you today is to emphasize the importance of clarifying and expediting the permitting process for marine renewables if this industry is to grow and prosper in the United States.

A permitting process for marine renewables must take into account the principles of proportionality and fairness, while encouraging innovation to address our common environmental and energy goals. Moreover, the industry needs funding for R&D demonstration projects, and it needs tax incentives.

Is the resource there? Yes, and you will hear from others on this, but 252 million megawatt hours of wave resources alone, resources located near highly populated areas on the coast placing fewer demands on already burdened transmission infrastructure.

Is the resource cost competitive? Not yet, but every indication suggests a much shorter time to commercial viability than experienced by many other renewable technologies.

Is the resource environmentally friendly? Once again, early indications show that ocean renewables represent some of the most environmentally benign energy technologies available today. No air emissions, no fuel costs, no fuel transportation costs or related environmental effects.

Moreover, we anticipate that proper siting, environmental assessment and incorporating the principles of adaptive management will minimize the effects on the marine environment.

In this regard, we note that the approach Congressman Inslee has taken in his bill will go a long way toward promoting marine renewables and generating data on environmental effects. Congressman Inslee's leadership in marine renewables goes back some time, and his understanding of the adaptive management program and funding for environmental studies under this program will help the industry gather the data necessary for building greater confidence in these resources.

We wholeheartedly support Congressman Inslee's bill and thank him and all the Members of Congress who have offered their support. Congressman Inslee's legislation will address the funding needs that have limited the growth of this industry, as well as encourage local communities, tribes and stakeholders to take part in the process.

At the same time, we need a regulatory environment that will complement new investment. Today the marine renewables industry faces two obstacles on the OCS. First, MMS needs to issue regulations for siting renewables on the Outer Continental Shelf. In

the absence of regulations, offshore developers can't even place wind monitoring devices or acoustic doppler equipment on the Outer Continental Shelf to study the potential sites.

We appreciate all of the good work that MMS and FERC have done to date, including the completion of a draft EIS. At a minimum, in the case of MMS we urge them to adopt interim regulations so that renewable development can proceed.

Second, wave and tidal developers face the potential of dual MMS and FERC regulation in projects located on the OCS or which straddle the OCS and state waters. Dual regulation will pose additional regulatory burdens for developers and must be avoided. We urge MMS and FERC to resolve the jurisdictional dispute expeditiously and avoid dual regulation at all costs.

Ocean renewables can help us diversify our energy portfolio and improve our environment. With the proper support, these resources will become a robust part of a reliable, affordable, clean electric supply portfolio. The worst outcome before us is to leave continued ambiguity on these issues of permitting and jurisdiction.

Thank you very much.

[The prepared statement of Mr. O'Neill follows:]

Statement of Sean O'Neill, President,
Ocean Renewable Energy Coalition

Introduction

Ocean Renewable Energy Coalition (OREC) is the national trade association for marine and hydrokinetic renewable energy dedicated to promoting energy technologies from clean, renewable ocean resources including wave, tidal, offshore wind and marine biomass. Coincidentally, OREC celebrates its second anniversary the same week as this hearing, and during this time, we have grown from a handful of developers to 36 members from all over the world. OREC is working with industry, academia, and interested organizations NGO's to encourage commercial development of ocean renewable technologies and raise awareness of their substantial, potential contribution to an affordable, reliable, environmentally friendly energy future.

We seek a legislative and regulatory regime in the United States that fosters the development of ocean renewable technologies, their commercial development, and allows for capturing the rich energy potential of our oceans. While other countries have already funded and deployed viable, operating, power generating projects using the emission-free power of ocean waves, currents, and tidal forces, the U.S. is only beginning to acknowledge the importance these technologies.

Ocean energy can play a significant role in our nation's renewable energy portfolio. With the right support, the United States ocean energy industry can be competitive internationally. With the right encouragement, ocean renewable energy technologies can help us reduce our reliance on foreign oil—fossil fuels, in general—and provide clean energy alternatives to conventional power generating systems. And with the right public awareness, our coastline communities can use ocean renewables as a springboard for coastal planning that reflects the principles of marine biodiversity.

Today, OREC will address the steps that we must take to realize the promise and potential of ocean renewables.

Is the resource there? Yes, and the resource is located near highly populated areas on the coast, placing fewer demands on already taxed transmission infrastructure.

Is the resource cost competitive? Not yet, but indications suggest a much shorter time to commercial viability than experienced by many other renewable technologies.

Is the resource environmentally friendly? Yes. Ocean renewables present some of the most potentially environmentally benign energy technologies available today—no air emissions, no fuel costs or associated mining or drilling effects, no fuel transportation costs or related environmental effects, and, with proper siting and technology, minimal marine or fisheries effects. Unfortunately, there is very little data to support this last claim, yet the data that does exist suggests minimal impacts with proper technology and siting.

BACKGROUND

A. Types of Technology

Before we describe the benefits that ocean renewables offer, we take a step back and offer a description of the different technologies. Ocean energy refers to a range of technologies that utilize the oceans or ocean resources to generate electricity. Many ocean technologies are also adaptable to non-impoundment uses in other water bodies such as lakes or rivers. These technologies are can be separated into three main categories:

Wave Energy Converters: These systems extract the power of ocean waves and convert it into electricity. Typically, these systems use either a water column or some type of surface or just-below-surface buoy to capture the wave power. In addition to oceans, some lakes may offer sufficient wave activity to support wave energy converter technology.

Tidal/Current: These systems capture the energy of ocean currents below the wave surface and convert them into electricity. Typically, these systems rely on underwater turbines, either horizontal or vertical, which rotate in either the ocean current or changing tide (either one way or bi-directionally), almost like an underwater windmill. These technologies can be sized or adapted for ocean or for use in lakes or non-impounded river sites.

Ocean Thermal Energy Conversion (OTEC): OTEC generates electricity through the temperature differential in warmer surface water and colder deep water. Of ocean technologies, OTEC has the most limited applicability in the United States because it requires a 40-degree temperature differential that is typically available in locations like Hawaii and other more tropical climates.

Offshore Wind: Offshore wind projects take advantage of the vast wind resources available across oceans and large water bodies. Out at sea, winds blow freely, unobstructed by any buildings or other structures. Moreover, winds over oceans are stronger than most onshore, thus allowing for wind projects with capacity factors of as much as 65 percent, in contrast to the 35-40 percent achieved onshore.

Other: Marine biomass to generate fuel from marine plants or other organic materials, hydrogen generated from a variety of ocean renewables and marine geothermal power. There are also opportunities for hybrid projects, such as combination offshore wind and wave or even wind and natural gas.

B. The status of U.S. wave, current and tidal projects

At present, prototype offshore renewable projects are moving forward in the United States. These include the following:

New Jersey based Ocean Power Technologies (OPT) has operated a test wave energy buoy off the coast of Hawaii for the U.S. Navy. It has also operated a buoy off the coast of New Jersey funded by Board of Public Utilities since 2005 and in February 2007received a preliminary permit to study the feasibility of a 50 MW commercial wave farm at Reedsport, off the coast of Oregon.

Finavera Renewables, Inc., has proposed a 1 MW pilot project for the Makah Bay off the coast of Washington state. In November 2006, Finavera completed a four year permitting process and submitted a license application and draft Environmental Assessment to the Federal Energy Regulatory Commission which is pending review.

New York based Verdant Power is undergoing licensing at FERC and deployed two of six units of a tidal/current project located in the East River of New York in December 2006. Verdant Power, Inc is in the process of deploying 4 more turbines scheduled for completion early May of 2007. One of the units is already delivering power to a commercial customer on Roosevelt Island.

Australian based Energetech has formed a subsidiary in Rhode Island which has received funding from the Massachusetts Trust Collaborative and has planned a 750 kw project for Port Judith Rhode Island. Permitting has not yet commenced.

Ocean Renewable Power Company of North Miami, Florida recently secured preliminary FERC permits for two sites in Alaska

Multiple permits for sites in Maine, California, Oregon, Alaska and Florida have been filed with the Federal Energy Regulatory Commission.

The Mineral Management Service (MMS) now has authority to lease lands for offshore wind projects on the Outer Continental Shelf. MMS has conducted environmental review of the proposed 420 MW Cape Wind Farm off the coast of Nantucket, MA and LIPA/FPL 100 MW project off the coast of Long Island, NY.

C. Overseas

In Europe, projects are moving ahead. Europe has already installed 587 MW of offshore wind in Denmark, Holland, Scotland, England and UK. See http://www.bwea.com/offshore/worldwide.html. Two near shore wave projects, are oper-

ating in Scotland and Isle of Azores. Pelamis of OPD in Scotland is deploying the world's first commercial wind farm off the coast of Portugal and Marine Current Turbines has operated a prototype tidal project for 2 years.

D. Commercial Viability of Ocean Renewables

Offshore wind costs range from 3-8 cents per kWh compared to 2.5-7 cents onshore. (World Renewable Energy Report 2002-2007, Renewable UK). These figures have been derived based on operating experiences in Europe and reflect operating experience. Costs for offshore wind increase as projects move further offshore, necessitating more costly mooring systems and larger turbines.

As for wave and tidal, we have general parameters on cost, but they remain subject to further refinement. The World Renewable Energy Report estimates the cost of wave energy at an average of 9 cents/kWh and tidal and current an average of 8 cents/kWh.

Recent EPRI reports have found that, presently, the cost of power from ocean technologies ranges from 7 cents to 16 cents/kw in a low case scenario. For tidal, the May 2006 EPRI report found that the cost is driven by the resource, a strong resource can yield power at prices as low as 6 cents/kwh. Plus, similarities between tidal and offshore wind bring costs down.

And, the costs of offshore wind or wave are stable. Whereas natural gas and oil have fluctuated over the years (with natural gas now higher than ever), offshore wind and wave energy costs are stable, since the cost of renewable power sources like wind or wave are free. The analogy here is that renewable energy financing functions more like a fixed-rate mortgage as opposed to a variable rate mortgage associated with the use of finite fossil fuel resources.

Also, costs are expected to decline as the industry matures and as economies of scale make ocean projects less costly. To compare, back in 1978 wind energy cost 25 cents/kwh to produce—but now costs between 4.5 and 6 cents/kwh. Wave is already less costly than wind was in its early stages. Moreover, the EPRI report found that if wave had obtained the same government subsidies as wind, it would be a far more advanced technology than at present. As the offshore wind industry makes advancements on mooring systems, turbine durability and other issues that bear on the cost of marine projects, these advancements will help bring down the cost of ocean energy. In addition, if we can gain a better assessment of our resources, we can target the most powerful sites first and learn from our experience in these locations to bring costs down further.

In addition, ocean renewable energy offers other economic benefits. Development of a robust offshore renewables industry can:

- Reduce reliance on foreign oil
- Rely upon ocean terrain for power generation as opposed to onshore land resources
- Revitalize shipyards, coastal industrial parks and shuttered naval bases
- Create jobs in coastal communities
- Allow the U.S. to transfer technology to other countries, just as a country like Scotland is exporting its marine renewables know-how
- Provide low cost power for niche or distributed uses like desalination plants, aquaculture, naval and military bases, powering stations for hybrid vehicles and for offshore oil and gas platforms
- Provide use for decommissioned oil platforms through "rigs to reefs program"
- Promote coastal planning that reflects the goals of bio-diversity, that maximize best comprehensive use of resources and capitalizes on synergies between offshore industries

II. WHAT THE INDUSTRY NEEDS TO ACHIEVE OUR GOALS

What will it take for the ocean renewable industry to move from where it is now to achieve its potential? OREC recommends the following actions:

—More funding for R&D and technology development: Wind energy has benefited from substantial government investment. Thirty years ago, wind cost 30 cents/kWH to generate; today, that cost stands at 3 to 7 cents/kWH. And even today, DOE continues to invest in wind. Just a few months ago, DOE announced a $27 million partnership with GE to develop large-scale turbines and also issued a $750,000 SBIR to Northern Power for offshore wind technology development.

Private developers have borne the costs of bringing the ocean energy technology forward for the past thirty years, but they need government support. Government funding will also give confidence to private investors and help attract private capital.

—Resource Assessment: At present, we do not even know the full potential of offshore renewables, because no agency has ever mapped the resource comprehen-

sively. The Energy Policy Act of 2005 directed the Secretary of DOE to inventory our renewable resources but that work has never been funded. And even as MMS moves forward with a rulemaking for offshore renewables on the OCS, it has not received funding to map the resource.

Preliminary studies done by EPRI and private companies show that we have substantial ocean resources. But we will not know the full scope without further mapping and study.

—Incentives for Private Investment: Offshore renewables are compatible with other large industries in our country, such as oil and maritime industry. These industries, with the right tax incentives, can provide substantial support to offshore renewable development. Incentives could include investment tax credits for investment in offshore renewables and incentive to use abandoned shipyards and decommissioned platforms for prototypes and demonstration projects.

—Incentives for coastal communities: Coastal municipalities stand to gain tremendously from installation of offshore renewables. They need to be stakeholders in the process with a voice in development that takes place off their shores. Congress can support this by continuing to authorize Clean Renewable Energy Bonds (CREBS) and the Renewable Energy Portfolio Incentives (REPI) for coastal projects.

—Reduced regulatory barriers: Until companies get projects in the water, we will not learn about the environmental impacts or true costs of offshore renewables. Unfortunately, developers face onerous barriers to siting small, experimental projects. We should establish streamlined regulation and permitting for offshore renewables, with maximum cooperation between state and federal agencies. A system to coordinate joint authorities could be established up front, either through MOUs, a Joint Office or liaison system, so there is one place that coordinates and integrates the lead agency process with other state and federal permits. Agencies will establish clear lines of responsibility and coordination and adhere to firm deadlines.

To minimize duplication of effort and develop expertise with hydrokinetic and offshore renewable technologies, each agency could dedicate teams of responsible parties from their respective agency that can coordinate on applications. The same team can learn the new technology, the new permitting and licensing process, and can more efficiently process all applications.

Another option is to create a Joint Hydrokinetic and Marine Renewables Office, staffed with key personnel from relevant agencies. Working through a joint office will increase accountability and enhance efficiency and information sharing. In the Energy Policy Act, Congress provided for creation of a joint renewables office within BLM.

III. Principles of Adaptive Management

In particular, we need a streamlined system that will allow for deployment of pilot projects to demonstrate technological viability and allow for study of environmental effects. Right now, pilot projects, few of which will ever generate significant revenues, remain subject to the same permitting requirements as conventional projects. In fact, environmental studies and regulatory costs account for as much as forty percent of the cost of wave and tidal projects. Agencies should be encouraged to minimize upfront review and extensive study of smaller, demonstration and pilot projects, and instead, incorporate principles of adaptive management that allow for study and mitigation on an "as you go" basis.

The concept of adaptive management allows for modification of project operation to accommodate newly discovered affects. For nascent technologies, adaptive management is preferable to a front loaded process, because it allows continued collection of data and ongoing monitoring after the project is deployed. Information gleaned from adaptive management is therefore, more accurate about affects than pre-deployment studies and projections. Adaptive management also allows for proportionality—the actions taken should be proportional to the adverse impacts identified. This concept is critical to the development of this industry.

IV. Dual Regulation Stifles Innovation, is Anti-Competitive, and Wasteful

OREC opposes any jurisdictional overlap between MMS and FERC for projects on the OCS. Dual regulation will give rise to duplication of effort and unduly burden developers. Moreover, such duplication would unnecessarily waste taxpayer dollars.

In addition, dual regulation will place wave energy developers on the OCS at a competitive disadvantage to developers of other alternative technology (like offshore wind) because these technologies are not subject to FERC's licensing requirements. Wave developers would also face additional costs, because MMS intends to charge royalties for use of public lands, while FERC assesses annual charges for costs associated with administration of the Federal Power Act.

Moreover, MMS must move expeditiously to devise regulations for issuing licenses and permits on the OCS. While we laud MMS' extensive work to date in developing rules for alternative energy development on the OCS, at the same time, the deadline imposed on MMS by Congress in the Energy Policy Act to issue regulations for siting alternate energy projects on the OCS have long passed. As a result, developers are still without guidance for licensing on the OCS at this critical juncture that wave, tidal and offshore wind technologies are building momentum.

It is essential that the Federal Government deals with the licensing process for this industry is to move forward.

V. Conclusion

Both the Federal Energy Regulatory Commission and the Minerals Management Service were established decades ago with responsibility over large scale energy development. With the resurgence of hydrokinetic and marine renewables, both of these agencies have undertaken the enormous task of interpreting their mission, as defined by law, in the regulation and permitting of these new and emerging technologies. I applaud their efforts and encourage them to achieve a timely, fair, and realistic approach.

It is essential that a licensing process for new and emerging renewable technologies take into account the principles of proportionality and fairness while encouraging innovation to address our common environmental and energy goals.

Is the resource there? Yes, and the resource is located near highly populated areas on the coast, placing fewer demands on already taxed transmission infrastructure.

Is the resource cost competitive? Not yet, but indications suggest a much shorter time to commercial viability than experienced by many other renewable technologies.

Is the resource environmentally friendly? Yes. Ocean renewables present some of the most potentially environmentally benign energy technologies available today—no air emissions, no fuel costs or associated mining or drilling effects, no fuel transportation costs or related environmental effects, and, with proper siting and technology, minimal marine or fisheries effects. Unfortunately, there is very little data to support this last claim, yet the data that does exist suggests minimal impacts with proper technology and siting.

Ocean renewables can help diversify our energy portfolio and improve our environment. With the proper support, these resources will become a robust part of a reliable, affordable, clean electric supply portfolio.

Ms. BORDALLO. Thank you, Mr. O'Neill.

Our next witness is Mr. Jason Bak, Chief Executive Officer of Finavera Renewables.

STATEMENT OF JASON BAK, CHIEF EXECUTIVE OFFICER, FINAVERA RENEWABLES

Mr. BAK. Chairwoman Bordallo and Members of the Subcommittees, thank you for your invitation to appear before you today. I am Jason Bak, the CEO of Finavera Renewables.

We are an energy company focused solely on development, ownership and operation of renewable energy projects around the world. Although we are developing up to 1,500 megawatts of wind energy in Canada and Ireland, my company is represented here today because we are the cutting edge of ocean wave energy in the United States through our U.S. subsidiary, Finavera Renewables Ocean Energy.

We have three wave energy projects under development in California, Oregon and Washington, and we are developing others outside of America. These are not just paper projects. We are literally weeks away from issuing contracts that will put U.S. steelworkers to work constructing our second generation wave energy buoy, which we are going to install off the coast of Newport, Oregon, this summer.

I am joined today by my colleague, Alla Weinstein, who leads Finavera's ocean energy technology team. Alla is a true pioneer in this field. The company that Alla co-founded, AquaEnergy Group, Ltd., became part of Finavera in 2006 when, after looking closely at every other type of wave energy generation and concept, we determined that the technology that Alla and her team developed had by far the highest potential to deliver environmentally sound, market competitive electricity to the American power grid.

The technology that we have works like this: Our buoy, which we call the AquaBuOY, converts the up and down motion of waves into a pressurized water flow, effectively creating the equivalent of a 650 foot waterfall. The pressurized water spins a turbine that generates electricity just like a conventional hydropower plant, but with no dam and no reservoir.

Unlike other ocean energy technologies, the AquaBuOY doesn't use petroleum hydraulic fluids nor does it require dredging to anchor it to the ocean floor. It is safer for the environment, and of course with wave energy there is no greenhouse gas emissions.

My message to you and the committee today is simple. Ocean renewable energy's time has come. It is not just pie in the sky. We are already turning ideas into jobs here in the U.S. Now we are about to turn blueprints into tons of carefully engineered American made steel.

Ocean energy has a huge potential resource. The amount of energy available for us to convert into clean electric power just off the West Coast is about equal to 1.5 times all of the existing hydropower in the U.S. Add Alaska, the east coast and the Gulf, and that is still more potential.

While the potential is great, regulations are not maturing rapidly enough. In many cases, the government hasn't begun to figure out how to take advantage of what we offer in terms of helping solve the climate crisis.

But that is not true everywhere. The State of Oregon has embraced wave energy. Our tribal and state partners in Washington state and local Federal officials are working hard with us to license our Makah Bay project.

