

RENEWABLE ENERGY AND THE GLOBAL ENVIRONMENT

HEARING

BEFORE THE
SUBCOMMITTEE ON ASIA, THE PACIFIC, AND
THE GLOBAL ENVIRONMENT
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RENEWABLE ENERGY AND THE GLOBAL ENVIRONMENT

TUESDAY, OCTOBER 30, 2007

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ASIA, THE PACIFIC,
AND THE GLOBAL ENVIRONMENT,
COMMITTEE ON FOREIGN AFFAIRS,
Washington, DC.

The subcommittee met, pursuant to notice, at 2 o'clock p.m. in room 2172, Rayburn House Office Building, Hon. Eni F.H. Faleomavaega (chairman of the subcommittee) presiding.

Mr. FALEOMAVAEGA. My distinguished ranking member is on his way, just one more vote and he will be right here, so I would ask for your patience for a couple more minutes before we begin. Thanks.

The House Foreign Affairs Subcommittee on Asia, the Pacific, and the Global Environment will now come to order. I appreciate very much the presence of our witnesses whom we have called to participate and to give their testimony. And this afternoon I know my distinguished ranking member is on his way. I think I am going to go ahead and start our dialogue with an opening statement.

Without objection, all the statements and any extraneous materials our witnesses may want to submit to be made part of the record will be made in order, as well as the members of the committee and for myself and also the distinguished ranking member.

[The prepared statement of Mr. Faleomavaega follows:]

PREPARED STATEMENT OF THE HONORABLE ENI F.H. FALEOMAVAEGA, A REPRESENTATIVE IN CONGRESS FROM AMERICAN SAMOA, AND CHAIRMAN, SUBCOMMITTEE ON ASIA, THE PACIFIC, AND THE GLOBAL ENVIRONMENT

Today, we are holding the third in a series of hearings we have held this year on the global environment which included an update on the Kyoto Protocol, APEC's joint declaration on climate change, and now renewable energy.

Renewable energy options are especially important in the Asia Pacific region where air pollution may impact economic development and energy insecurity fuels geopolitical tension. For example, most experts agree that India and China's rapidly growing economies will require large amounts of new energy in the coming decades, and this poses challenges not only for the US but also for the region as our present economies hinge on the availability of fossil fuels. Lessening our dependence on fossil fuels and encouraging others to also invest in renewable sources is one way to advance our way to a more peaceful future.

This is why I am pleased that multiple federal agencies including the US Department of State, the US Department of Energy, the Overseas Private Investment Corporation (OPIC), and the US Department of Agriculture, have joined with us today to discuss US efforts in renewable energy, with particular focus on the US and India as partners in renewable energy innovation.

I am also pleased that we have with us Mr. Sanjay Puri, President of the US-India Business Alliance (USIBA), a bilateral trade promotion group that provides advocacy to maximize investment and trade by drawing upon the power of the Indian American community, which is a strong catalyst in the growth of both economies. Mr. Puri has been at the forefront of galvanizing the Indian American community in support of US-India civil nuclear cooperation and recently returned from India where he met last week with Prime Minister Singh, and other top government officials, who thanked him for the work he has done for the past five years to move this historic agreement forward. While US-India civil nuclear cooperation is outside of the scope of our hearing, I applaud Mr. Puri's efforts in advancing US-India interests and I commend Prime Minister Singh for his commitment and determination to get a US-India civil nuclear cooperation agreement done despite whatever obstacles he may have to overcome.

I look forward to Mr. Puri's testimony regarding renewable energy and his suggestions about how we can enhance bilateral cooperation and assistance between India and the US especially given that today and tomorrow he is hosting the first ever US-India Renewable Energy conference to be held on Capitol Hill.

I also look forward to Dr. Redmond Clarke's testimony as he has been very involved in both national and international new technology development, technology transfer and new technology commercialization.

As a result of today's hearing, I hope we will be able to determine how effective DOE and USAID assistance efforts are in India and how we could achieve a greater impact. I am also hopeful that our witnesses will address the following areas affecting renewable energy including budget and funding, subsidies, incentives, and mandates, renewable fuels, climate change, conversion technologies, and commercial deployment of renewable energy. Also, if applicable, we have asked you to discuss the Asia-Pacific Network for Energy Technology (APNet) which was formed to offer India an incentive to play a more active role in APEC.

Given that we have 6 witnesses testifying before us today, we would ask that you limit your oral testimony to 5 minutes, and submit your complete statements for the record. I will also ask all Members to limit their opening statements and questions to 5 minutes each.

I will conclude my opening statement by saying that a 2002 report by Greenpeace entitled *Losing the Clean Energy Race: How the United States Can Retake the Lead and Solve Global Warming* asserts that the US is falling farther behind in clean energy technologies and argues that if this trend is not reversed, the nation will forfeit a cleaner environment, millions of good jobs, and billions of dollars in potential investment and revenue. While the report was only partially affirmed by Congressional Research Service (CRS), it most definitely raises serious concerns that we must address.

In fact, according to the most recent data provided by CRS, Germany and China are the investment leaders in renewable energy, followed by the US, Spain, Japan, and India. I am hopeful that as a result of this hearing and many more to come on the subject of renewable energy that we will do our part to take America in a new direction with particular focus on India as a collaborative partner.