The Government of Canada has adopted tax policies aimed specifically at boosting private investment in wave energy, and within the U.S. Government the Federal Energy Regulatory Commission is using its hydropower licensing authority in a very, very helpful way.

I would like to make two requests here today, but also would like to make two commitments. First are the requests. I would like to ask Congress to assure equitable tax treatment for ocean energy alongside of other renewable energies. No special treatment, just let us compete on a level playing field with our clean energy peers such as wind power.

Second, I would ask that Congress clarify the current regulatory system. Section 388 of the Energy Policy Act was a step in the right direction, but it left many questions unanswered and created a few new ones.

Here are my commitments. First, I commit to Congress that Finavera will, if given a rational regulatory environment, deliver very large amounts of clean energy free of climate changing

emissions in an environmentally sustainable way at competitive prices. We want the chance to help you solve the climate challenge by developing the new energy economy.

Second, I commit to my fellow panelists and other ocean stakeholders that my company is devoted to preventing the ocean energy equivalent of what Altamont Pass represented in the wind energy industry. We want to get it right the first time.

Finavera is the leader in this space. Finavera's Makah Bay project is the first and only wave energy project to enter the Federal licensing process. We understand and embrace our responsibility to engage collaboratively with conservationists, with fishermen, scientists, regulators and others so that we do get it right.

I would just like to finish by saying that this should be the beginning of a search for solutions. We need to keep talking. My fellow stakeholders here will play a key role in this process, and I would like to propose that we continue our dialogue.

In fact, I would love to host a meeting maybe in California to focus on discussion and building on the progress that we have made so far. If stakeholders are interested, we would be more than happy to organize this type of meeting and begin discussing this at an early stage.

Thank you for this opportunity to testify. I would be happy to respond to any questions and request that my full written statement be included in the record.

[The prepared statement of Mr. Bak follows:]

Statement of Jason Bak, CEO and Founder, Finavera Renewables, Inc.

Chairman Costa, Chairwoman Bordallo and Members of the Subcommittees, thank you for your invitation to appear before you today.

I am the CEO of Finavera Renewables. We are an energy company focused solely on development, ownership and operation of renewable energy projects around the world. Although we are developing 1500 megawatts of wind energy in Canada and Ireland, my company is represented here today because we are at the cutting edge of ocean wave energy in the United States through our U.S. subsidiary, Finavera Renewables Ocean Energy.

We have three wave energy projects under development in California, Oregon, and Washington, and we are in discussions about others. These are not just paper projects. We are literally weeks away from issuing contracts that will put U.S. steelworkers to work constructing our prototype wave energy buoy, which we are going to install off the coast of Newport, Oregon this summer.

I am joined today by my colleague Alla Weinstein who leads Finavera's ocean energy team. Alla is a true pioneer in this field. The company that Alla co-founded, AquaEnergy Group Ltd., became part of Finavera in 2006 when, after looking closely at every other engineering concept for wave energy, we determined that the technology Alla and her team developed has by far the highest potential to deliver environmentally sound, market-competitive electricity to the American power grid.

The technology works like this: Our buoy, which we call the AquaBuOY, converts the up-and-down motion of waves into a pressurized water flow, effectively creating the equivalent of a 650-foot waterfall. The pressurized water spins a turbine that generates electricity, just like a conventional hydropower plant, but with no dam and no reservoir. And unlike other ocean energy technologies, the AquaBuOY does not use petroleum hydraulic fluids, so it's safer for the environment. And, of course, there are no greenhouse gas emissions.

My message to you today is simple: Ocean renewable energy's time has come. This is not pie in the sky. We are already turning ideas into jobs here in the US. Now, we're about to turn blueprints into tons of carefully engineered American-made steel. And that steel, in the form of our buoys floating off the West Coast, will soon demonstrate our ability to convert the virtually limitless supply of Pacific Ocean waves into megawatts of clean electricity.

It is a huge potential resource. The amount of energy available for us to convert into clean electrical power off just the West Coast is equal to about one and one-half times all the hydropower in the US. The East Coast and Gulf offer still more potential.

But while our time may have come, we have to acknowledge that our technology and ambitions are maturing at roughly the same time that most federal, state, tribal and local governments are first becoming aware of us. In many cases, government hasn't begun to figure out how to take advantage of what we offer in terms of helping solve the climate crisis.

That is not true everywhere. The State of Oregon has embraced wave energy. Our tribal and state partners in Washington State, and local federal officials, are working hard with us to license our Makah Bay project. The Government of Canada has adopted tax policies aimed specifically at boosting private investment in wave energy. And within U.S. government, the Federal Energy Regulatory Commission is using its hydropower licensing authorities in a helpful way.

If we had to, we could continue forward with our business under the current laws. But if you believe, as Alla and I do, that ocean energy should be an integral, important part of the United States' response to climate change, then the current system is not good enough.

I have a two-part request of you. I also have two commitments to make, one to Congress and the second to my co-panelists who are stakeholders with Finavera in the management and conservation of the ocean.

Here are my requests:

First, I would ask that Congress assure equitable tax treatment for ocean energy alongside other renewables. No special treatment, just let us compete on a level playing field with our clean energy peers, such as wind power.

Second, I would ask that Congress clarify the current regulatory system. Section 388 of the Energy Policy Act was a step in the right direction, but it left many questions unanswered and created a few new ones.

Here are my commitments:

First, I commit to Congress that Finavera will, if given a rational regulatory environment, deliver very large amounts of clean energy, free of climate changing emissions, in an environmentally sustainable way, at competitive prices. We want the chance to help you solve the climate challenge.

Second, I commit to my fellow panelists and other ocean stakeholders that my company is devoted to preventing the ocean energy equivalent of what Altamont Pass represents in the history of wind development. We want to get it right the first time.

We are the leaders. Finavera's Makah Bay project is the first—and only—wave energy project to enter the federal licensing process. We understand and embrace our responsibility to engage collaboratively with conservationists, fishermen, scientists, regulators and others—so that we do get it right.

Detailed Description of Finavera's Wave Energy Projects

Finavera is actively pursuing development of a number of wave energy projects, including two in Oregon (one of which is intended to be a demonstration project in 2007, the other ultimately a true commercial project), a pilot 1 MW installation in Washington, and a commercial plant project in California. All projects are proposed for locations within a few miles of shore, mostly within state waters and not on the federal OCS, because, first, transmission cables are very expensive and a limiting factor in project location and, second, so as not become involved the apparent regulatory conflict between FERC and MMS over jurisdiction in the zone between three and twelve miles off shore.

In addition, the company has projects under development in Portugal, South Africa and Canada. While the regulatory and jurisdictional aspects of those projects do not relate to the subject matter of this hearing, it is worth noting that various stakeholders in the European Union have been active, and remain quite supportive, in creating incentives for development of renewable ocean energy technologies. The forms of support have included research grants administered by the European Commission, feed-in tariffs specifically designed for ocean energy in UK and Portugal, and concentrated effort of bringing together the European ocean energy community with a goal to reach commercialization as soon as possible. There is also considerable interest in using the technology to serve isolated, energy-poor coastal regions around the world.

Oregon Projects—Coos County and Newport

Finavera has applied for, but not yet received a preliminary permit from FERC for the proposed 100 MW Coos County Offshore Wave Energy Plant in Oregon

(FERC Docket P-12752). The company is also pursuing a demonstration project off Newport, Oregon, for which Finavera is in the process of obtaining the required state and U.S. Army Corps of Engineers permits. A FERC permit is not necessary for Newport project because it will not be connected to the power grid.

Finavera will be manufacturing prototype buoys at Oregon Iron Works over the next few months, and intends to install a single test buoy at Newport during the summer of 2007. The demonstration tests will be completed by October 2007. Finavera anticipates that test results will be positive, such that the company will be in a position to develop the projects into full utility scale. If so, the company will need to seek project licenses from FERC, and various other federal and state approvals.

- **Washington Project—Makah Bay**

Finavera has applied to FERC for a project license for its proposed Makah Bay project off the northwest tip of Washington's Olympic Peninsula. This is the first and only application to FERC for a license to construct an offshore wave energy plant. The company recently completed a comprehensive environmental assessment under NEPA that concluded that the proposed project would have no significant adverse effects. The FERC licensing process for the Makah Bay project (FERC Docket P-12751) is expected to be completed by the end of 2007. The Makah Bay project, when built, will be relatively small, four buoys generating a total of 1MW, a scale that is a reflection of the very limited onshore grid capacity at the site.

The Makah Bay project is a true pilot, both in the traditional engineering sense, but also in a different way. There simply was no applicable comprehensive regulatory system in existence at the time of project inception by AquaEnergy (now part of Finavera) in 2001. Nobody in the private sector, academia or government—federal, state or tribal—had ever been required to think through what issues, concerns, or questions would need to be addressed in order to properly site an ocean wave energy project.

The project team did the right thing. Rather than try to take advantage of the regulatory uncertainty to evade scrutiny of its plans, the company launched a comprehensive outreach effort to all stakeholders. With the inception of the Makah Bay project in 2001, Finavera pioneered a collaborative approach to wave energy project development by involving commercial and recreational fishermen, environmental groups, park users, government stakeholders, public utilities, and universities in the company's planning. This approach ultimately resulted in a very high level of consensus among stakeholders, and paved the way for the FERC licensing process.

We note with particular gratification that the stakeholder advisory council for the Olympic Coast National Marine Sanctuary, in its comments to FERC regarding our license application, has not expressed opposition to our project, but has quite reasonably called for a sophisticated and continuing monitoring and evaluation program, involving sustained stakeholder communications and collaboration. The Makah Tribe is working closely with Finavera on this project as a true partner. The Department of the Interior and NOAA Fisheries and Marine Sanctuary Programs, as well as various Washington State resource agencies are not opposing our efforts, and have worked well with us to identify appropriate environmental protections and monitoring protocols.

To our knowledge, no party is opposing issuance of a FERC license for the Makah Bay project, which marks a considerable achievement for any energy project, let alone a first-of-a-kind project sited in an environmentally sensitive marine environment within the boundaries of a national marine sanctuary. We see no reason that the Makah Bay project will not be licensed, built and put into operation in a manner that meets our interests as project developers while satisfying the concerns of all stakeholders.

- **California Projects—Humboldt County**

Finavera is working aggressively with California utilities to launch wave energy development in that state. The company has applied for a preliminary permit from FERC for a project near Humboldt County, along the north coast (FERC Docket P-12753). Among other things, Finavera is currently negotiating a "bankable" power purchase agreement (PPA) with one utility for a significantly sized wave power project using the company's AquaBuOY technology off the coast of California. The company looks to finance the project through conventional commercial debt. Permitting and associated project development activities are on-going.

Explanation of Finavera's AquaBuOY* Technology

Finavera's offshore power plants consist of patented wave energy converters that are based on proven, survivable buoy technology. Clusters of these small, modular devices called AquaBuOYs are moored several miles offshore where the wave resource is the greatest. The power plants are scalable from hundreds of kilowatts to hundreds of megawatts.

The AquaBuOY is a floating buoy structure that converts the kinetic energy of the vertical motion of oncoming waves into electricity. The AquaBuOY is categorized as a point absorber, defined as having a small dimension in relation to the longer wave length in which it is operating. It utilizes a cylindrical buoy as the displacer and the reactor is a large water mass enclosed by a long vertical tube underneath the buoy. The system is comprised of components that have been proven in other marine industries for decades.

The AquaBuOY consists of four elements:

- Buoy
- Acceleration Tube
- Piston
- Hose Pump

The acceleration tube is a vertical, hollow cylinder rigidly mounted under the body of the buoy. The tube is open in both ends so seawater can pass unimpeded back and forth, forcing the piston to move, and in turn extend or compress the hose pumps. Positioned at the midpoint of the acceleration tube is the piston, a broad, neutrally buoyant disk. When the buoy is at rest, the piston is held at the midpoint by the balanced tension of two hose pumps that are attached to opposite sides of the piston and extend to the top and bottom of the acceleration tube, respectively. When the buoy rides the waves, the acceleration tube moves in relation to the piston, and in turn extends or compresses each hose pump in tandem.

The hose-pump is a steel reinforced rubber hose whose internal volume is reduced when the hose is stretched, thereby acting as a pump. The pressurized sea water is subsequently expelled into a high-pressure accumulator, and in turn fed to a turbine which drives a generator. Generated electricity is brought to shore via a standard submarine cable.

A cluster of AquaBuOYs would have a low silhouette in the water. Located several miles offshore, the power plant arrays would be visible to allow for safe navigation and no more noticeable than small fishing boats or pilot lights.

Any offshore system must survive the harsh ocean environment. AquaBuOYs are similar to navigational buoys that have been known to survive for many decades. Safely positioned offshore, AquaBuOYs are designed for 100-year storms by riding atop the extreme waves at sea, rather than experiencing catastrophic damage, as during tsunami, from the breaking waves onshore. AquaBuOYs are moored with advanced anchoring and mooring technology.

Because the AquaBuOY power plant systems are modular, it is easy to scale projects to meet growing power demand. Additionally, the system's modularity provides a more consistent flow of power during maintenance cycles, since individual buoys can be taken off-line, while others remain in operation. The simplicity of the AquaBuOY system makes it an ideal choice for sourcing local suppliers, construction, and maintenance. Most components are readily available from domestic suppliers and the job skills required for fabrication and maintenance are present in most coastal communities.

Observations on Current U.S. Regulatory Approach

- **Direct Subsidies are Unnecessary**

Finavera believes, based on our success attracting private capital, that the ocean wave energy industry does not need direct subsidies. We do, however, believe it would be in the general public interest, and supportive of our industry, for Congress to provide adequate funding to the Department of Energy, including the National Renewable Energy Laboratories, to support independent assessment of ocean energy potential and advanced R&D work.

- **Taxation Should Be Equitable**

Ocean energy should be treated under the Tax Code on a par with other important renewable technologies, such as wind power. We do not need favorable treatment, just a level playing field. There are numerous legislative proposals under de-

*The unorthodox capitalization in the name AquaBuOY honors the memory of AquaEnergy's chief technologist, Bengt-Olov Sjostrom (B-O), and company co-founder, Yury Avrutin (Y), who died together in December 2001 when their plane crashed while investigating potential wave energy sites along the Oregon Coast.

velopment today that would amend the Code to promote renewable energy. We urge Congress to ensure that ocean renewable energy is given fair treatment in such legislation.

In the longer term, we would call to Congress's attention the tax policies adopted by the Government of Canada and the State of Oregon designed to promote renewable energy technology such as ours, particularly the flow-through tax credits provided under both schemes. Descriptions of those approaches are provided in an attachment to my testimony.

- **Federal Agency Authorities Need Clarification Based on Clear Goals and Principles**

The February 20, 2007 Report from Congressional Research Service, Issues Affecting Tidal, Wave, and In-Stream Generation Projects, provides an excellent overview of the current regulatory system. We would also draw to your attention the March 7, 2007 CRS report, Wind Energy: Offshore Permitting, which provides a very useful complement to the earlier report, especially in its discussion of Coastal Zone Management Act and state jurisdictional matters.

As can be seen from Finavera's experience with the Makah Bay project, we have found a way to work within the current regulatory system. Moreover, there are federal agency officials at FERC, NOAA, the Interior Department, Corps of Engineers, Coast Guard, and elsewhere who are doing their very best to make the current system work in a way that supports development of ocean renewable energy in a way that meets environmental, safety, navigation, fishery access, and other legitimate public concerns.

That said, the current system is not optimal. There are too many uncertainties about the respective authorities of federal agencies. Equally important, there are many questions about the relative powers of federal, state, and tribal levels of governments.

We understand the general temptation to focus on this situation by asking the question: Who should be in charge?

But, in Finavera's view, that is the wrong question at this time. We believe the better question is: What do we want to achieve?

Congress should focus on goals and objectives before wrestling with the question of who should carry out the mission.

You will not be surprised that we believe Congress should adopt an affirmative, enthusiastic policy to promote development of ocean renewable energy. We also believe that pursuit of that goal should be governed by the following principles:

1. Ocean renewable energy technologies and projects should be held to the highest standards of environmental performance. Blue energy has to be green.
2. The relative business success of different ocean energy technologies should be decided by private markets, not government. Let us compete to find out which technologies do the best job of meeting power market needs. Investors will embrace the most promising technologies, and utilities will buy from the most reliable and affordable sources. We believe that the quality of Finavera's technology will make us brothers-in-arms with the most demanding and prescient investors. Our competitors must feel the same way about their prospects—there is no need for government to pick winners or losers.
3. The States should be encouraged to provide timely leadership in identifying coastal areas that will be suitable, from a public policy standpoint, for ocean energy. We do not want to find ourselves pursuing federal approvals for projects that are not welcomed by the adjacent States in whose waters we may be located and on whose shores we must interconnect our projects.
4. Federal agencies should collaborate to study on a programmatic level certain environmental and other issues that likely are associated with all forms of offshore renewable energy in most locations. For example, it does not make sense to study on solely a case-by-case basis the potential impacts of ocean energy projects on marine mammal migration. Another example of a "generic" issue would be the impact of energy projects on sand and sediment deposition.
5. Rents, royalties, and other financial terms pertaining to use of the seabed should be established in a manner that promotes, and does not discourage, ocean renewable energy, especially during the decade or more that will be needed to bring the industry to relative maturity. The many comments submitted to MMS from offshore wind interests during the course of that agency's rulemaking on Section 388 offer useful perspective on this key financial matter.
6. Projects currently under development should not be interrupted or delayed while Congress works to enact new law. And, once new rules have been established, those projects that have made meaningful progress under the existing

regulatory system should not be forced to re-start the regulatory process. We need to keep moving forward to develop ocean energy sources while making the transition to a more straightforward regulatory environment.

Thank you for this opportunity to testify. I would be happy to respond to any questions, and request that my full written statement be included in the record.

Attachment to Testimony of Jason Bak
Examples of Tax and Other Incentives from Oregon and Canada

Oregon's Approach

Oregon has adopted a collection of programs designed to create incentives for private investment in renewable energy sources, including ocean wave energy.

- **Business Energy Tax Credit**

The Oregon Business Energy Tax Credit (BETC) is valued at 35% of "eligible costs" for any particular project. The manufacturing of renewable energy devices qualifies for the BETC. The maximum eligible cost is $10 million, resulting in a $3.5 million tax credit. The credit is a dollar for dollar credit against State of Oregon Business taxes owed. In addition, there is a "pass-through" option that converts the tax credit to a cash payment upon project completion. A pass through partner is identified (with assistance from ODOE) and takes the credit on one's behalf in exchange for a 25.5% cash payment based on eligible costs. Details, contact persons and applications can be found at http://www.energy.state.or.us/bus/tax/taxcdt.htm

- **Energy Loan Program**

The Oregon Energy Loan Program (also known as SELP) promotes energy conservation and renewable energy resource development. The program offers low-interest loans for projects that: save energy; produce energy from renewable resources such as water, geothermal, solar, biomass, biofuels, waste materials or waste heat; use recycled materials to create products; or use alternative fuels. The costs of designing and building an Oregon wave energy equipment manufacturing plant is eligible for a loan from Oregon's Energy Loan Program. Likewise, the costs of planning, designing and building a wave energy facility in Oregon is eligible for an energy loan. It appears that both a manufacturing plant and a wave energy facility would qualify for lower-rate loans resulting from tax-exempt bonds. Projects must be in sited Oregon. http://www.energy.state.or.us/loan/selphme.htm

- **Enterprise Zone Exemption (ORS 285C.055)**

Through a short-term tax exemption, an Oregon enterprise zone induces eligible businesses of all sizes to make additional investments that will improve employment opportunities, spur economic growth and diversify business activity. Qualifying new plant & equipment in a zone receives a total exemption for at least three and—in some cases—up to five consecutive years from the local assessment of ad valorem property taxes, which can otherwise have a deterring effect on private investors seeking to start or enlarge operations with a substantial capital outlay. Enterprise zone property (except hotel/resorts and utilities) also is exempt for up to two years while it is being constructed or installed. http://www.econ.state.or.us/enterthezones/whatare.htm

- **Construction-in-Process (C-i-P)**

For up to two years, all structures and heavy equipment are exempt from taxation. This exemption is available for each year, in which on January 1 the facility has been neither placed in service nor used or occupied for intended, commercial operations. http://www.econ.state.or.us/BIexemp.htm

- **Strategic Reserve Fund**

The Strategic Reserve Fund (SRF) was established by the Oregon Legislative Assembly to support economic and community development in Oregon. SRF projects must be approved for funding by the Governor. With the SRF, Oregon supports cost effective projects that create, expand and preserve the principal traded-sector industries of Oregon. The fund encourages diversification and preservation of regional economies. Administered by the Oregon Economic and Community Development Department (OECDD), the SRF is used to invest in time-sensitive economic opportunities statewide. Awards from the fund must be directly approved by the Governor of Oregon and are most often in the form of a forgivable loan.

- **Research Tax Credit**

The credit applies to research activity or investments during the tax year. It equals 5 percent of the increase in research expenses over a base amount for the

taxable year. Alternatively, the credit is 5 percent of qualified research expenses that exceed 10 percent of Oregon sales for the year (capped at $10,000 for each percentage point in excess). The annual maximum credit allowed per taxpayer is $2 million. This credit is based on the federal R&D credit and available only to corporate taxpayers. http://www.oregon.gov/DOR/BUS/docs/102-694-9.pdf

- **Strategic Investment Program (SIP)**

The Strategic Investment Program (SIP) was authorized by the 1993 Legislature to increase Oregon's ability to attract and retain capital-intensive industry and jobs, particularly in high-technology industry. Under the SIP, traded-sector companies making large investments in new real and personal property are subject to fewer taxes, with the aim of fostering economic growth and improving employment opportunities in the state. Projects approved for the SIP must pay full property taxes on the first $25 million or $100 million invested, a threshold that increases 3 percent each year; all value above this threshold is exempt from taxation. An annual Community Service Fee equal to 25 percent of abated taxes, up to $500,000 or $2 million, must also be paid. Additional fees can be negotiated, as part of the local approval process with the county and city government. http://www.econ.state.or.us/BIexemp.htm

- **Workforce Training Funds**

The Employer Workforce Training Fund (EWTF) provides a resource for training Oregon's private sector workforce. The emphasis of the funds is to upgrade skills of the workforce in order to increase productivity, keep Oregon businesses viable and competitive, and to offer new skills and opportunities to Oregon's workers. Particular emphasis will be placed on investments that assist labor, businesses and industries with cost effective training projects that retain and expand jobs in traded-sector clusters that are economically important to the state's regional economies and the state as a whole.

After the company has been in operation for at least 120 days, it can be eligible for workforce training assistance. Application must be made for such grants and issuance of the grants cannot be guaranteed by the State. However, the State and the local partners shall make best efforts to secure grants for training to meet the company's needs and in accordance with state laws and regulations. http://www.econ.state.or.us/BIAworkforce.htm

Canadian Approach

Canada, and in particular British Columbia (where Finavera's head office is located) is a favorable region in which to set up a technology venture, because of generous research and development tax credits. These incentives include federal government incentives (New "flow through of expenses" regime and SRED), and provincial incentives.

- **New Federal Government "Flow-Through" and accelerated CCR incentives**

In its recently-announced 2007 Budget, the federal government made ocean energy eligible for the Canadian Renewable and Conservation Expense ("Flow Through") and the Accelerated Capital Cost Allowance regime.

The new tax credits will help ocean energy companies raise money for development work. The "flow through" tax credit—which currently available for mineral and wind resource development—encourages investment in exploration by offering tax incentives to investors.

On April 18, 2007 The Honorable Gary Lunn, P.C., M.P., Canada's Minister of Natural Resources, wrote Finavera the following letter:

> *Dear Mr. Bak:*
>
> *Thank you for your letter of March 26, 2007, regarding tax treatment to ocean energy.*
>
> *On March 19, 2007, our government displayed its commitment to the environment and renewable energy by announcing the extension of the accelerated capital cost allowance and Canadian Renewable and Conservation Expense (CRCE) to ocean energy and other renewables. As active proponents of this amendment, Finavera Renewables helped to successfully illustrate to government the utility of these market driven tax incentives to support Canada technology and domestic industry.*
>
> *Through the implementation of these important tax incentives, the Government of Canada is investing in technologies that contribute to reductions in greenhouse gas emissions, improved air quality, that promote the diversifica-*

tion of the energy supply and a competitive economy. We will support the ocean energy sector and its Canadian developers and technology leaders such as Finavera.

Again, thank you for writing on this important matter.

Yours sincerely,

The Honourable Gary Lunn, P.C., M.P.

Following are the details of the incentives promulgated in the 2007 Budget.

Accelerated Capital Cost Allowance for Clean Energy Generation

A 50-percent accelerated capital cost allowance (CCA) is provided under Class 43.2 of Schedule II to the Income Tax Regulations for specified energy generation equipment.

Eligible equipment must generate either (1) heat for use in an industrial process or (2) electricity, by:

- using a renewable energy source (e.g. wind, solar, small hydro),
- using waste fuel (e.g. landfill gas, manure, wood waste), or
- making efficient use of fossil fuels (e.g. high efficiency cogeneration systems).

Class 43.2 was introduced in 2005 and is currently available for assets acquired on or after February 23, 2005 and before 2012. For assets acquired before February 23, 2005, accelerated CCA is provided under Class 43.1 (30 per cent). The eligibility criteria for these classes are generally the same except that cogeneration systems that use fossil fuels must meet a higher efficiency standard for Class 43.2 than that for Class 43.1. Systems that only meet the lower efficiency standard continue to be eligible for Class 43.1.

Where the majority of the tangible property in a project is eligible for Class 43.1 or Class 43.2, certain project start-up expenses (e.g. feasibility studies, engineering and design work) qualify as Canadian Renewable and Conservation Expenses (CRCE). They may be deducted in full in the year incurred, carried forward indefinitely for use in future years, or transferred to investors using flow-through shares.

The Government continues to review Class 43.2 on an ongoing basis to ensure inclusion of appropriate energy generation technologies that have the potential to contribute to energy efficiency and the use of alternative energy sources.

The Federal Budget 2007 proposes to extend eligibility to an emerging source of renewable energy—wave and tidal energy—and to a broader range of applications involving active solar heating, photovoltaics, stationary fuel cells, production of biogas from organic waste, and pulp and paper waste fuels. The Federal Budget 2007 also proposes to extend eligibility for Class 43.2 to assets acquired before 2020.

By encouraging investment in these technologies, these changes will contribute to a reduction in greenhouse gas emissions, improve air quality and promote the diversification of the energy supply.

Wave and Tidal Energy Equipment

The 2007 Federal Budget proposes to extend eligibility for Class 43.1 and Class 43.2 to include equipment that generates electricity using wave or tidal energy, provided they do not do so by means of a barrage or other dam-like structure. Eligible equipment will include support structures, control, conditioning and battery storage equipment, subsea cables and related transmission equipment, but will not include buildings, distribution equipment or auxiliary electrical generating equipment and any other property not used primarily for the purpose of the wave- or tidal-energy system. The change will apply to eligible assets acquired on or after March 19, 2007.

- **Federal Government SRED Program**

The Canadian government provides over $1.5 billion of incentives each year to companies and other taxpayers who do research and development work. This program is known as the Scientific Research and Experimental Development Program (SRED). Current information on the program is available on the Canada Customs and Revenue Agency (CCRA) web site at http://www.rc.gc.ca/sred/. The CCRA is responsible for administering the SRED program, while the Department of Finance, an executive branch of the federal government, is responsible for the legislation that governs it.

What is SRED?

SRED is designed and administered as a federal tax incentive program to encourage Canadian businesses of all sizes and in all sectors to conduct scientific research and experimental development (SR&ED) in Canada. The aim is to encourage and, indirectly, finance new, improved, or technologically advanced products or processes. SRED is the largest single source of federal government support for industrial re-

search and development. SRED claimants can apply for SRED investment tax credits for expenditures such as wages, materials, machinery, equipment, some overhead, and SRED contracts.

Who qualifies for SRED?

Generally, a Canadian-controlled private corporation (CCPC) can earn an investment tax credit (ITC) of 35% up to the first $2 million of qualified expenditures for SR&ED carried out in Canada, and 20% on any excess amount. Other Canadian corporations, proprietorships, partnerships, and trusts can earn an ITC of 20% of qualified expenditures for SR&ED carried out in Canada. Generally, a CCPC with a taxable income in the immediately preceding year that does not exceed the business limit may receive a portion of the ITC earned as a refund, after applying these tax credits against taxes payable. The ITC earned by a Canadian corporation that is not a CCPC is non-refundable, but may be used to reduce any taxes payable. The ITC earned by a proprietorship or certain trusts may be partially refunded after applying these tax credits against taxes payable.

What kind of projects qualify for SRED?

To qualify for the SRED program, work must advance the understanding of scientific relations or technologies, address scientific or technological uncertainty, and incorporate a systematic investigation by qualified personnel. Work that qualifies for SRED tax credits includes:

- experimental development to achieve technological advancement to create new materials, devices, products, or processes, or improve existing ones;
- applied research to advance scientific knowledge with a specific practical application in view;
- basic research to advance scientific knowledge without a specific practical application in view; and
- support work in engineering, design, operations research, mathematical analysis, computer programming, data collection, testing, or psychological research, but only if the work is commensurate with, and directly supports, the eligible experimental development, or applied or basic research.

How the SRED program financially assists companies—examples

Even if a claimant has no revenue, or has revenue but is not yet profitable, it can receive the SRED credits in cash. The federal government will send such a claimant a check. In British Columbia, that can amount to as much as 68 cents back on every incremental SR&ED dollar spent by the claimant.

Generally, Canadian-controlled private corporations (CCPCs) with less than $200,000 in taxable income can receive a refundable investment tax credit (ITC) of 35% (68% after the gross up—see below) of qualifying SR&ED expenditures, to a maximum of $2 million of expenditures. Most other Canadian corporations, proprietorships, partnerships, and trusts can receive an investment tax credit of 20% of qualifying SR&ED expenditures.

So, for every $1.00 the company spends on research and development including an overhead allowance, it may be eligible to receive up to $.35 back in either cash or a tax credit from the federal government. From a corporate finance point of view, this is similar to having a 35% equity infusion into the business. Public companies and non-CCPCs, such as foreign controlled corporations, are limited to a 20% grant.

The federal government also allows claimants to claim overhead on their SR&ED expenditures. For companies that have a dedicated R&D facility this is easy to do, but if the R&D is part of the company's overall operation the calculation of overhead can be cumbersome. Therefore, the government permits claimants to claim an overhead "proxy" which amounts to 65% of their direct cost. Example: a company hires an R&D employee and pays her $100K during the fiscal year. The company can actually claim the 35% SRED grant on its total "deemed" cost of $165K (i.e. $100K x 1.65).

- **British Columbia (BC) and other provincial SRED incentives**

Certain provinces, such as British Columbia, also provide a provincial SRED credit. In the case of BC, the Province provides an additional 10% SRED credit. So, for every incremental SR&ED dollar spent, a total of $.68 can be recovered by way of SRED credits—taking into account the provincial and federal SRED credits on the "overhead topped-up" direct R&D cost.

Response to questions submitted for the record by Jason Bak, Finavera Renewables

Questions from Chairwoman Bordallo:

Question 1. Memorandum of Agreement

In its testimony, FERC advised that the Minerals and Management Service and the Federal Energy Regulatory Commission are devising a memorandum of agreement to assist the applicant in the regulatory process. Would it be helpful to you if NOAA was involved in this MOA so that you could know what will be required of you in terms of compliance with the environmental laws? Would it be helpful if one agency, instead of several, were involved?

Finavera Response: Finavera strongly supports those measures that would allow efficient and predictable coordination of effort among the various federal agencies involved in regulating ocean renewable energy. We take the same view of the importance of effective coordination between the federal agencies and the states.

In an ideal world, the number of federal agencies involved in deciding whether and under what terms to allow the development ocean renewable energy projects would be a small one. There is, however, no agency that appears ready today to take exclusive responsibility for the full range of issues related to ocean renewable energy development. We fear that, were Congress to decide to assign exclusive responsibility to a single agency, we would face a very long period of regulatory inaction and confusion which would stop project development and devastate our industry.

We understand that FERC and MMS need to resolve their different views of their respective jurisdictions over water-powered projects in the portion of the OCS between 3 and 12 nautical miles offshore. That is an important issue to overcome for the future of ocean renewable energy, but there are other regulatory and procedural issues of equal importance where NOAA's jurisdiction and expertise is implicated. We see no reason why NOAA should not be fully involved in development of an interagency agreement or protocol that would set out the federal agencies' roles and responsibilities.

Interagency coordination is almost always hard to achieve and harder to maintain over time. The fact that the agencies are still struggling to come to terms on some initial matters suggests that the Administration has not made such coordination a priority in this case. We suggest that the Congress should take those actions that will prompt the Administration to move forward.

As a starting point, we believe that MMS and FERC can, if suitably motivated, identify a set of legal concepts and procedural steps that would allow the agencies to fulfill their existing statutory mandates without undue conflict. For example, we do not perceive a fundamental conflict between an interpretation of existing law that would recognize clear authority in FERC to license wave, tidal and current energy projects in the U.S. Territorial Sea and clear authority in MMS to set the terms of leases, easements and rights of way to use the OCS within the EEZ. These are distinct tasks that can be coordinated responsibly. We would urge the Subcommittee to develop and support legislation, ideally as amendments to the energy legislation soon to be under full Committee review, that would help the agencies get past their threshold disagreements and move forward to set up a sensible regulatory approach under their respective statutory mandates. We would be happy to suggest potential language.

Questions from Chairman Costa:

Question 1. You mention that your Makah Bay project is a true pilot project in the sense that you had to conceive, with minimal guidance, a comprehensive outreach effort to all stakeholders and a collaborative approach to wave energy development at the project's inception in 2001, to determine how to properly site an ocean wave energy project. You note that a high level of consensus resulted.

- **I understand that that Finavera's project in Washington State took about four years to permit, and I've heard that Verdant Power's project in New York also took several years. Is that appropriate?**

Finavera Response: The considerable amount of time required to bring the Makah Bay Project to its current status reflects the challenge inherent in any effort to develop a first-of-its-kind energy project at a location owned by the American public adjacent to some of the most beautiful and environmentally sensitive places in the country. We wish it could have been a quicker process, but we have no re-

grets. It was important to take the time required to build understanding and an adequate degree of trust among all the stakeholders.

We do not believe that future projects will move so slowly, and we certainly hope they will not. The licensing of each project will probably make it incrementally easier to license the next one—assuming that project developers can demonstrate, through monitoring and evaluation, that project impacts are not problematic from the standpoint of public policy.

Our greatest scheduling-related concern at this point stems from the unresolved jurisdictional debate between FERC and MMS. The agencies' inability to decide how to collaborate in meeting their duties has the potential to discourage project development, delay agency decision-making, interrupt licensing and leasing proceedings, and encourage litigation. We urge the Subcommittee to take this issue on directly and immediately.

We would encourage the Subcommittees to recognize that the efficiency of any licensing process will be heavily influenced by the quality of engagement by the states. State governments have numerous authorities that are related to siting and operation of our projects. The states need to be true partners with the federal government in choosing the proper locations for projects, license conditions, and monitoring and evaluation procedures. The federal government should affirmatively encourage informed, coordinated engagement by the states in promotion and regulation of ocean renewable energy. We believe that proper use of the CZMA will be helpful in this regard, as will well-run, inclusive NEPA procedures.

Question 2. Your testimony says that a stakeholder group requested that Finavera lead a sophisticated and continuing monitoring and evaluation program. Please tell us more about that program.

What challenges does Finavera face in leading a such a monitoring program? What will that cost and over what time frame?

Will your data and findings be made public?

Finavera Response: The key challenge we face in designing the monitoring and evaluation program for the Makah Bay Project is the problem of scale. The Makah Bay Project is small, involving just 4 devices that collectively have capacity to generate 1 megawatt of electricity. Though we intend to sell the electricity it generates, it is not a true commercial-scale project; it is a pilot demonstration project. Yet, because it is the first project to apply for a FERC license, there is considerable interest within the company and among stakeholders to use the project to learn all we can from it. We need to reach agreement with the stakeholders on a program that is extensive enough to address legitimate concerns, but is not so expensive that it renders the project economically infeasible.

We do not know at this point what the likely cost will be. We can say with confidence, however, that we would welcome participation in the monitoring project from federal and other agencies in a manner that would expand resources in order to take advantage of the learning opportunity the project represents.

We would expect that the results of a program negotiated with the Makah Bay Project stakeholder community to monitor and evaluate project impacts on public resources and values will be made public.

Question 3. I understand from your testimony that Finavera believes that direct subsidies to the ocean wave industry are unnecessary.

What are your thoughts on an access fee or royalties for renewable projects like yours on the Outer Continental Shelf?

Finavera Response: Finavera believes that it is appropriate, as a conceptual matter, for the federal government to charge a fee for use of the OCS by renewable energy projects, particularly to the extent the use precludes use of the same area by the general public. We do not, however, believe that a royalty is appropriate, since a renewable energy project does not use up a finite resource.

We believe strongly that any fee applied by the federal government to renewable energy projects on the OCS should be tailored to acknowledge the financial realities of these projects and the national policy imperative of expanding renewable energy resources. For some time to come, ocean renewable energy projects of all kinds will be small and will not generate substantial revenues, let alone profits, for developers or owners. Fees should not discourage development of projects that hold the potential to contribute millions of megawatt hours of clean electricity to the nation's power system. The public will directly benefit from these projects. For the first phase of this new industry's life, the public interest will be fully and properly served by promoting the projects themselves. Once the industry becomes established, and

the financial and regulatory risks are reduced to more conventional levels, use fees may become a reasonable component of the regulatory system.

Question 4. You note that most ocean wave energy projects currently are proposed for locations within a few miles of shore, mostly within state waters and not on the federal OCS "because, first, transmission cables are very expensive and a limiting factor in project location and, second, so as not become involved in the apparent regulatory conflict between FERC and MMS over jurisdiction in the zone between three and twelve miles offshore."

Please tell us more about the cost of transmission cables and how we might address that challenge in encouraging renewable energy projects further off-shore.

Finavera Response: Underwater power cables are expensive. They cost approximately $1 million per mile. This sort of expense is proportionally small for a large oil or gas platform that might cost $1 billion or more and produce many billions of dollars worth of commodity products sold into global commercial markets. But for any renewable energy project at this stage in the industry's life, the cost of power cable is hugely disproportionate to the cost of other features of the project, including permitting, manufacturing, and operations, and can easily render a project unprofitable. As ocean renewable projects grow larger over time, the proportionate cost of cabling will diminish, and it is likely that some will be sited farther offshore, where the energy in waves is greatest.

Although the cost of undersea cables is expensive, we are most concerned about the potential lack of capacity in the on-shore transmission system currently serving coastal areas throughout the country. Many coastal areas with potentially valuable wave, current or tidal energy sources are served by transmission lines that have no ability to carry significant additional amounts of electric energy. Finavera believes that the Congress should consider directing the Department of Energy and the relevant federal power marketing administrations to identify the parts of the coastal transmission system that will need expansion to carry the clean renewable energy that our industry hopes to bring ashore in the coming years. The nation will need to know where to steer new investments in transmission infrastructure and, given the many public issues related to transmission infrastructure, we will need a number of years to reach the point of making good decisions about the location and character of new construction.

Question 5. Given the cost of transmission and other challenges associated with projects further off-shore, in deeper waters, how many years away do you realistically think we are from commercial projects on the OCS?

Finavera Response: The principal impediment today to location of ocean wave, tidal, or current energy project on the OCS is the unresolved jurisdictional dispute between FERC and MMS. Congress should expect that no developer will choose to risk becoming entangled in that argument, and all development will be planned for sites less than three miles offshore until it is clear which federal agency is responsible for what features of wave, tidal or current energy project development on the OCS.

This is an unfortunate situation that hurts the public interest. It arbitrarily constrains project siting to a fairly narrow strip of ocean, thereby increasing the potential for user group conflict, reducing the potential size of the developable renewable energy resource, and increasing the regulatory risk associated with all projects.

If the FERC-MMS dispute were resolved, especially if it were resolved with appropriate legislation, it is highly likely that each project under consideration by Finavera could be shifted or expanded to include areas on the OCS. We believe that other developers would react similarly. In other words, there will not be a delay in movement of energy projects onto the OCS once the federal agency jurisdiction problem is resolved (and assuming that transmission capacity constraints can be addressed).

Ms. BORDALLO. Thank you. Thank you very much, Mr. Bak. You get an A+. You are just three or four seconds over.

I would like now to recognize Mr. Zeke Grader, Pacific Coast Federation of Fishermen's Associations. Mr. Grader?

STATEMENT OF W.F. "ZEKE" GRADER, JR., PACIFIC COAST FEDERATION OF FISHERMEN'S ASSOCIATIONS

Mr. GRADER. Thank you, Madam Chairman. My name is Zeke Grader, and I am the Executive Director for the Pacific Coast Federation of Fishermen's Associations, which represents working men and women in the West Coast commercial fishing fleet.

We have been looking at wave energy. It was first brought to our attention between 25 and 30 years ago. We began looking at it from the standpoint of dual purpose facilities as far as using it for breakwater and then rather than doing rock and concrete basically being able to take the energy from the waves and then turn it into energy, so we have been intrigued with the concept for some time.

The breakwater idea has never come together, but we have looked at wave energy, as well as wind and ocean current generation I think with a great deal of interest in terms of both looking for replacement renewable power, and keep in mind when you are looking for replacement power nowadays particularly in California it better be renewable.

As a renewable source for hydro, taking out some antiquated fish killing hydro dams—whether they are on the Klamath River or on Battle Creek or even the Snake River—to be able to remove some of these dams that have been so destructive to our fisheries. But at the same time, we have to be able to identify a source of renewable replacement energy, so we have had a great deal of interest there.

The second area we have been interested in has been from the standpoint of desalination. The west, as you know, has severe water problems, probably no place greater than California. Well, maybe Texas, but certainly California where most of our rivers are overdrafted. Our Bay-Delta system, as Mr. Costa can tell you, has got an annual deficit of about 1.6 million acre feet.

We have to reduce the demand on our rivers and this delta and find new reliable sources, and desalinization could be one particularly since most of our population is along the coast. We see wave energy or offshore wind as possibly a good source of renewable energy to perhaps not completely power desalination, but to help reduce its energy or to at least put in most of the energy use based on renewables. Again, we are very much intrigued with that.

Moreover, I think as a fishing industry we are seeing what is happening right now with global warming, and particularly the thing that is most ominous, that scares us the most, is the acidification of our oceans because of carbon sequestration. We know that we all have to commit to find new sources of energy. We cannot continue dumping carbon into the atmosphere because a lot of that is ending up in our oceans and it is making them acidic.

We understand those things. That said, however, there are some concerns. First of all, we are not really sure what the environmental/ecological impacts may be from these various types of energy. We will have to study that. I suspect it is probably not going to be as great as many other activities, but we don't know for sure.

Probably the thing that is more troubling for us along the Pacific Coast in particular where our Continental Shelf is so narrow, that is the band where coastal fishermen can work is a fairly narrow band up and down the coast, is that all of that area is important,

and right now it is being affected by movements afoot to try and create these so-called marine protected areas, which in fact are nothing more than no fishing zones at the current time, or the current closures that have been imposed, rightfully so, by our regional fishery council and the National Marine Fishery Service.

We have to be concerned where riggings are going to be placed to make sure that they are not in the middle, for example, of key critical fishing grounds. That is our concern there.

I think to try and help us work things out, and I appreciate Mr. Bak's offer that has been made here. I think it is going to be critical that, first of all, we require consultation, particularly as far as fisheries goes, consultation not with NOAA, but with the regional council themselves because we often find where, frankly, NOAA has sold our fisheries out, and I don't want to go chapter and verse of the examples of what they have done to us. We have had to continually sue them. I think certainly the councils should be given consultative authority.

Moreover, I think we do need to have consistency. I think particularly on the West Coast with the states of Oregon, Washington and California, the three Governors have committed to work together. They have pledged to reduce greenhouse gases.

I think, given the states' consistency, it is not going to hold up the development of this power, but it will just make sure it is done right because these three states want to reduce their carbon impact and want to look for renewable sources of energy.

Thank you.

[The prepared statement of Mr. Grader follows:]

Statement of W.F. "Zeke" Grader, Jr., Executive Director, Pacific Coast Federation of Fishermen's Associations

Chairwoman Bordallo, Chairman Costa, members of the Subcommittees. Thank you for the opportunity to provide testimony here this morning.

My name is Zeke Grader and I am the Executive Director for the Pacific Coast Federation of Fishermen's Associations (PCFFA). PCFFA represents working men and women in the U.S. west coast fishing fleet and is the largest fishermen's organization on the Pacific Coast. Our members are primarily owner/operators and crew aboard small to mid-size commercial fishing boats utilizing a variety of gears and engaged in numerous different fisheries. Our members can best be described as "family fishermen," as opposed to the large industrial fishing fleet operations.

I have served as ED and counsel for PCFFA since 1976. Representing, among others, nearly all of California's organized commercial salmon fishermen, with members in Oregon and Washington as well, we have had to tackle numerous resource issues in our efforts to protect the fishery resource base our members depend upon for their livelihoods. That has included numerous land use issues, such as logging in salmon watersheds, water—as Mr. Costa knows—in terms of both quantity and quality, and fish passage on rivers, as well as ocean activities such as offshore oil development. We joked that at least we didn't have to worry about air pollution—at least not on the West Coast where we were spared acid rain. That was until recently. Now, however, we are beginning to understand the implication of decades of green gas house emissions and what that means for our oceans in terms of sea level rise, rising temperatures, currents, upwellings and acidification.

Members of my organization understand clearly the relationship between the development of renewable energy sources—to reduce our "carbon footprint"—and the ecological and economic health of our fisheries. With regards to the development of renewable energy from wind, current and waves on the outer continental shelf, I think I can best describe our position as cautious and conditional. We understand the need for and potential benefits of this energy development, but we are wary, as well, of potential problems, including those for the environment.

Intriguing Potential

My organization was first introduced to the idea of harnessing the energy of waves some 25 years ago. An outer breakwater was being considered for Noyo Harbor on the Mendocino Coast in Northern California. However, the president of our organization, a fisherman from that port, scoffed at the idea of a traditional rock or concrete barrier built by the Corps of Engineers to fight the waves to make entry into harbor safer.

He suggested, instead, a series of buoys to capture the energy of the waves, rather than fight them like a breakwater. His vision was to take the energy of the waves captured by the up-and-down motion of buoys for the generation of electricity. The idea went further from there. The electricity would be used to produce hydrogen from seawater that in turn would be an energy source for powering fishing vessels. This was during one of a series of oil embargoes, and I think he saw this as a way of wresting this source—that he believed was our future for clean energy—from the oil companies before they seized its production and distribution. Most of us at that time equated hydrogen with the Hindenburg. The Corps was not interested in investing research into floating buoys that generated electricity when they had the rock and concrete technology down for ocean breakwaters.

The idea of a dual purpose facility—that could both serve as a breakwater (making port entrances safer) and an energy generation facility has continued to intrigue some of us for the past quarter century. A dual purpose facility, however, is probably unsuitable for most locations. There are few ports around our nation's coasts where there is both the need for an outer breakwater and the conditions are conducive to a wave energy generation facility. Just the same, on the West Coast, anyway, I believe some wave energy generation facilities could help fishermen address other problems—other than global warming—they are faced with.

PCFFA has been an advocate, along with some recreational fishing organizations, tribes, and conservation groups for the removal of fish-killing dams, particularly antiquated ones with little hydropower or water storage value. One of the issues we have to deal with in the relicensing process for these dams—when we're proposing their removal—is identifying replacement power. Now days replacement means from a renewable power source. Along with solar and wind, wave generation is one of the renewables we'd like to have available to replace dam hydropower.

In the west, particularly in California, we're also faced with a tremendous overdraft of most of our rivers, along with the San Francisco Bay/Sacramento-San Joaquin Delta system—where most of the salmon harvested offshore the three Pacific Coast states migrate between the Sierra spawning streams and the ocean. To the extent we can develop environmentally acceptable desalination facilities along our coast we have the potential for providing a reliable back-up water supply for coastal urban areas. This means less demand from urban sources on the water currently utilized by agriculture, but more importantly for fishermen this could allow for the restoration of flows to many rivers and help to meet a Delta outflow deficit of some 1.6 million acre-feet.

One of the major objections raised to desalination has been its energy requirements. A nearby wave generation facility, depending on location along the coast, could help to supply a portion of the energy requirements for a desalination operation.

Thus from the view of fishermen looking for renewable replacement power for hydro dams or as a power source for desalination facilities to protect or restore flows to rivers and estuaries, the potential of wave energy, and to a certain extent offshore wind and ocean current energy generation, is intriguing.

Daunting Problems

Now, having looked at some of the potential we see that could be had from wave energy and, perhaps, wind and current, let's look at some of the problems. The problems we see right off are operational. That is not to say that there may not be other physical or biological problems we may be faced with by some of these operations. We're simply not aware of them or at least to what extent there may be problems. The operational problems these facilities pose to fishermen are fairly straight forward. They are potential navigation hazards and preclusion of fishing grounds. Ocean current generation facilities may also pose a hazard to fish life through entrainment.

Navigation Hazards. Large structures placed in the ocean, particularly those on, above, or just under the surface present obstacles for mariners to avoid. Wave generation, offshore wind facilities, and probably most generation facilities around ocean currents will be large, certainly in comparison to our vessels. They will require good marking and lighting. Most important, however, they will have to be lo-

cated outside of shipping lanes and the courses set by fishermen between ports and fishing grounds.

In addition to the placement of these facilities, some, such as various wave energy technologies that have been proposed, have the potential for getting loose in a major storm, as we witnessed with some of the offshore oil rigs during Hurricane Katrina, and if they're floating at or just below the surface—possibly undetected by radar—they constitute a serious navigation threat to vessels at sea.

Preclusion of Fishing Grounds. The other operational problem is preclusion of fishing grounds. Fishermen on the West Coast have already suffered the loss of access to large parts of the ocean for some of their fisheries due to conservation closures implemented by the Pacific Fishery Management Council. We're not questioning the need for these—we hope most will only be temporary—but state it as one of the factors fishermen are dealing with.

Moreover, in California the state is already moving ahead implementing a network of restricted or no fishing zones, euphemistically called marine protected areas (to date, they only regulate fishing, not pollution or any other factor affecting the marine environment), and the federal government is preparing to do the same in the EEZ. This will mean, most likely, the loss of some important fishing grounds. We cannot stand the additive impact of the loss of additional fishing grounds by energy generating facilities. For example, one of the areas viewed as having the most potential for a wave generation facility off Northern California is in an area between 35 and 45 fathoms of depth offshore the port of Eureka. This just happens to be the prime Dungeness crab fishing ground.

Thus, while we find the idea of wave energy, in particular, intriguing, we have to be mindful of the physical problems associated with the placement of these facilities and the danger and economic harm that can result if this is not done in a sensitive, thoughtful and careful manner.

Details and Process

While we understand the need for development of renewable energy sources and can envision the possibilities wave energy could provide fishermen, we are not at all comfortable with the current governance of renewable energy generation on the OCS. The leasing authority, the Minerals Management Service (MMS) primary expertise is in offshore oil and gas. We have never found MMS to be sensitive to either fishing operations or the biological needs of fish or the marine ecosystem in our dealings with them in California—specifically in the Santa Barbara Channel.

Consultation. At the very least, we need a requirement in law, that MMS be required to consult with the regional fishery management councils, the National Marine Fisheries Service and the coastal state fishery agencies over the placement of any renewable energy facility in the OCS where it will affect either state or federally managed fisheries.

We also recommend MMS, if it is to remain the offshore leasing entity, be required to consult with affected fishing groups, that bonding be required to cover liability, and mitigation for economic losses suffered by any third party (e.g., fishermen) be required as a result of these energy operations.

Consistency. Further, we recommend that any renewable energy generation facility located on the OCS be operated not only consistent with a state coastal management program, but also with regional fishery management council FMPs [fishery management plans] or, in the case of a state managed fishery, consistent with the statutes or regulations governing an affected fishery.

State Management. Finally, with regards to the Federal Energy Regulatory Commission (FERC) authority, we recommend a change in law to ensure that FERC not preempt state statutes but that its licensing of such facilities be required to be consistent with state statutes and regulations as they may exist over such operations or for the protection of a state's coastal zone, water quality, and fisheries, among other resources.

Conclusion

Thank you Madam Chairwoman and Mr. Chairman and Subcommittee members for this opportunity to comment. I apologize for a certain ambivalence on our part. I wish I could provide you with more details, more specificity, but we, too, are looking to learn more about a technology that we believe has some exciting potential. It certainly has promise, but in the words of a former Defense Secretary there are the "unknown unknowns" that we have to be mindful of. I'd be happy to attempt to answer any questions members may have.

Response to questions submitted for the record by Zeke Grader

Questions from Chairwoman Bordallo:

1. International Leaders: What nations are the leaders in investments in ocean energy technologies? What should the United States do to catch up with them?

From my reading on the issue, it appears most of the investment is taking place in the UK right now with some investments taking place in other parts of Europe, such as Portugal. The one thing the U.S. should consider, I believe, to catch up or stay abreast of other nations would be to provide economic incentives for ocean energy technology research and development. Grants, tax incentives and other financial assistance should be encouraged, however, not at the expense of the environment or other traditional marine uses, such as fishing. A balanced approach then, would consist of tax and other financial incentives, but with additional oversight by the states, and other federal agencies, such as the National Marine Fisheries Service (including consultation with the Regional Fishery Councils), to ensure protection of the marine environment and other marine uses.

Questions from Mr. Brown:

1. Do you or your organization receive funding from the Pew Charitable Trust or the David and Lucille Packard Foundation?

I represent two organizations. The first, the Pacific Coast Federation of Fishermen's Associations is a trade organization whose funding primarily comes from assessments on fishermen's catches that are voluntarily paid to their local marketing associations and a portion remitted to the PCFFA, the umbrella organization. While assessments have been the soul funding for PCFFA for most of its existence, it has received grants from the David & Lucile Packard Foundation over the past four years solely to pay for PCFFA's work in conservation, not its other activities. None of the funds PCFFA receives from Packard are related to the topic of this hearing, nor have I or anyone at PCFFA discussed ocean energy issues with anyone at the David & Lucile Packard Foundation. PCFFA does not receive any funding from the Pew Charitable Trust.

The Institute for Fisheries Resources (IFR), the 501(c)(3), organized by PCFFA to conduct research, education and outreach (no lobbying), does receive government contracts and grants and grants from private foundations. The David & Lucile Packard Foundation has made grants to IFR in the past for outreach to fishermen to engage them in fishery management and conservation and IFR is now completing a Packard grant to assist in the formation of a national commercial fishermen's organization—the Commercial Fishermen of America, which will soon be opening its national office in Maryland. IFR receives grants from numerous other foundations for its work, as well as grants and contracts from state and federal agencies. It does not, nor has it ever received any funding from the Pew Charitable Trust, nor has it ever applied to the Pew Charitable Trust for funding.

PCFFA and IFR's relationship with the Pew Charitable Trust has been through other entities. IFR's president Pietro Parravano was one of two commercial fishermen to be named to the Pew Oceans Commission and he still serves on the Joint Oceans Commission Initiative, although it no longer receives, to my knowledge, any financial support from Pew. We are also members of the Save Our Wild Salmon Coalition which does receive some funding from Pew. Finally, I sit on the executive committee of the Marine Fish Conservation Network which does receive some Pew funding. As with Packard, I have never been approached by the Pew Charitable Trust in regards to the ocean renewable energy issue, nor in regard to the testimony I prepared for this hearing.

2. In answer to a question at the hearing, you said that "NOAA has sold our fisheries out...we've had to keep suing them..." Are you or your organization currently a party to any lawsuits against any NOAA or any agency within the Department of Commerce or the Department of the Interior? Please give the details.

I'd be happy to. The PCFFA is involved in a number of lawsuits against the Department of Commerce, NOAA and NMFS, in regards to the Department's and its agencies chronic failure to protect the salmon resources that most of our membership depends upon for its livelihoods.

We are the lead plaintiff in a lawsuit against Commerce right now, PCFFA v. Gutierrez, having to do with NMFS' failure to prepare a biological opinion sufficient to protect ESA-listed salmon runs in the Sacramento River. Our members are prohibited from taking these fish (the incidental catch rates are set well below the

numbers required for recovery under the ESA, so the fish are protected from fishing activity), and we have continually sought to ensure that other factors affecting the health and recovery of the listed fish, such as diversions and entrainments at pumps, do not endanger these runs. Moreover, the protections for the listed fish have benefited the runs of salmon commercial and recreational fishermen are allowed to harvest. In the above case, as a result of the suit, NMFS is now revising its biological opinion, we hope so the fish are protected.

PCFFA was also the lead plaintiff on a case in the Klamath over NMFS' failure to establish a biological opinion sufficient to protect the fish. Shortly after the trial judge ruled against us in the spring of 2002, there was a massive die-off of juvenile salmon in the river—we believe because of insufficient flows (flows we had asked for in the suit) and a massive fish kill late that summer of returning adult spawners. We appealed the trial court decision to the Ninth Circuit, which reversed the trial judge. The federal trial court judge subsequently found in our behalf and we are now awaiting a new biological opinion from NMFS. The damage, however, from the fish kills was done forcing major restrictions on our salmon fishery offshore California and Oregon in 2005 (when those juvenile fish would have been adults available in the catch) and a near total closure of the Oregon and California salmon fishery in 2006, along with the loss of the tribal and in-river sport fishery on the Klamath River. Congress recently passed disaster relief funds to help assist the communities affected by the salmon closures. For many, however, that relief will be too late.

PCFFA did intervene on the side of the federal government when Klamath Basin growers attempted to sue the government for damages as a result of water cutbacks in 2001 that were necessitated by a severe drought in the basin and flows were needed to ensure survival of the listed fish. The Court of Claims ruled for the government, and PCFFA, in that case.

PCFFA has also filed lawsuits against the Environmental Protection Agency, PCFFA v. Marcus, to force the development of TMDLs, under the Clean Water Act, on northern California salmon streams to protect water quality. PCFFA was a co-plaintiff in the lengthy litigation brought against the Department of Interior (Bureau of Reclamation) to restore fish flows to the San Joaquin River. PCFFA is also involved with a number of other fishing and conservation groups in litigation against federal agencies in regard to the protection of salmon runs in the Columbia River.

PCFFA was not organized for the purpose of litigation, nor does it gain any financial remuneration for engaging in litigation. But when agencies flaunt the law as they have done in regard to the protection of Pacific Salmon from non-fishing impacts, then we've had no alternative but to seek redress in court. To have done less we would have failed the trust working fishing men and women have placed in us. Judging from our record on the lawsuits, nearly every federal judge and appeals court has agreed with us.

3. Do you or your organization receive any grants from any agency within either of those two departments? Do you serve on any FACA committees under any agency within either of these departments?

Yes, we have in the past. We're sophisticated enough to know when to sue an agency, when its done wrong, and partner with them when they're doing something right for the fish. We received a NOAA restoration grant for some of the work we attempted at oyster restoration in San Francisco Bay. I no longer serve on any FACA committee within any agency in the two departments although I did serve on the Secretary of Commerce's Marine Fisheries Advisory Committee (MAFAC) during the Reagan and first Bush presidencies.

4. You testify that your organization, when advocating for the removal of a hydropower dam, will identify "replacement power" from renewable power sources. Do you calculate the amount of energy that will be lost from the dam and come up with an equal or greater amount of energy from renewable sources? Do you also calculate the cost of the energy produced from the dam and the cost of the equal or greater amount of energy produced from the renewable sources?

Yes, we actually have brought on an economist who specializes in the valuation of hydropower and other energy production to assist us in finding replacement power equal or greater than that which we seek to remove. Today, replacement power is mainly from renewable sources. Unless we can identify viable replacement power, it is nearly impossible to make a case for dam removal to FERC.

5. You testify that your organization was first introduced to the idea of harnessing wave energy approximately 25 years ago. Yet this type of technology is still considered by many to be in its infancy. If it takes more than 25 years to develop the technology and make this type of technology economic, how can we replace the nation's oil/gas needs in the short term?

First, let me say in regard to this question and the following, my expertise is in fishing, not development of ocean renewable energy technologies. We have an interest in this technology as far as it may benefit our fisheries and not adversely impact them. My responses thus to this and the following questions are not based on any expertise in this technology, but are offered from the perspective of a fishery trade organization that hopes to play a constructive role in the debate over development of ocean renewable energy sources.

Second, from what I've seen this technology doesn't take 25 years to develop; what it took was 25 years to convince policy makers and business leaders that we needed to reduce our dependence of carbon-based fuels. And a lot of them still don't get it. There is a lot of technology available now to reduce U.S. dependence on oil/gas. What's lacking is political will. And the other technologies we need—whether its wave, tidal, ocean current or offshore wind farms as renewable sources, or desalination and reuse facilities for addressing water needs, we could develop in a very short time, I believe, if we began now—if we stopped whining and started acting.

6. Does the offshore wave technology buoy system that you describe require some type of cable to relay the energy back to shore? Does this raise potential conflicts with other users such as fishing equipment that might touch the sea bottom? What types of on-shore facility is needed to harness the energy created by the buoys?

A cable to shore will be required and with that, as well as the placement of the equipment in the ocean, there is a potential for conflict. That is why we believe stakeholders such as fishermen be brought in early in the planning process to work these types of issues out. As I said in my testimony, we see a lot of potential good coming from ocean renewable energy development, so we're not going to be throwing up roadblocks to its development, but just making sure it's compatible with fishing operations.

7. Mr. Keeney testified that while the Ocean Thermal Energy Conversion Act of 1980 was passed more than 20 years ago, "There has been a low level of activity under OTEC Act since its passage in 1980...NOAA has not received any license applications for OTEC facilities or plantships." While much of the offshore technology is interesting, how long will it be before it becomes economic for the private sector to invest in?

Now that there is finally a recognition of the need to reduce "our carbon footprint" through increased energy efficiency, decreased energy use where possible, and development of renewable energy sources, the climate for investment in offshore technology is the best it's ever been and should continue to improve. Apparently some investors are interested in getting into it now. Certainly Congress can help by creating financial incentives such as tax breaks for this type of energy development. Our one caution is that neither Congress nor the Administration attempt to short circuit the review and regulatory system needed to ensure this development does not harm the marine environment or other beneficial uses of our oceans and coasts.

8. One of the concerns raised about underwater turbines is the effect on fish. What is your view on underwater turbine technology?

If the turbines are slow turning where fish can avoid them it should not be a problem. Fast turning blades, however, could literally grind up fish. I think we will have an opportunity soon to evaluate this technology with the project being sited in the East River in New York.

9. You mention that siting new structures in the ocean might pose navigation hazards. It has been suggested that new wind power facilities could be placed on existing or decommissioned oil/gas platforms that are already sited in the offshore areas. How do you feel about such proposals? Would you prefer that wind power be required to construct new platforms for their operations?

Again, let me reiterate, my expertise is in fisheries, not in the development of this technology. From what I have seen the configuration of an offshore wind farm is different than the siting of oil platforms on the OCS. We have serious problems with proposals for dismantling the rigs in place and leaving them at their sites, or in a nearby ones, as a so-called artificial reefs. Our members in the Santa Barbara

Channel who've worked around the rigs for 40 years, believe if they are to stay in place, a portion of the structure (e.g., first floor) should be left above the water line with proper navigational lighting. The big benefit from the rigs is the shade canopy they provide, not from scrap metal on the ocean floor. Thus, if rigs are suitable for wind farms, that should be explored—it is preferable to cutting them off below the waterline. However, any such use should not absolve oil companies from their clean-up responsibilities around the rigs, including the safe disposal of toxic sediments.

10. You also testify that, while supportive of renewable energy sources, you "cannot stand the additive impact of the loss of additional fishing grounds by energy generating facilities." Does this mean that you would oppose any alternative energy sources that might be proposed for anywhere your members fish? Does that include facilities as well as cables necessary to link production facilities to on-shore facilities?

No. I was simply pointing out that along the west coast, the area for coastal fishing is limited by a narrow shelf. I would not being offering positive comments about ocean energy generation technology if we had taken a position of "not in our backyard" and decided to fight anything. In siting these facilities we have to be mindful of the limited fishing areas and try to pick the areas both for the location of the equipment and the cables to minimize fishing impacts. That is why it is so important that fishermen be consulted at the very beginning of the process in order to avoid conflicts later on that could either delay or stop a project.

11. You mention that you think that offshore renewable energy facilities be operated consistent with regional fishery management council fishery management plans. These councils have no authority over non-fishing activities. Do you think the council authority should be extended to include the ability to regulate non-fishing activities?

I don't think the Regional Fishery Councils should regulate offshore energy, but we should require the licensing and permitting authorities, i.e., the Federal Energy Regulatory Commission and the Minerals Management Service to consult with the Regional Fishery Councils to prevent conflicts with those fisheries the councils have responsibility, i.e., fishery management plans, for.

12. You mention the loss of fishing grounds to marine protected areas has been a concern of your group. You also state that you think the Minerals Management Service should be required to work through the fishery management councils on any offshore energy proposals that might affect fishing grounds. Do you also think that other Federal actions such as additional closures of fishing grounds due to changes in National Marine Sanctuary designations or modifications should also go through the council process?

The National Marine Sanctuaries have not closed any fishing grounds, to date, on the west coast. They have rather, helped to protect some key fishing grounds from dumping, etc.

The problem is, rather, with the designation of so-called marine protected areas (MPAs). I say so-called because most, if not all, have to date done nothing more than restrict or prohibit fishing. They have not addressed water quality, dumping or any number of other factors affecting marine life. While we believe they may play a role in conserving our ocean waters, they are a relatively minor tool in that effort compared to statutes protecting water quality, preserving wetlands, preventing overfishing, etc. Our fear is the process of establishing MPAs not run amok, closing important fishing grounds, while providing only marginal, at best, conservation benefits. MPAs have, unfortunately, become marine conservation on the cheap for a lot of groups—government and non-government alike—those who don't have the stomach for the hard work of protecting all of our ocean waters from all of the factors affecting our marine environment. For that reason I believe any MPA siting process—whether it be by the states, a national marine sanctuary, or the federal MPA program—that affects any federally managed fishery should be required to consult with the Regional Fishery Management Councils.

Thank you for this opportunity to respond to your questions.

Ms. BORDALLO. Thank you very much, Mr. Grader.

The Chair now recognizes Dr. Doug Rader.

STATEMENT OF DOUGLAS N. RADER, Ph.D., PRINCIPAL SCIENTIST FOR OCEANS AND ESTUARIES, ENVIRONMENTAL DEFENSE

Mr. RADER. I am staggered by Mr. Grader's adherence to time.

Thank you, Madam Chairman, for the opportunity to present the views of Environmental Defense on developing environmentally responsible low emissions energy from America's seas.

As I hope you know, Environmental Defense is a global nongovernmental organization working to develop solutions to environmental problems that are robust because they are grounded in science, law and economics. We are known for finding the ways that work.

In terms of full disclosure, you should know I also chair the Habitat Environmental Protection Advisory Panel for the South Atlantic Fishery Management Council, which encompasses Federal fisheries management from North Carolina to Florida.

The upswing in interest in U.S. ocean waters for uses other than fishing is truly remarkable in renewable energy, but also deepwater fossil fuels, deepwater mining, marine aquaculture, carbon storage and sequestration and others. Remarkable.

Some of these proposed activities are more compatible than others with ocean health. Regardless, the future looks to us to be multiple use in the sea. A new day is dawning in the sea.

The growing consensus that global warming threatens the biosphere, including our oceans and their living resources, is obviously fueling the push for energy conservation, for developing green, low carbon energy sources and now for environmentally responsible blue energy from the sea.

Such development in the oceans must be done carefully with strong science, properly aligned incentives to ensure the sustainable ocean future we all desire, but the simple truth is that the current ocean management system is unprepared for the complex array of challenges and opportunities facing America's seas, both in terms of agency mission and agency capacity, yet the need for an updated integrated approach to management of regional seas, that need expressed clearly by the U.S. Ocean Commission and the Pew Oceans Commission is greater every day.

Because the risks are real, particularly in moving from small scale pilots, as good as they may be, to anything approaching commercial scale, we offer four overarching principles that should govern that expansion.

Number one, ocean energy development should be based on clearly defined criteria consistent with a national policy of protecting and restoring healthy ocean ecosystems, taking into account cumulative impacts.

Number two, the government must support the research necessary to develop cutting edge green technologies so it can understand and mitigate their potential impacts, especially at commercial scales, and then to accelerate both as pilots and beyond the technologies that are the least pollution.

Number three, the government must invest in the science needed to manage marine ecosystems effectively.

Number four, the public must benefit from the conversion of public resources to private gain. Appropriate incentives should be put

in place to encourage green energy development, and the public must be involved in charting our own ocean future as citizens.

While the potential for blue ocean energy from U.S. waters seems very, very bright indeed, reaching that potential depends upon bold leadership from Congress to make sure that ocean energy development proceeds consistent with a broader vision for protecting and restoring America's seas.

A key requirement for obtaining that bold future is in placing policies and decision making frameworks that instill confidence in citizens, but also in industry. Whether that evolution can occur with existing agencies remains to be seen.

Finally, in addition to being a nerd scientist, I am also an amateur historian, and in my many hours in the North Carolina archives I found considerable evidence of the role of wind power on colonial landscapes.

It seems clear to me personally that our future landscapes and our future seascapes must adapt to help produce green energy and blue energy in a fashion that contributes both to energy sufficiency and security and to ocean ecosystem integrity.

Thank you much, and in closing I will second Mr. Bak's proposal, but suggest Guam as an alterative location.

[The prepared statement of Mr. Rader follows:]

Statement of Douglas N. Rader, Ph.D.,
Principal Scientist for Oceans and Estuaries, Environmental Defense

Introduction

Madame Chairman, Mr. Chairman, and Members of the Committee, I am honored to appear before you today to present the recommendations of Environmental Defense on how to manage ocean energy resources effectively, to provide economic and global-warming benefits while protecting the health of ocean ecosystems.

As many of you know, Environmental Defense is a worldwide, not-for-profit organization, whose hallmark is "finding the ways that work," environmentally, economically, and legally. Our organization is deeply committed to durable strategies that meet people's needs for energy while taking dramatic action to reduce global warming pollution. Achieving this goal will entail the use of a variety of tools including energy conservation and renewable energy production.

I currently serve as Principal Scientist for Oceans and Estuaries for Environmental Defense. While my training is in marine and estuarine ecology, my work experience has focused on sustainable fisheries, and coastal resource and water quality protection. I have worked for Environmental Defense since 1988, with special attention to integrated and effective management of coastal and marine ecosystems; I helped form our Oceans Program in 1996. Prior to coming to Environmental Defense, I worked in state government in North Carolina, serving as director of the first National Estuary Program certified under the Clean Water Act of 1987, the Albemarle-Pamlico National Estuary Program.

In addition, I have served as chair of the South Atlantic Fishery Management Council's Habitat and Environmental Protection Advisory Panel for most of the last decade. In that role, I have worked very closely with agency staff on policies to protect essential fish habitats (EFH) from energy development activities, on measures to protect both shallow and deep-water coral ecosystems, and on drafting one of the nation's first comprehensive Fishery Ecosystem Plans (FEP) for the U.S. Southeast region, which considers how non-fishing ocean uses, such as offshore energy, effect fish stocks.

Today, I draw from these experiences, to recommend measures that Congress can take to ensure that as America begins in earnest to look to the sea for energy to light our cities and fuel our economy, a rational system that aligns incentives with conservation is in place to protect our priceless ocean legacy and the coastal communities that rely upon it.

"Blue" Ocean Energy

Meeting America's on-going energy needs while at the same time addressing the global warming challenge will require a new age of energy conservation, and the

tapping of sustainable options for ecofriendly energy production. There is no doubt that firm limits on emissions of greenhouse gases, and increased energy conservation, are critical to slowing global warming. But it seems increasingly unlikely that conservation alone can meet the nation's energy demands. As the world turns to "low carbon" or "clean" energy sources that minimize contributions to global warming, it is increasingly likely that the sea will be a part of the "greening" (or, maybe more appropriately in this case, "bluing") of our energy-production portfolio.

First, let me make clear that there are key ocean energy sources (like wind, tide, wave, and current) that are potentially sustainable, and that will help us address global warming, while others will not help us move closer to a sustainable future (for example, methane clathrates from the deepsea).

In pursuing ocean energy sources that are better for the environment, I offer the following four key principles.

1. Ocean energy development should be based on clearly defined criteria, and consistent with a national policy of protecting and restoring healthy ocean ecosystems, including cumulative impacts.
2. The public should benefit from the use of public resources, and appropriate incentives should be in place to encourage green energy development; decision processes should encourage public engagement, and meet the highest standards of transparency.
3. The federal government should support the research needed to develop cutting-edge green technologies, to understand and mitigate their potential impacts, and to accelerate technologies that are less polluting, and more consistent with sustainable oceans.
4. The federal government should invest in the science needed to manage marine ecosystems effectively; government decisions should be based on the best peer-reviewed science.

Protecting Ocean Ecosystems

Today, it appears that while some ocean energy technologies have unacceptable impacts on coastal ecosystems, many others may have fairly low and manageable environmental impacts. Even so, our decision processes are not currently adequate to distinguish among projects that are consistent with sustainable oceans and those that are not.

To make the challenge even greater, many of the technologies available today have the very real potential for much greater cumulative impacts at larger scales. Little has been done to assess the consequences of commercial scale operations in the ocean, or to identify ways to minimize and mitigate those effects. For example, a small wave energy facility may have a negligible impact, but many such facilities or a very large scale facility could have adverse impacts on local circulation patterns that could be critical for maintaining transport of fish larvae, sediment and nutrient delivery, and other important ecological processes and services. Similarly, the way ocean energy projects are implemented, and the specific kind of technology employed, could have a large bearing on the size of their cumulative environmental impact. For example, slow-speed turbines that are phased in over time would be expected to have lower environmental impact than the damming of an estuary to construct a tidal barrage.

Incentives and Public Benefits

The ocean is a vast common resource, presenting significant challenges for policy makers on how to avoid unsustainable use while encouraging appropriate development. Few "use privileges" or other conservation incentives exist in the sea that could institutionalize orderly and controlled development of marine resources. Environmental Defense has recently completed a study of approaches that have been used in this country to manage public trust resources, called "Sustaining America's Fisheries and Fishing Communities." We found that while granting use privileges is a common tool in resource management, the way those privileges are administered can achieve other social benefits.

There is also a strong need for a new "social contract" with regard to ocean resource use similar to the evolution of natural resource policies on land, where emphasis has shifted through time from rapid extraction at all costs ("use-it-or-lose-it," with no economic rents) to sustainable use (appropriate regulation coupled to positive incentives, and including economic rents, e.g. auctions of electromagnetic spectrum).

Current Challenges

Our Nation lags behind others in assessing, experimenting and investing in truly sustainable ocean energy technologies, and has fallen far short on investing in the science necessary to manage ocean ecosystems effectively. Basic information on the

distribution, abundance and function of marine habitats is woefully inadequate. In fact, much of the information available on deepwater ecosystems has been developed directly by private project proponents. Until we properly understand habitat function and oceanographic processes that support habitats and biodiversity, we will remain unable to adequately avoid impacts on important habitats, and mitigate for unavoidable impacts. Until we adequately understand the array of perspective technologies available, and their likely implications for marine ecosystems, it will remain difficult to plan for sustainable ocean energy.

Recent debates have centered on the risks and environmental dangers of specific installations, and on perceived impacts on coastal ways of life, rather than on defining broad science-driven criteria for ocean energy development that transcend individual projects while conserving coastal landscapes and seascapes. Certainly, coastal communities and other ocean resource users (e.g., fishermen) should have a voice in where development occurs. However, fully understanding the potential costs (such as habitat degradation) and benefits (including reducing the impacts of global warming) is critical to ensuring rational decision-making that is in the best interest of all. The "Not in My Backyard!" approach will not provide for the public interest.

The prevailing "thumb in the dike" attitude is entirely understandable, given the complexity and disarray of federal institutions. Management authority for ocean uses is split among many agencies with unaligned legal requirements. There is neither a clearly defined approval process for "blue" energy development nor are there set conditions for decision-making. Getting past this fractured system of ocean governance will require the development and implementation of programs that people can trust to ensure that the coastal environments they hold dear will not be destroyed by industrial development for renewable energy production.

It is very clear that we need updated governance systems that can guide ocean energy development consistent with maintaining high-quality marine and estuarine ecosystems. A key task for Congress is to update our governance systems in order to guide renewable ocean energy development consistent with maintaining high-quality marine and estuarine ecosystems.

Few people recognize that widespread coastal renewable energy production is not new in the United States. In fact windmills used to be prolific in the Southeast. While scouring the North Carolina Archives for historic documents, I found maps from the 1700s showing the locations of many coastal windmills. In addition, there are many old photographs of windmills from the 19th and early 20th Centuries spread throughout the Southeast coastal plain.

These past experiences, as well as those from around the world on ocean energy, hold important lessons for U.S. policymakers. It is clear that, despite being many years in the making, the expansion in technologies is still underway, and that—if properly understood and managed—America does not have to settle for damaging approaches to harness "blue" energy.

Effective Governmental Decision-making

The lack of effective governance systems in the sea is effectively enumerated in the final reports of the U.S. Ocean Commission on Ocean Policy and the Pew Oceans Commission. All analyses of threats to the Nation's oceans place the fragmentation of management authority by topic and geography at or near the top of the list.

We can ill-afford a continuation of ineffective governance. There is high potential for expansion of existing uses of our coastal and ocean waters and the Exclusive Economic Zone (EEZ) for mariculture, sand and gravel mining, phosphorite mining and others. In addition, a high potential exists for new uses including renewable ocean energy. It seems increasingly likely that the ocean of the near future will be far more complex than today.

There is great urgency in fixing this key problem of dysfunctional ocean governance before the looming expansion in ocean uses makes it impossible. The compelling need for clean, renewable energy production raises the stakes dramatically.

Unfortunately, the current morass of government programs competing for primacy in this area, and the apparent mission of decision agencies as primary advocates for energy production, compels coastal residents' skepticism. The complex mosaic of state and federal agencies with some responsibility for ocean energy management or regulation is daunting, with little organization in which potentially affected parties can have confidence.

Each of the federal agencies that makes decisions relating to the oceans has significant shortages of capacity in key areas needed to make sound and efficient decisions. Some of the key capacity needs are as follows:

- Technical capacity to develop and apply standards to minimize impacts on valuable fisheries and key ecosystems

- Scientific capacity to identify how to minimize ecosystem impacts, and to develop new research in strategic leverage points in ocean ecosystem protection
- Regulatory capability to quickly evaluate, propose and finalize decisions about proposed projects, and to monitor and enforce compliance with those decisions
- Confidence of the public in the agency's unbiased decisions

There is currently no one agency that has adequate capacity in each of these arenas. Rather than walk through the capabilities and drawbacks of the myriad agencies, I would like to point out a couple of positive developments in governance. None of these is adequate, and each of these has positive lessons the committee can draw upon as you move forward.

Positive Examples

While developing slowly, and constrained by existing tools and authorities, there is important movement toward ecosystem-based management at the regional scale, with which comprehensive energy policy can be unified.

In the U.S. Southeast by the South Atlantic Fishery Management Council (SAFMC) is creating an integrated ecosystem-based management plan, called the "Fishery Ecosystem Plan," to protect and sustain the living marine resources of the region in the context of changing threats from both fishing and non-fishing activities. One small piece of that effort is a policy to protect essential fish habitats (EFH) from the potential impacts of energy development in the region, adopted in revised form by the SAFMC in 2006. The positive lesson from this effort is that an agency with an ecosystem mandate can identify the key habitats that need protection, and can establish approaches that emphasize science, transparency, inter-agency consultation and effective decision-making. While I remain concerned that the wind, wave and tidal sections of that policy need to be updated, and the approaches to elevate concerns about non-fishing threats are underutilized. The approach has proven effective in getting decisions on unacceptable impacts. I would suggest from this experience that regional fishery management councils can provide a helpful voice in shaping energy policy development when they are focused on their responsibility to fully protect EFH.

Similarly, the States are playing an important role in building a more integrated approach to marine ecosystems. The California Marine Life Protection Act, and the North Carolina Marine Fisheries Reform Act provide excellent examples of forward-looking legal frameworks that build from existing foundations, but apply new authority to protect key marine and estuarine ecosystems.

Now, many regions of the country are taking up the challenge that managing jointly held natural resources present. The Gulf of Mexico Coalition, the Great Lakes Regional Collaborative, and new interstate collaborations on the West Coast, the U.S. Southeast, and New England, represent important early strides toward the management of regional seas. In addition, important cross-state pollination is underway under the umbrella of the National Fish Habitat Plan, and its regional collaboratives.

Recommendations for Blue Energy

An effective management system for blue ocean energy in the outer continental shelf (OCS) needs to address several key challenges, including:

1. A national ocean policy that brings together the many expanding offshore uses under a unified vision for healthy and sustainable oceans.
2. Clearly defined criteria for decision-making that align incentives to provide for clean (i.e. low-carbon), renewable ocean energy development and conservation of the ocean environment.
3. A lead regulatory entity (such as an agency or regional council) with an ecosystem-protection mission and substantial capacity (including knowledge, authority, and funding) on both energy and marine ecosystem health.
4. A transparent and robust project planning and evaluation process that includes integrating input from stakeholders, states and other agencies;
5. Long-term development plans that:
   - meet the defined criteria for decision-making;
   - project and address cumulative impacts;
   - establish clear and efficient siting parameters for specific installations;
   - establish measurable objectives for evaluation;
   - are compatible with regional ecosystem plans;
   - are based on appropriate social and economic incentives and strong science, including enhanced investments in understanding and mapping benthic habitats;
   - have strong accountability measures for unanticipated adverse environmental impacts, such as performance bonding.

6. Sustained funding for ocean and energy science and management.

Conclusion

This generation must chart the course for a successful transformation from the wild-west mentality that characterizes our nation's marine frontiers to one of order and sustainable production of protein, minerals and energy in harmony with the protection of ocean ecosystems. It is inevitable that a sea-change will occur over the next few decades in uses of the territorial sea and the exclusive economic zone, from ad hoc fisheries and opportunistic energy and mining to a mixed use future. It will happen faster than anyone believes.

The opportunity exists to lay the foundation for an organized and efficient use of natural resources that is both sustainable and sustaining of coastal and marine ecosystems and communities, but it will not happen unless bold leaders seize this opportunity. Civil society can step forward by creating positive models, and identifying decision approaches that take into account multiple perspectives. Congress can lead by setting a high bar before widespread permitting ensues.

Ms. BORDALLO. This is the second time you have made my day.

The Chair now recognizes Mr. George Hagerman, Senior Research Associate, Virginia Tech Advanced Research Institute.

STATEMENT OF GEORGE M. HAGERMAN, JR., SENIOR RESEARCH ASSOCIATE, VIRGINIA TECH ADVANCED RESEARCH INSTITUTE

Mr. HAGERMAN. Thank you, Madam Chairwoman. You have my written testimony. I won't read it. I instead am making this presentation. This will be an attachment. I think it will get some of the things across that would not come across otherwise.

Basically I was asked in my invitation letter to discuss the energy resource potential from offshore wind, ocean wave and ocean current in the OCS, and I will present what we know of the overall energy estimates from those three locations and in fact answer an earlier question from Mr. Inslee.

I am not going to be talking about some important resources for various reasons. Ocean thermal energy conservation or OTEC, which you have heard about, is a deepwater resource. It is off the Shelf and requires at least 500 to 1,000 meters access to the deep cold water. That does exist in EEZ, but not on our Continental Shelf.

Tidal in-stream energy is an inshore resource and so is not relevant to Federal waters, and marine biofuels, which has a considerable research history, has not been asked to be discussed today, but it does have quite a bit of potential.

[Slide.]

Mr. HAGERMAN. This is going to be sort of my conclusion in terms of for the percentages, and you will be able to read this later, but basically the largest of the three resources I have been asked to present on is offshore wind.

My written testimony has what NREL assumes for excluded areas to allow for commercial fishing and military uses and other potentially conflicting uses offshore. With those exclusions, you can see that the potential yield of energy in terawatt hours per year is comparable to in the 50 to 60 to 70 percent range of U.S. electricity consumption, so it is a huge resource even with those exclusions.

Offshore wave. You have heard this number before, 252 terawatt hours per year. That is if 15 percent utilized.

Ocean current. The really only ocean current in the Federal OCS is the Florida current between Miami and Bimini, and that is a very small resource in terms of the overall national scene.

So this gives you a sense of the scale of these resources and so I am going to focus on offshore wind. I am not going to even really go through this slide. This is the essentials of offshore wind. It is the movement of solar energy from the equator to the poles in the form of nor'easters like we experienced last week.

This shows the distribution of offshore wind. You can see the Mid-Atlantic is really where you have a resource that could be harnessed using technology that is commercially demonstrated off the coast of Europe now.

This is a better graphic of that. The red is the Mid-Atlantic, and you can see that there is considerable, in terms of installed capacity, gigawatts. The Mid-Atlantic really has a huge potential relative to the other regions. New England is also significant, as are the Great Lakes, in the zero to 30 meter water depth range.

You can see that in terms of Pacific versus Atlantic really the wind resource in the Pacific Northwest in California is onshore, and the opposite is true in the Mid-Atlantic. Indeed, if we look at Virginia as a Mid-Atlantic state, you can see the red, red and the purple, is high harnessable resources, and you can see that it is just the mountain ridges.

These are often national park land, forest land, difficult to permit, whereas we only have one Federal regulatory authority in the OCS and so this really represents a much more attractive target for large scale development of renewable energy on the Mid-Atlantic.

This is the technology that is used to harness the offshore winds in the zero to 30 meter depth range. In Virginia we could get 20 percent of our annual electricity demand by harnessing just a little over a quarter of the monopile base potential.

This will go in the 30 to 60 meter depth range, so it has gotten beyond PowerPoint engineering. This is the Beatrice Project. This is technology we are keeping a close eye on because this is significant in the Mid-Atlantic as well.

Offshore wave energy. You have heard about 252 terawatt hours a year, much more diverse. There are all kinds of terminators, attenuators, point absorbers. There has not yet been a convergence to a single best technical approach. Waves are governed by wind. They are higher offshore than onshore.

This is the distribution of the resource. Now you can see it is opposite of the offshore wind. In the lower 48 it is really Washington, Oregon and northern and central California where you have the premiere wave resource, where you have the narrow Continental Shelf and so you don't have the reduction of the wave energy that you have off the east coast.

Ocean current energy. This is some work that was done by DOE in 1980. They did a resource estimate in the Bimini Current. There are a lot of challenges there, and now you add to that the potential climate changing impact of potentially taking kinetic energy out of the gulfstream, and I think this is one that is not—I don't see this as being large on the horizon compared to offshore wind and wave.

Recommendations for research and development. The data exists. NOAA has the National Data Buoy Center. Scripps has a wave measurement program. There is some good wave modeling by both the Corps of Engineers and the NOAA National Centers for Environmental Prediction.

You need to map these potentially competing uses, so you need to involve the CZM program managers. Many of them have GIS layers already developed, and I can give examples if wanted. If I can add to this testimony later, I can give specific examples.

You also need to look at the cumulative energy potential as a function of the market value of energy. In other words, if the market value of energy goes to 15 cents a kilowatt hour and becomes competitive then you are going to have a much bigger resource. You have to put that into the equation. I think the PERI feasibility study is a good model for developing that collaborative approach.

Finally, you need to involve the utility, grid operators, their load flow modeling, grid constraints with the onshore interconnection points, and they need to be involved in this process as well, so it is not just the resource. You need to involve these other stakeholders.

Thank you for extending my length of time.

[The prepared statement of Mr. Hagerman follows:]

Statement of George M. Hagerman, Jr., Senior Research Associate, Virginia Tech Advanced Research Institute, Arlington, Virginia

The following comments do not represent the position of Virginia Tech but represent my views as a citizen of Virginia and a research engineer with over 25 years experience in the field of renewable ocean energy conversion. This experience is summarized briefly, below, and my resume is included as an attachment to this testimony.

From 1980 to 1985, I worked as a project engineer for Gibbs & Cox, Inc., a naval architecture firm in Arlington, Virginia, in support of the U.S. Department of Energy's ocean energy program, which at that time was focused primarily on ocean thermal energy conversion (OTEC).

In 1986, I formed SEASUN Power Systems in Alexandria, Virginia, where I conducted regional wave energy resource and technology assessments for private utilities and state government organizations in California, Hawaii, Virginia, and North Carolina. With financial support from the U.S. National Science Foundation, Virginia's Center for Innovative Technology, and limited private funding, I also carried out extensive numerical and physical modeling of wave-powered desalination systems.

In 1996-97, I was again hired by Gibbs & Cox, Inc. to manage a fully integrated feasibility study of a land-based OTEC plant for a commercial client in Puerto Rico, where I was responsible for direction of seven junior engineers and coordination of sub-contractor activities.

In 1999, I was hired by Virginia Tech, where I am now a Senior Research Associate at the Advanced Research Institute in Arlington, Virginia. Recent ocean energy projects include evaluation of coastal wind data to estimate turbine output for a proposed wind energy project on Virginia's Eastern Shore, a preliminary assessment of the wave energy resource potential off southern New England, and potential project site characterizations for the U.S. Electric Power Research Institute's (EPRI's) offshore wave energy feasibility study for Hawaii, Oregon, Washington, Massachusetts, and Maine. Last spring EPRI completed a similar feasibility study of tidal in-stream energy conversion, with participation by and co-funding from Nova Scotia, New Brunswick, Maine, Massachusetts, Alaska, San Francisco, and utilities in the Puget Sound area of Washington. As with EPRI's offshore wave energy study, I was responsible for energy resource assessment and site characterization.

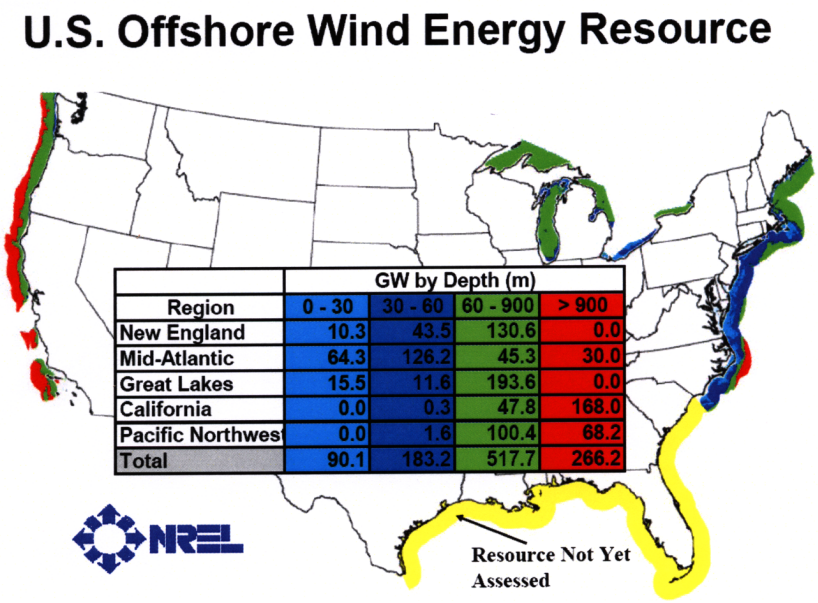
The EPRI wave energy feasibility study was completed in 2004, and its tidal in-stream energy conversion study was completed in 2006. A comprehensive set of reports is freely available for public download at the EPRI ocean energy web site: http://www.epri.com/oceanenergy/.

During the past eighteen months, I have been working closely with colleagues at four other state universities, as well as Virginia's maritime industry, to help launch the Virginia Coastal Energy Research Consortium (VCERC), which was created in the 2006 legislative session of the General Assembly and funded by budget amendment in the 2007 legislative session. The Virginia Tech Advanced Research Institute was named as one of five founding members, in addition to Old Dominion University, the Virginia Institute of Marine Science, Norfolk State University, and James Madison University.

VCERC was established to serve as an interdisciplinary research, study, and information resource for the Commonwealth of Virginia on its coastal energy resources, including offshore winds, offshore waves, marine biofuels, and seafloor methane hydrates. My main research activities for VCERC to date have been estimating the potential energy and economic benefits of offshore wind energy development on the Outer Continental Shelf (OCS) off Virginia, and I will present some preliminary results of this work today.

OCS Offshore Wind Energy Potential

Much of the information presented here was developed by federal researchers at the National Renewable Energy Laboratory (NREL) in Golden, Colorado, under the leadership of Walt Musial. Their preliminary estimate of the offshore wind energy resource distribution of the mainland United States are presented in Figure 1, below.



Region	GW by Depth (m) 0 - 30	30 - 60	60 - 900	> 900
New England	10.3	43.5	130.6	0.0
Mid-Atlantic	64.3	126.2	45.3	30.0
Great Lakes	15.5	11.6	193.6	0.0
California	0.0	0.3	47.8	168.0
Pacific Northwest	0.0	1.6	100.4	68.2
Total	90.1	183.2	517.7	266.2

Figure 1. Regional distribution of U.S. offshore wind energy resources out to 50 nautical miles (n.mi) offshore. Numbers are potential installed capacity (in gigawatts), assuming a wind turbine spacing density of 5 megawatts per square kilometer. To account for exclusions due to other uses of sea space (e.g., military exercise areas, shipping lanes, and commercial fishing grounds), NREL researchers assumed there would be no offshore wind energy development within 5 n.mi of shore (100% exclusion), and that only one-third of the available resource could be developed between 5 and 20 n.mi. offshore (67% exclusion), while two-thirds of the available resource could be developed between 20 and 50 m.mi offshore (33% exclusion).

For the "Lower 48" states mapped in Figure 1, the total potential offshore wind capacity in the federal OCS across all regions and all depths is 908 gigawatts (GW). Assuming a 35% annual capacity factor (due to wind speed variability), this represents an electric generation potential of 2,780 terawatt-hours (TWh).

The most immediately developable resource, using monopile foundations that have been commercially proven in European waters is in depths of 30 meters or less. As shown in Figure 2, below, such depths are most abundant in the mid-Atlantic re-

gion. The next most developable resource would be in depths of 30 to 60 meters, using trusswork foundations, which are now being demonstrated by the Talisman Project in the Beatrice Field of the North Sea. Again the mid-Atlantic leads the regions in having vast OCS areas in this depth range.

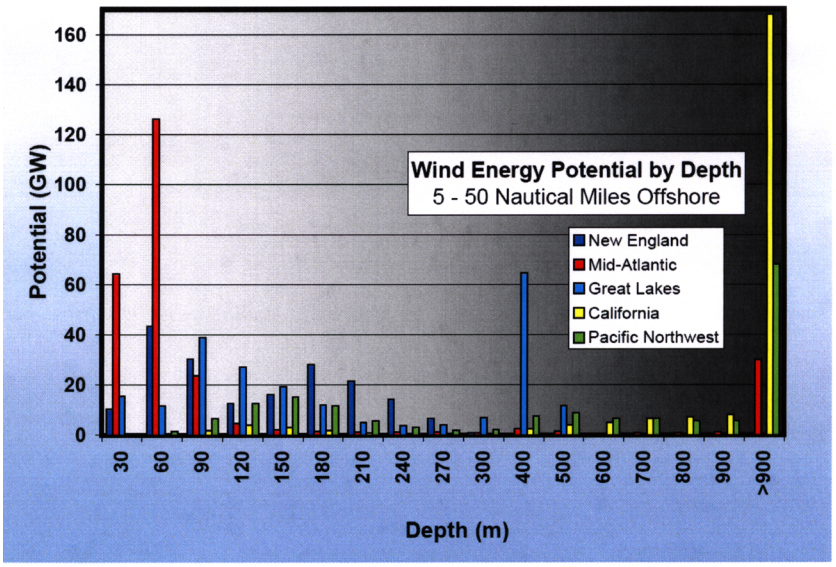


Figure 2. Depth distribution of U.S. offshore wind energy resources out to 50 nautical miles (n.mi) offshore. Note large near-term potential in Mid-Atlantic region.

A significant concern for coastal utility grids interconnected with large amounts of offshore wind energy is the hour-to-hour variability of the resource, as well as its seasonal variability. Rather than relying on back-up fossil fuel power plants onshore, however, utilities may derive more benefits from deploying distributed solar-electric (photovoltaic) systems on commercial and institutional buildings on shore, which particularly addresses the seasonal variability question.

Hourly variability may be addressed by on-shore batter y storage in plug-in hybrid electric vehicles, and/or storage of compressed hydrogen in the offshore tower structure. We are just starting to look at these options in Virginia.

Hybrid offshore wind and offshore gas combustion turbine projects represent another promising alternative, which has many advantages. These include increased revenues derived from having a completely dispatchable baseload power supply, and the much lower environmental impact and greater security of submarine power cable vs. pipeline energy transmission to shore. Eclipse Energy's Ormonde project is an example of such a hybrid, combining 108 MW of offshore wind power capacity with 98 MW of natural gas generation. It is expected to be operating in 2008.

Another renewable ocean energy resource that deserves consideration is marine biomass, which represents a sustainable source of offshore methane that can replace offshore fossil gas in hybrid wind-gas generation projects as described above, once the offshore fossil reserves are depleted.

OCS Offshore Wave Energy Potential

One preliminary finding of the EPRI wave energy feasibility study is that extracting just 15% of the offshore wave energy flux into the federal OCS would yield 252 TWh annually. Although this is an order of magnitude smaller than the offshore wind generation potential estimated above, it is nevertheless comparable to all conventional hydro-electric generation in the U.S. (which was 258 TWh in 2004). Wave energy in the OCS is thus a substantial resource.

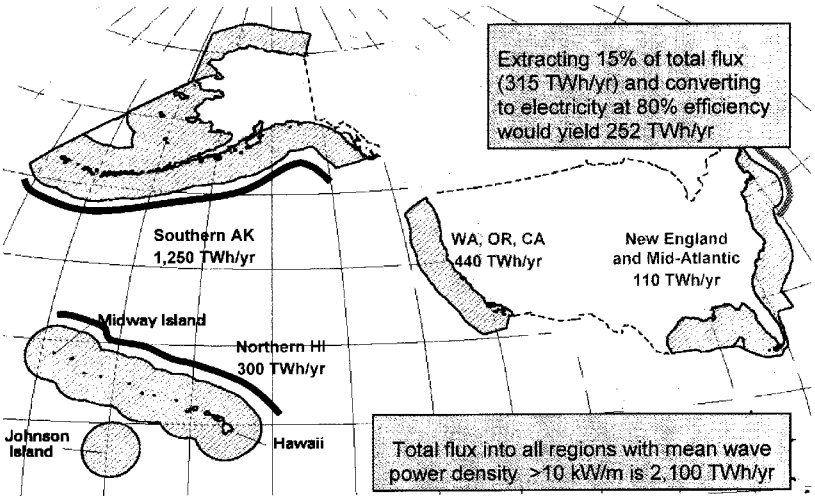


Figure 3. Geographical distribution of offshore wave energy resources having an annual average incident wave power density of more than 10 kilowatts per meter.

Wave energy's contribution could be even greater if hybridized with deep-water wind turbines in a single floating system that would share common mooring hardware and electrical interconnection cables, thus improving system economics. The output of such a floating hybrid wind-wave system would also be more continuous, since "yesterday's winds are today's waves."

Thank you for this opportunity to testify, and I would be happy to answer any questions or provide additional information.

Ms. BORDALLO. Thank you. Thank you very much, Mr. Hagerman.

Now the Chair recognizes Dr. Porter Hoagland, Research Specialist, Woods Hole Oceanographic Institute.

STATEMENT OF PORTER HOAGLAND, Ph.D., RESEARCH SPECIALIST, WOODS HOLE OCEANOGRAPHIC INSTITUTE

Mr. HOAGLAND. Thank you, Madam Chairwoman. My current understanding of the regulatory processes relating to EEZ renewable energy projects draws from my recent work with colleagues in the design of a national policy framework for the siting of coastal ocean wind power.

The conclusions of our work are relevant to the siting of wave and current projects too. I will focus my remarks on your questions concerning the general need for addressing the impacts on the environment and other uses of the ocean.

In the context of renewable energy, the relevant resource to be allocated is ocean space. The presence of quality differences across ocean areas implies that areas with the right qualities may be scarce, meaning that they have economic value.

Further, ocean areas may have value for other human uses. It is necessary to determine which other uses are compatible with renewable energy and which are not. Further, it is important to quantify these respective values in order to appreciate fully the op-

portunity costs from decisions to allocate ocean areas for renewable energy.

As part of the process of assessing environmental impacts, Congress should require that economic analyses be conducted of the opportunity costs of siting renewable energy, including the development of estimates of nonmarket or passive use damages.

Until recently, the Federal permitting process has been based upon Section 10 of the 1899 Rivers and Harbors Act, which regulates obstructions to navigation. While navigational issues still are important, recent legislation finds that the 1899 Act is inadequate per se for making decisions about the use of the ocean for renewable energy.

Section 388 of the Energy Policy Act assigns responsibility to MMS for the design and implementation of a policy framework for renewable energy in the ocean. MMS is now in the process of drafting regulations under the authority of the OCS Lands Act to grant leases, easements or rights-of-way for siting renewable energy facilities.

Energy-related activities authorized under these new provisions are not to interfere with other reasonable uses of the EEZ. While this assignment of authority to MMS renders moot the question of the adequacy of the 1899 Act as a means for providing access, the issues that arise with coordinating responsible agencies will not disappear.

Many permittings and environmental reviews must be undertaken by other agencies, and I have summarized these briefly in my written testimony.

On the surface, the long list of review authorities may appear to be evidence of a lack of integration in marine policy. However, the multiple approval process cannot be circumvented without difficulty, and it cannot be easily harmonized by administrative reorganizations, calls for regional management, devolution of authority to coastal states or mandates for stakeholder involvement.

What is critical here is that an agency is authorized to take a leadership role as a facilitator of a regulatory process. This is a key feature of the successful policy frameworks we studied. Clearly MMS has the experience and now the authority to assume the mantle of lead agency for siting renewable energy in the ocean.

In order to improve our understanding of the value of ocean space as a resource renewable energy, Congress should mandate a nationwide effort to assess ocean space as a resource for renewable energy development. This resource assessment could complement emerging efforts to develop regional and national capacities and ocean observation systems.

Further, Congress should encourage the undertaking of scientific research to design and evaluate the impacts of the first generation of renewable energy facilities as the siting of these facilities can be thought of as natural experiments.

In general, subsidies at both the Federal and state levels encourage the development of renewable energy in the United States, but does it make sense to promote ocean wind, for example, with a production tax credit and accelerated depreciation on the one hand and to exact a royalty on the production of electricity on the other?

This contradiction can be resolved by interpreting the financial terms as a sequential variable royalty comprising an initial subsidy while cashflows are negative, followed by the payment of royalties as cashflows turn positive.

In practice, the precise details would need to be ironed out, and the nature of incentives thereby created would need to be scrutinized carefully. Congress should encourage innovation in the design of financial institutions that would achieve both a development of renewable energy in the ocean and a return for the use of the ocean as a public resource.

Finally, one of the key recommendations of the U.S. Commission on Ocean Policy is the need to increase funding for oceanographic research, monitoring and the conservation and management of the marine environment.

Following the precedence embodied in the use of the OCS revenues for the Land and Water Conservation Fund, the National Historic Preservation Fund and revenue sharing with coastal states, Congress should consider requiring that any remaining revenues from the siting of renewable energy facilities be applied toward the sustainable financing of ocean management.

Thank you very much.

[The prepared statement of Mr. Hoagland follows:]

Statement of Porter Hoagland, Ph.D., Marine Policy Center, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts

Thank-you Chairwoman Bordallo, Chairman Costa, and Subcommittee Members for the opportunity to testify before this joint hearing of the House Subcommittee on Fisheries, Wildlife and Oceans and the House Subcommittee on Energy and Mineral Resources on "Renewable Energy Opportunities and Issues on the Outer Continental Shelf." My name is Porter Hoagland. I am employed as a Research Specialist at the Marine Policy Center, a social science research unit of the Woods Hole Oceanographic Institution in Woods Hole, Massachusetts. I have worked and studied as a marine policy analyst focusing on the economic and regulatory issues relating to the conservation and management of coastal and ocean resources for more than 25 years. This testimony represents my own views and not those of the Woods Hole Oceanographic Institution.

I have been asked to discuss the current regulatory structure for offshore wind, wave and current projects, what Federal agencies are in charge, the role of States, and what Congress can do to clarify the existing regulatory structure. My current understanding of the regulatory structure relating to renewable energy projects on the U.S. Outer Continental Shelf (OCS) draws from my recent work with colleagues on the design of a national policy framework for the siting of coastal ocean wind power. Concerning this work and in portions of this testimony, I would like to acknowledge the help of my colleagues, Ms. Mary Schumacher and Dr. Hauke Kite-Powell at Woods Hole and Professor John Duff at the University of Massachusetts Boston. I would also like to acknowledge the sponsors of this research, including the Massachusetts Technology Collaborative, the Goldman Sachs Group, Inc., and the Johnson Endowment at the WHOI Marine Policy Center.

Our recent work seeks to clarify the national, regional, and local decisions about the siting of wind power facilities in the U.S. coastal ocean. Its main conclusions are general enough to be of relevance to the siting of offshore wave and current projects as well. One of our main goals has been to identify and characterize the common features of a land and resource management system that are appropriate for the siting of wind power in the U.S. coastal ocean. In our full project report [1], which I would be happy to make available to the Subcommittees, we identify 16 common features of an "access system" for coastal ocean wind power, and we discuss their usefulness and efficiency. My testimony today will focus mainly on the findings

[1] Hoagland, P., M.E. Schumacher, H.L. Kite-Powell and J.A. Duff. 2006. Legal and regulatory framework for siting offshore wind energy facilities. Project No. 2004-OWEC-01. Westborough, Mass.: Offshore Wind Energy Collaborative Pilot Projects Grant Program, Massachusetts Technology Collaborative (30 June).

of our study relating to those access system features that may help Congress clarify the regulatory structure.

Ocean Space as the Relevant Resource

In the context of renewable energy facilities, the relevant resource to be allocated is ocean space. With respect to ocean wind power, ocean space may be characterized by its average wind speed, wind consistency, distance from electrical transmission facilities, distance from electrical consumers, and exposure to adverse weather conditions, among other qualities. The existence of quality differences across ocean areas implies that, like good cropland, ocean space with the right qualities may be a scarce natural resource. As a consequence, ocean space useful for wind farming or other renewable energy production may have economic value. Further, ocean space may have value for other human uses, including commercial fishing, marine aquaculture, recreation, environmental conservation, shipping, among many others. Consequently, there may be significant opportunity costs from a decision to allocate ocean space for renewable energy development (or, alternatively, for other purposes).

There is no private market for ocean space. Specialized institutions must be devised, if they do not yet exist, for allocating ocean space for renewable energy development. The existence of institutions to establish legal interests in ocean space and to provide a means for enforcement against any infringement of these interests is critical. Such legal interests are one key component of an "access system" for allocating ocean space that is needed to enable the development of renewable energy in the ocean as a productive industry. The features of an access system may influence the extent to which the siting of ocean renewable energy is economically efficient.

The siting of renewable energy facilities does not involve an exclusive use of ocean space in all cases. It is necessary to determine which other uses are compatible with wind farming and which are excluded or diminished. For example, some types of aquaculture and recreational fishing may be compatible with wind farming, while certain kinds of commercial fishing (dragging the seafloor with trawl nets) and the aesthetic appearance of the seascape may not. In making decisions about exclusivity and compatibility, it is critical to quantify tradeoffs in economic terms, where feasible. Importantly, the economic concept of "resource rent," representing the value of ocean space as a scarce resource, should be utilized in analyzing such tradeoffs.

It is relatively straightforward to estimate resource rents associated with commercial activities and progressively more difficult to estimate the value of uses that are further removed from markets, such as recreation, aesthetics, or the benefits of environmental amenities. Consequently, the opportunity costs of allocating areas for specific uses or for specific combinations of uses can be uncertain. Similarly, there is uncertainty about the non-market values of modifications in seabird or subsea habitat when a renewable energy facility is sited. Even the opportunity costs of displacing commercial uses, such as shipping and fishing, can involve uncertainty in their calculations.

It is important for a disinterested party to undertake economic studies, such as studies to estimate resource rents and non-market values. Although stakeholders, such as prospective developers or nongovernmental organizations, may wish to conduct or sponsor their own analyses, there is the clear possibility of bias built into assumptions and hidden in the results. Typically, the government would conduct policy analyses or contract for studies to be undertaken by independent analysts. Although arguably more credible than analyses conducted by stakeholders, the government, too, may not be a completely disinterested party. Therefore, the results of such analyses should be subject to a scientific peer-review.

Current Regulatory Structure, What Federal Agencies are in Charge, and the Role of States

The federal "permitting" process has until recently been based upon section 10 of the 1899 U.S. Rivers and Harbors Act (RHA), which assigns jurisdiction to the U.S. Army Corps of Engineers (ACoE) to regulate obstructions to navigation in the navigable waters of the United States and on its Outer Continental Shelf (OCS). While navigational issues still are paramount, recent legislative developments would seem to acknowledge that the RHA is inadequate for making decisions about the exclusive use of the ocean for permanent activities such as offshore wind power generation.

Section 388 of the Energy Policy Act of 2005 [P.L. 109-58], which was signed into law by President George W. Bush on August 8, 2005, assigns responsibility for the design and implementation of an access system for siting ocean wind energy to the Minerals Management Service (MMS) in the U.S. Department of the Interior. MMS is now in the process of drafting interim regulations under the authority of the Outer Continental Shelf Lands Act Amendments of 1978 to grant leases, easements,

or rights-of-way for siting facilities that produce, transport, or transmit energy from sources other than oil and gas, including ocean wind energy facilities. These rights are to be granted on a competitive basis, unless a determination of "no competitive interest" is made.

Additional provisions of the Energy Policy Act require MMS to establish financial terms that ensure a fair return to the United States for the granting of these rights and to set up a revenue-sharing program with coastal states for grants within three nautical miles of a state's submerged lands, analogous to the existing 8(g) program for OCS mineral leasing. MMS is now to act as the lead agency in coordinating the actions of other agencies in siting decisions.

Another important component in the development of MMS policy has been the drafting of offshore administrative lines from adjoining coastal states. These administrative lines will serve a number of important functions, such as helping MMS determine which states have prevailing interests in extended offshore areas because of the growing number of commercial activities on the federal OCS; providing a basis for accurate delineation of OCS planning areas; assisting in development and evaluation of "affected State" status under the Coastal Zone Management Act and the OCS Lands Act; assisting in the required comparative analysis by MMS to determine an equitable sharing of developmental benefits and environmental risks; and helping define appropriate consultation and information sharing between MMS and coastal states.

While this assignment of authority to MMS renders moot the question of the adequacy of the RHA as a legal means for providing access, the issues that arise with coordinating responsible agencies will not disappear. In particular, an RHA § 10 permit for potential obstructions to navigation will still be required among other approvals or reviews by numerous federal and state agencies. Further, there is now a requirement that energy-related activities authorized under these new provisions "are carried out in a manner that provides for...prevention of interference with reasonable uses of the EEZ." The Secretary of the Interior is accorded discretion in determining what uses are to be classified as reasonable.

Based upon our review of access systems in Europe and on the U.S. public lands, we find that an access system needs a lead agency that is responsible for resource assessments, area selections, and allocations for specific resources. A lead agency with a "place-based" orientation is more likely than one with a "functional" orientation to allocate access to and to manage an area under its jurisdiction within a framework of multiple-use planning that takes the opportunity costs of alternative uses (including non-uses) into account. At least in principle, such an agency is better suited to advance a complex mix of policy objectives, such as energy diversification, environmental protection, resource conservation, and a fair return to the public, among others.

Because MMS now has primary responsibility for regulating offshore renewable energy development on the OCS, MMS also has lead agency responsibility under the National Environmental Policy Act (NEPA) for conducting environmental assessments and drafting environmental impact statements. Further, as lead agency, MMS has the responsibility for coordinating permitting and environmental review undertaken by other federal agencies under a wide variety of other laws and policies.

At the federal level, such permitting and review includes, but may not be limited to the following: Section 7 consultations triggering potential biological assessments under the Endangered Species Act for interactions with protected species (NMFS); permits for harassments or incidental takes under the Marine Mammal Protection Act (NMFS); conservation assessments for potential impacts on essential fish habitat under provisions of the Magnuson-Stevens Fishery Conservation and Management Act (NMFS and the regional Fishery Management Councils); permits for dredge and fill activities under provisions of Section 103 of the Ocean Dumping Act and Section 404 of the Clean Water Act (ACoE and EPA); taking into account under section 106 of the National Historic Preservation Act of any impacts on historic resources deemed eligible for listing on the National Register of Historic Places (NPS); and permits for private aids to navigation (USCG).

Even when the proposed location for an offshore wind energy facility is in federal waters, a number of state agencies will also play some role in the siting process. Among other possible sources of state jurisdiction, state and tribal governments have standing as "stakeholders" under the NEPA requirements for environmental impact review; and, under the Coastal Zone Management Act, most uses of coastal federal waters must be consistent with any affected state's definition and authorized uses of its "coastal zone."

This long list of review authorities ostensibly may appear to be both confusing and evidence of a lack of integration in marine policy. Moreover, the amount of

interagency coordination and the number of required approvals has been blamed for retarding the nascent industry's growth. Notwithstanding these concerns, to a large extent, the multiple approval process cannot be circumvented easily, and it cannot be easily harmonized further by administrative reorganizations, mandates for regional management, or devolution of authority to coastal states. What is critical is that a lead agency—here MMS—serves as a facilitator of this process, establishing a form of "one-stop shopping" in ocean-space allocation decisions. At this juncture, this seems to be the direction that MMS is taking.

The development of renewable energy facilities in the ocean, particularly wind power, also is influenced by a number of other public policies. These policies continue to be in a state of flux, thereby increasing the level of regulatory risk faced by entrepreneurs who are thinking about constructing a wind farm in the coastal ocean. Among these policies are the reinstatement of the federal production tax credit and the enactment by states of renewable portfolio standards.

Recommendations for Congressional Clarifications of Existing Regulations

In our study of the design of an appropriate access system for renewable energy in the ocean, we have analyzed the economic implications of 16 generic features of access systems. Among these features, the following issues stand out as candidates for Congressional clarification of regulations: multiple-use decision-making; financial terms and subsidies; environmental monitoring I finish with a recommendation concerning sustainable financing of ocean management.

Multiple-Use Decision-making. Most modern access systems incorporate methods of resolving existing or potential conflicts among alternative uses. All of the access systems in our database incorporate provisions for consideration, at some level of detail, of alternative uses of the ocean in areas where ocean renewable energy facilities might be sited. The need for methods of resolving multiple-use conflicts arises from the recognition that allocation decisions may result in opportunity costs in terms of displaced uses, including such "non-uses" as habitat protection or the supply of ecosystem services. This need is a reflection also of the incompleteness of property rights for alternative uses of ocean space as a public resource and the absence of markets for allocating ocean space as a resource.

Policy objectives for U.S. offshore renewable energy development, which relate to the prevention of interference with other "reasonable" uses and the consideration of other uses of the sea and seabed, appear to require MMS to conduct multiple use decision-making with respect to the siting of renewable energy facilities. MMS appears to be moving in the direction of analyzing the economic opportunity costs of siting renewable energy facilities in the ocean, although there is no explicit mandate from Congress to do so.

An important need is for the development of estimates of "non-market" values. For example, the siting of an ocean renewable energy facility may involve a change in the seascape. Both coastal residents and tourists may benefit from an unimpeded view of the ocean, but this view is not a commodity that typically is traded in established markets. Environmental economists have developed methods for estimating non-market values, and these methods can be applied to estimate the economic losses (or gains) associated with changes in the aesthetic properties of seascapes. Areas where additional research is needed include the selection of the most appropriate analytical methods and the development of estimates of potential non-market damages from siting ocean renewable energy facilities.

Notwithstanding the cumbersome nature of traditional non-integrated management, an access system should incorporate methods of resolving existing or potential conflicts among alternative uses. In practice, estimating the opportunity costs of allocating areas for specific uses or for specific combinations of uses can be very uncertain. Nevertheless, as part of the process of conflict resolution, Congress might specify that economic policy analysis be incorporated into an access system so that the government can begin to systematically integrate estimates of opportunity costs into its decisions about allocating ocean space. Such a comparison is needed especially where renewable energy has been selectively subsidized.

Subsidies and Other Financial Terms. In general, exogenous subsidies encourage the development of ocean wind power in the United States. Within the maritime boundaries of coastal states, the federal production tax credit (PTC) and accelerated depreciation, state renewable portfolio standards policies, system benefits funds, and property and sales tax abatements can lower the relative costs of wind power construction and operation. Only the federal subsidies (PTC and accelerated depreciation) would appear to apply to developments in the U.S. exclusive economic zone, however.

The rationale for such subsidies is to level the playing field for renewable power, with respect to electric utilities that rely upon fossil fuels. Fossil fuel burning plants

receive implicit subsidies when they are not required to account for the external costs of pollution, such as through releases of carbon dioxide or other pollutants. Little work has been undertaken to estimate the scale of the subsidies enjoyed by fossil fuel burning plants and to understand the extent to which subsidies for renewable energy do, in fact, level the playing field. Congress might encourage the development of economic models and the compilation and analysis of data to understand whether the renewable energy subsidy appropriately levels the playing field.

Policy discussions calling both for subsidies for renewable energy and charges (royalties or other) for the use of ocean areas are apparently inconsistent. Does it make sense both to promote ocean wind, for example, with a production tax credit and accelerated depreciation on the one hand and exact a royalty on the production of electricity from this same source on the other? This question also raises issues of the relative incentives faced by wind farm developers in choosing onshore versus offshore sites.

This issue may be resolved, at least conceptually, by considering a sequencing of subsidy and royalty. In effect, we might consider one form of a variable royalty, known as a "Brown tax." A Brown tax comprises an initial subsidy, while cash flows are negative (say, through the initial expenditures to characterize the relevant environmental parameters and to optimize the operations of a renewable energy facility), followed by the payment of royalties as cash flow turns positive. Because wind power is subsidized with a production tax credit and accelerated depreciation rules, these subsidies can be thought of as the "negative" royalties that apply during the early phases of ocean wind development. Over time, these subsidies may be phased out, and positive royalties could then be invoked.

A potentially useful institution for implementing a variable royalty is known as a Townsend-Young "evergreen lease." An evergreen lease is renegotiated after approximately one-half of the tenure has been completed: say, at ten years on a 20-year lease. Evergreen negotiations for a renewable energy lease might involve an increase in royalty payments, in line with the sequencing of a Brown tax. Although the precise details of a variable royalty/evergreen lease method would need to be ironed out, and the nature of incentives thereby created would need to be scrutinized carefully, this kind of an institution may make sense for both the government and energy producers where rents are expected to increase over time due to expansion in demands for both ocean space and electricity.

As a further consideration, we might expect that many areas of the ocean initially will be provided to industry on a first-come, first-serve basis for the siting of renewable energy facilities. As ocean space becomes increasingly scarce, however, methods of competitive bidding and allocation will come into play. Under an access system that mandates a competitive process for allocating ocean space for renewable energy development, prospective developers will bid away any subsidies as well as resource rents. The bidding away of subsidies implies that the economic efficiencies embodied in a competitive access system may defeat the purpose of other policy objectives that encourage the development of renewable energy through subsidies.

The existence of these issues suggests that there is a need for Congress to encourage experimentation with innovative financial institutions that would achieve both the development of renewable energy in the ocean and a return for the use of ocean space as a public resource.

Monitoring. A strong argument can be made for including provisions in an access system that promote the collection of environmental monitoring data prior to the allocation of legal interests. Such data can improve our understanding of the value of ocean space as a resource for the specific purpose of siting renewable energy facilities. Further, such data can help us to get a sense of the opportunity costs of siting renewable energy facilities in the ocean. Environmental monitoring data could be collected by the government and released publicly or through a permitting program for prospective wind farm developers. Alternatively, prospective developers might be encouraged to pool their resources to conduct environmental monitoring efforts in areas that show promise for wind power development. A policy to pool monitoring efforts would reduce the waste associated with duplicate monitoring efforts in the same location.

Congress might usefully require the implementation of a national environmental monitoring effort to assess the characteristics of ocean space as a resource. This national effort could be integrated into complementary efforts on the development of regional and national capacities in ocean observation systems.

The external effects of ocean renewable energy facilities are not normally a function of output (electricity) but instead of the placement of the structures. Once rock piles, towers, turbines, or floating facilities are in place, both the view and, potentially, the habitat have been altered. Short of removing the structures, there is little that can be done to mitigate adverse effects. As a consequence, relative to the more

common types of pollution-generating facilities, there would appear to be a reduced need for the ongoing monitoring and enforcement of ocean renewable energy facilities.

The siting of the first generation of wind farms in the ocean may be understood as a kind of scientific experiment. The understanding gained from these initial experiments undoubtedly would be of use in subsequent decisions about the location, scale, and patterns of ocean wind farm development. Congress might encourage the undertaking of research efforts to design and evaluate the results of these first-generation experiments.

Sustainable financing. I'd like to add one final word about the sustainable financing of ocean management. One of the key recommendations of the U.S. Commission on Ocean Policy was the need to assign returns to the public from the use of its marine resources, such as bonuses, rentals, and royalties for offshore oil and natural gas, to help fund oceanographic research, monitoring, and conservation and management of the marine environment. As I mentioned above, under the Energy Policy Act, MMS is to establish financial terms that ensure a fair return to the United States for the granting of rights to renewable energy development. Further MMS is to establish a revenue-sharing program with coastal states for grants within three nautical miles of a state's submerged lands. Following this policy, and other precedent embodied in the use of OCS revenues for the Land and Water Conservation Fund and the National Historic Preservation Fund, Congress should require that remaining revenues from the siting of renewable energy facilities be used for sustainable financing of ocean management.

Ms. BORDALLO. The Chair thanks Dr. Hoagland and all of the witnesses that appeared here this afternoon.

I do have a few questions for Mr. Jason Bak. You spoke about royalties. You testified that rents and royalties for seabed use should promote ocean renewable energy, not discourage it.

Can you please elaborate on what you mean by that? How could the royalties promote renewable energy development?

Mr. BAK. Sure. What we have seen in various other jurisdictions in relation to wind energy is that these royalties are phased in over time in order to have an up front royalty free stage that would allow the developer to have slightly higher returns than it would otherwise.

So in British Columbia, for example, in the wind energy industry we see that there is a 10-year rent free period that helps stimulate developers to get into development or, in this case, get in the water, and then in time when the technology is more robust, when you start seeing those near commercial returns, then apply a reasonable type royalty.

So the stimulation would be the lack of a royalty for a fixed period so that the project can get to an economy of scale or a certain level of development and then phase in a royalty.

Ms. BORDALLO. Thank you.

I have another question for Mr. Grader, Mr. Zeke Grader. In your testimony you discuss your interest in ensuring that renewable energy projects are operated in a manner that is consistent with regional fishery management plans.

Fishery management plans are developed regularly, and energy projects will have a much longer duration. How do you envision the two could be coordinated?

Mr. GRADER. I think basically requiring that the energy or the agency, for example, if it is Minerals Management Service, require that there be a consultation with the regional councils to make sure that, for example, we are not placing these facilities down in areas that are prime fishing grounds. For example, one of the areas

being looked at off of Eureka is between 25 and 35 fathoms offshore. Well, that happens to be right in the middle of a prime fishing grounds.

If we might relocate that someplace else, these are the types of things I think that could be dealt with if there was the early on discussion and requirement for consistency in this to make sure that it is not one activity or the other, but that in fact we coordinate them so we can have both and both can operate successfully.

That is my concern because we have had to operate with the Minerals Management Service off of Santa Barbara, our fishermen there, for 40 years now, and it has not always been the happiest of experiences.

We just think that looking forward to this new type of energy, which we are excited about and see the need for, we just want to make sure that it is done in a way that is consistent with the fishing activities and other types of existing activities.

Ms. BORDALLO. Thank you. Thank you very much.

Dr. Hoagland, the use of revenues. The last sentence in your written testimony I noticed recommends that Congress require that revenues obtained from renewable energy projects on the OCS be used to sustain the financing of ocean management.

Can you elaborate on this? What would the revenue support? For example, do you envision monitoring or mitigation programs?

Mr. HOAGLAND. I don't have specific recommendations in that regard, but I think monitoring and mitigation would fall under that, as well as the administration of the program.

I think if you go back to the Ocean Commission's report, that is one of their key recommendations. They probably have a long list in there of how they envision the money would be spent.

I might add that we probably would expect that any revenues in addition to those that would go into those other revenue sharing arrangements might be small in the foreseeable future, but that should be incorporated into the law.

Ms. BORDALLO. So you do envision then monitoring or mitigation programs?

Mr. HOAGLAND. I think that could fit under it, yes.

Ms. BORDALLO. Yes. The Chair now would like to thank Mr. Inslee from Washington for returning after voting. We have been holding the hearing right through the voting process, and the Chair now recognizes Mr. Inslee for any questions he may have.

Mr. INSLEE. Thank you.

Mr. Grader, I thought your comments about ocean acidification—I didn't hear them, but my staff told me about them. I was just thinking. You kind of have the ying and yang of this industry because I am very concerned about acidification potentially affecting the whole food chain. If the phytoplankton collapse, you know, your industry is in pretty big trouble.

So here is an industry that can help on that, zero CO_2 emitting to deal with acidification, but at the same time if it is at a place that is causing you difficulty it is kind of a ying and yang kind of situation.

Here is a question I guess. Do you think there is a possibility and have you talked to any of the Federal agencies about going to the more proactive? The gentleman from the coastline commission,

Mr. Diers, had talked about trying to go to a more proactive siting plan.

In other words, should we be giving thought to the Federal agencies actually identifying areas that will be energy zones, if you will, in advance of specific permit applications from the industry? Would that be helpful?

Mr. GRADER. I think that makes a great deal of sense. In fact, I wish we were doing that in some more activities right now. For example, we are going through in California placement of these marine protected areas, and we haven't seen any coordination, for example, with the Federal council as far as where their existing conservation zones were.

I think we do need to have much more coordination here. I think it would be useful. I think the states could participate as well as the coastal management authorities. Keep in mind, this energy is different than LNG. It is different than offshore oil, which we had real problems with and we fought with.

We understand the need for renewable energy. We can see some real benefits from it. It is just a matter, as you described, of the ying and the yang, you know, making sure it is placed there correctly.

I think this type of coordination, proactive activity of doing this planning, would be extremely helpful. It is something we have never seen, frankly.

Mr. INSLEE. Maybe I could ask folks from the industry. Does it make sense to try to have a new regime where we charge the Federal government to go out and identify areas we could call energy zones that are almost prepermitted? Is that something we should be thinking about?

Mr. BAK. I think that could be useful in incentivizing developers, project developers along with technology developers, to actually finding economic zones.

If there are groups who would do the symmetry, the measuring of the profile of the sea floor, who would help do some of the prepermitting on the environmental side that would be very, very valuable because it removes that up front cost. Yes, I think that would help.

Mr. HAGERMAN. In NOAA, when NOAA was given charge of the OTEC program in the early 1980s one of the outcomes of that was to identify certain zones that were used to characterize both the resource, as well as the environmental effects.

These were kind of like reference study zones where developers could then go in and say gee, if I put my technology here it would cost this, so there is also some precedent in doing that at least with OTEC. You could have a zone that everybody would agree OK, here is the baseline data.

Of course, the identification of the zone would have to involve the other stakeholders to make sure that there are minimal conflicts there, but then once you have that zone that could also be a reference point to see how well the technology is doing as it goes through generation after generation.

Mr. HOAGLAND. As I mentioned in my testimony, the idea of a resource assessment, a national resource assessment, is important, and an important example of that is the OCS program itself where

the U.S. Geological Survey and MMS are involved in a resource assessment of the oil and gas resources offshore.

There also is precedent in that program for the pooling of industry activities in mapping the resource, which could reduce duplication, so that is another thing that should be considered.

Mr. RADER. Congressman, I think you are exactly right. The choice of place will be essential to getting this right both on the front end and the back, and what we need to learn from pilots can be maximized by choosing those places where both the ecological and technological questions can be answered in the long term as commercialization proceeds to minimize conflicts between existing users, including commercial fishermen and recreational fishermen and these new uses of the exclusive economic zone.

Mr. INSLEE. So let me get to potentially the biggest problem we have with this—the surfers. My son is a surfer, and his fellows have been asking him is this going to affect the surfing, which is the make or break issue, of course, in the nation.

I have told him no, it will not. It will be an infinitesimal impact on surfing waves. Is that correct?

Mr. GRADER. There has been a big protest right now off of Scotland. I didn't know you could surf Scotland, but apparently you can, and there has been a protest there. The surfers are claiming that this will reduce the wave heights by 10 feet.

How valid that is I don't know, but certainly the surfers are going to have to be considered in all this planning effort.

Mr. BAK. I can definitely speak to that. The simple physics of it, using our device, a point absorber, means that you have to attenuate a lot of mass, a lot of water movement, with your actual device in order to make a measurable impact on the wave energy.

It is very, very, very difficult to attenuate the waves and actually reduce the height of the waves for surfers. I think it is a fear of the unknown. I think you need to engage the stakeholders very, very early on. We did that successfully with surfers in Makah Bay.

It is just telling people so they are not afraid or unsure of what the result may be, but physically it would be difficult.

Mr. INSLEE. So the technical response to the surfer inquiry would be then chill out, dude? Would that be the response?

Mr. BAK. Exactly.

Mr. INSLEE. Do any of you have any comments about the legislation that I have introduced? Hopefully some positive, but if there are any ideas for constructive criticisms, we would love to hear it.

Mr. O'NEILL. Yes. Actually, Congressman Inslee, I was very heartened by the first panel and the second panel in terms of the comments made by NOAA and the comments made by the gentleman representing the different states.

NOAA actually asked specifically for adaptive management and embracing the adaptive management principles. Additionally, the gentleman representing the different states was looking for a programmatic environmental impact statement.

I think that programmatic environmental impact statement could also go a long way to providing some of the environmental studies that have been suggested by the panelists on this second panel today.

Mr. RADER. Congressman, Environmental Defense looks forward to working with you to get this key issue right, and we also side with Mr. Diers in suggesting that blending in an appropriate dose of ecosystems into the great technological proposals and management proposal that you have put on the table would go a long way toward meeting all of our objectives.

Mr. BAK. I would like to thank you as well, Congressman, for the help that you have given us over the last few years throughout the permitting of the Makah Bay project and the help that your office has given us.

It has helped us trailblaze in wave energy, and I think the bill that you have introduced is fantastic for that push to get this industry growing. We definitely believe in a number of the items that you have included in that bill and would like to stress that we would like to be a part of that process in offering any information that we can going forward.

Again, thank you very much for your continual help.

Mr. GRADER. Let me just add I think one thing. Part of a bigger issue beyond your bill, but other legislation, is I think the example of trying to plan for this wave energy and do it in a successful way really gets at the point of our need for a national ocean policy because then we could really begin planning all these activities in our ocean in a coherent way, which we have not done to date.

Mr. INSLEE. Thank you.

Ms. BORDALLO. I thank the gentleman from Washington.

The Co-Chair, Mr. Costa, has returned and so he probably has some questions for the witnesses and will close off the hearing, but before he does I would like to invite all of you on the panel to take a look at Guam and the oceans around the territory for new wind and wave technology. Will you do that?

Mr. O'NEILL. Absolutely.

Ms. BORDALLO. Thank you.

Mr. Chairman?

Mr. COSTA. [Presiding.] Thank you, Madam Chairwoman. I appreciate your solid efforts. I unfortunately had a conference call, and then we had some votes. I know that this panel did a good job. I read your testimony last night.

Mr. Grader, long time no see.

Mr. GRADER. Yes, it has been, Mr. Chairman.

Mr. COSTA. How are our fisheries doing?

Mr. GRADER. It is a mixed bag.

Mr. COSTA. Yes, I know.

Mr. GRADER. Yes.

Mr. COSTA. The efforts to try to deal with renewable sources of energy, both as it relates to wave action, and I appreciate the conversation, the exchange between the gentleman from Washington state. I, too, have a relative who seems to be an aggressive surfer, and I know how intense they can be.

I am just wondering. Has your association that has been long active in water-related issues in California taken the time to examine the potential impact as it relates to both wind action and wind power, as well as wave power?

I know these are prototypes and they haven't yet been implemented, but given the interest and the potential it seems to me we need to understand the impacts on fisheries.

Mr. GRADER. I think we are just beginning to understand this. Like I said in my testimony, I think we are intrigued with this for obvious reasons, and one thing that obviously you would be concerned with is we see these as a mechanism for perhaps powering desal plants, which could help take some pressure off of water use, free up water for agriculture. Of course, we see it as freeing up water for in-stream and doing that.

The biggest issue here is other than what potential impacts it may have on the environment, and, like I said, I think those will probably be minimal will be my suspicion, but I think the issue is just one of space. Can we place these in areas where they don't interfere with fishing either from the standpoint of preclusion to fishing grounds or creating navigation hazards?

I think what Mr. Inslee had mentioned was the idea of some proactive planning could perhaps do that, so people are not simply going to be where there is a fisherman, a recreational fisherman or whoever or a coastal community reacting to these type of things.

If you bring them all together initially and start planning for it, it seems to me it would make a lot more sense and perhaps make this go faster, make it less expensive and do it with much less controversy and chaos.

Mr. COSTA. Let me just ask one other quick question. I know that artificial reefs have been an effort that we have tried to pursue in California and elsewhere with some mixed success. Do you think these have any potential for habitat purposes?

Mr. GRADER. Mostly not. I think they are overblown mostly by some people that just want to leave their debris in the ocean. I mean, I suspect you could probably make a case for plastics in the ocean, the fact that things are——

Mr. COSTA. I am not making that case, Mr. Grader. You and I go back a long way.

Mr. GRADER. Yes. Yes.

Mr. COSTA. I have supported a lot of fishery restoration efforts over the years, as you know.

Mr. GRADER. No, I know that, and we appreciate that. I think I am a little bit nervous about people proposing——

Mr. COSTA. No. I just asked the question. I understand.

Mr. GRADER.—steel archipelagos or any other type of archipelago out there.

Mr. COSTA. Mr. Bak, I wasn't here to hear your testimony, but I did read it. I wanted to ask you specifically how far away are we from the establishment, and Mr. Inslee—I am sorry he left—talked about his bill, but where we can really begin to get a handle through a number of prototype efforts on the potential power, the challenges we face, how we deal with the application process and so forth. I mean, are we talking about a year? Two years? Where do you think we are?

Mr. BAK. This summer we will be installing one of our devices with Oregon State University off of Newport, Oregon. The following year we are going to upgrade the device using the data from the year that we have collected it being in the water, and then the fol-

lowing year, in 2009, we are going to install our first megawatts of devices producing power connected to the grid in Washington state.

Mr. COSTA. Where else in the country or in the world? Are we at the cutting edge, or are there other places we should be looking at?

Mr. BAK. In the world right now there is not a cumulative megawatt of wave energy installed anywhere, so we are planning for the——

Mr. COSTA. We are at the cutting edge?

Mr. BAK. Exactly, and we are planning for this to——

Mr. COSTA. And jobs that could be created? Do you have any perspective?

Mr. BAK. Right now we are bringing in foreign investment to build our device in Oregon with Oregon Iron Works and SAIC. During that process we are going to employ 10 to 20 people who are actually turning and bending steel, and that is for one device, in addition to a number of technical consultants.

If we were to build a 100 megawatt array we are looking at somewhere close to 100 people for the construction and fabrication process and then maybe 20 to 30 on an ongoing basis to manage and maintain the array, so this does create jobs. This does bring in foreign investment, and this is part of the new energy economy.

If we can find a way to streamline the process for us to spend our money getting devices in the water, we will create jobs.

Mr. COSTA. So comparable to the embryonic effort with wind power that many of us witnessed back in the 1970s and in the 1980s, do you see a similar type of progression with regards to wave power if successful or more accelerated?

Mr. BAK. I would say with wave energy I see it as being somewhere where wind was in the 1990s. We are at the stage now where we are coming close to competing with offshore wind in level of technical development.

Right now wind projects still find it difficult to be financed by banks offshore. We are at the stage where we can get bank involvement in our technology, meaning we can borrow other people's money and use it to build out our technology aggressively, so I can see the wave energy industry moving toward commercial projects in the next three to five years, and that is what we intend.

Mr. COSTA. The one facility that you are talking about in Washington, I was looking at the different schematics here. Which plan are you looking at for the one megawatt?

Mr. BAK. It is using the AquaBuOY technology.

Mr. COSTA. The AquaBuOY. OK. And I guess best science has yet to determine which of the different technologies. I mean, that is why you have prototypes which is ultimately going to provide the most amount of energy, the least amount of impact and the best bang for your buck.

Mr. BAK. And it has to do as well with the financing of this technology. There is a little financial push that is needed to really move this industry to the next level to get the same attention as ethanol, as wind, et cetera.

The financing of the technology and providing a level playing field for them to compete is something that we are very keen on seeing happen through various bills, et cetera.

Mr. COSTA. And I suspect you added whatever other comments you wished during your testimony about what we need to be considering here to try to encourage the efforts?

Mr. BAK. Yes. If I can stress one aspect of our written testimony is that I think investor tax incentives right now would be very, very useful for the market to bring capital into this space, and then the market and the investors can determine which technologies succeed based on their performance, based on their environmental impact, based on many factors.

This again is an incentive that was used in Denmark in conjunction with a feed-in tariff in the 1980s that grew a whole wind energy industry that still today has a dominant market share, and even GE can't knock the Danish wind turbines out of having that market share, so there is that same opportunity here in America.

Mr. COSTA. Tax incentives. Why didn't I think of that?

Mr. BAK. You can use them initially and scale them back.

Mr. COSTA. No. You don't have to belabor that.

Mr. BAK. I am a big, big, big fan.

Mr. COSTA. Right. Everybody seems to discover them at some point.

Anyway, I have belabored this committee enough. I have certainly exceeded my time. I hope I haven't exceeded the patience of my fellow Co-Chair of this Subcommittee.

We appreciated the Subcommittee on Fisheries, Wildlife and Oceans taking the time to do this with us. I think it was a good collaborative effort, and we will continue to look at more efforts when we can do this. It saves time, saves staff time. We appreciate the staff's effort on this as well.

I believe at this point, Madam Chairwoman, unless you have something else you would like to say, we are going to ask unanimous consent to allow for the submission of questions for the record. We ask all the witnesses to respond to those questions within 10 days.

Without any further ado, we will wrap up this important hearing. I want to thank all the witnesses, and we will follow your efforts closely. Thank you.

[Whereupon, at 5:39 p.m. the Subcommittees were adjourned.]

[A letter submitted for the record by John Alton Duff, J.D., LL.M., Environmental, Earth and Ocean Sciences Department, University of Massachusetts/Boston, follows:]

April 24, 2007

Dear Chairwoman Bordallo, Chairman Costa, and Subcommittee Members:

Thank you for the invitation to submit testimony to this joint hearing of the House Subcommittee on Fisheries, Wildlife and Oceans and the House Subcommittee on Energy and Mineral Resources on "Renewable Energy Opportunities and Issues on the Outer Continental Shelf." While I am not able to appear personally, I submit for your consideration the article Offshore Management Considerations: Law and Policy Questions Related to Fish, Oil and Wind, published in Volume 31 of the Boston College Environmental Affairs Law Review at pages 385-402 in 2004.

Sincerely,

John Duff, J.D., LL.M.
Assistant Professor
University of Massachusetts/Boston
100 Morrissey Blvd.
Boston, MA 02125-3393
(617) 287-7445
John.Duff@umb.edu

]NOTE: The article has been retained in the Committee's official files.]