Mr. FALCOMA. Today we are holding the third in a series of hearings we have held this year on the global environment, which included an update on the Kyoto Protocol, APEC joint declaration on climate change and now renewable energy. Renewable energy options are especially important in the Asian Pacific region where air pollution may impact economic development, and energy and security fuels geopolitical tensions.

For example, most experts agree that India and China's rapidly growing economies will require large amounts of new energy in the coming decades. This poses challenges not only for the United States, but also for the region as our present economies hinge on the availability of fossil fuels. Lessening our dependence on fossil fuels and encouraging others to also invest in renewable sources is one way to advance our way to a more peaceful future.

I am pleased that the multiple Federal agencies, including the U.S. Department of State, the U.S. Department of Energy, the Overseas Private Investment Corporation, and the U.S. Department of Agriculture, have joined with us today to discuss U.S. ef-

forts in renewable energy, with particular focus on the United States and India as partners in the renewable energy innovations.

I also want to state that as a result of today's hearing, I hope we will be able to determine how effective the Department of Energy and the USAID assistance efforts are in India, as well as in the other parts of Asia hopefully, and how we should achieve a greater impact. I am also hopeful that our witnesses will address the following areas affecting renewable energy, including budget and funding, subsidies, incentives, mandates, renewable fuels, climate change, conversion technologies and commercial deployment of renewable energy.

Also, if applicable, we have asked you to discuss the Asia Pacific Network for Energy Technology, or the acronym APNET, which was formed to offer India hopefully an incentive to play a more active role with within APEC.

I will conclude my opening statement by saying that in the year 2002 report by Green Peace, entitled *Losing the Clean Energy Race: How the United States Can Retake the Lead and Solve Global Warming*, asserts that the U.S. is falling farther behind in clean energy technologies and argues that if this trend is not reversed, the Nation will forfeit a cleaner environment, millions of good jobs and billions of dollars in potential investment and revenue. While the report was only partially affirmed by the Congressional Research Service, it most definitely raises serious concerns that we must address.

In fact, according to the most recent data report provided by the Congressional Research Service, Germany and China are now the investment leaders in renewable energy, followed by the United States, Spain, Japan and India. I am hopeful that as a result of this hearing and many more to come on the subject of renewable energy, that we will do our part to take America in a new direction with particular focus on India and other Asian Pacific countries that I am sure they will have just as much interest in the subject matter.

I welcome my good friend, the gentleman from California, Mr. Rohrabacher for his opening statement.

Mr. ROHRABACHER. Thank you very much, Mr. Chairman.

We obviously live in a totally different world than we lived in 50 years ago, and many of our patterns, economic patterns, and many of our political patterns were developed in this different world. One of the most dramatically changed part of the world is the fact that now in Asia we have a developing user of great deals of electricity and other types of energy, which that demand just did not exist. That demand will affect not just the Asia Pacific, but will affect the entire planet as we are seeing, especially if we are to have clean air.

I personally believe that the global warming theory is fallacious. We have had so many trends. There have been these up-and-down trends for millions of years, and I don't believe it has anything to do with what type of engines are being used, et cetera, especially when you consider that the same warming trends are visible on Jupiter and Mars as they are today. However, that does not mean that we do not face enormous challenges in keeping the air clean, the water clean and the soil clean, that we have a finite amount

of that available to us. And the great changes going on in Asia are in the process of having incredible impact on the health and well-being of the entire planet, especially in terms of energy.

Let me note that I think solar energy has now reached a stage where it can make a major contribution without subsidies. As long as we do not try to artificially keep the price of oil down, solar energy I think has now reached a point where it is competitive. I would like to hear from our witnesses whether they that observation is correct, whether solar energy today is actually competitive with other sources of electricity generated by, let's say, coal or oil.

The other thing that I would like to note is we have two alternatives that are quite often ignored by those people who are suggesting that they are concerned about the quality of the air. One is the nuclear option, and I certainly share everyone's concern that if we go about it the nuclear way, that there would be leftover materials that would be threatening to humankind with a great expansion of nuclear energy.

However, I would like to note for the record I am a senior member of the Science Committee, and there is a new type of nuclear reactor that is yet to be exploited called the high-temperature gas-cooled reactor. I would like the reaction from our witnesses to the high-temperature gas-cooled reactor, which I understand will not create material for bombs, cannot melt down, and will actually reduce the amount of waste that has to be stored as compared to any other reactor.

Also might I add that with the price of oil going up the way it has been, and the cost, traditional cost, of adding a nuclear power plant, there is an option which the United States should play a major role in would be called space solar power, in which we actually put the type of solar collectors in space and beam electricity down to receivers on the Earth. There has been a lot of work done on that over the last few years. Twenty years ago it was not feasible.

I am told by my friends in the aerospace industry that today space solar power is again an economic viable alternative, and that we could be building, for example, in India collectors; rather than big nuclear power plants, we could just build collectors, and it could beam down electricity from space.

Those are some of the innovative ideas this I have heard. I am interested in seeing what Asia might want to put to use to achieve these ends and what they think of those alternatives. So I appreciate you starting the discussion, and I am going to be listening here and in my office. Thank you.

Mr. FALEOMAVEGA. I thank the gentleman from California for his statement.

As a senior member of our Science Committee, I always defer to him for his sense of expertise in really understanding what is going on not only dealing with global warming, but climate change issues. I recall the gentleman, one time in our dialogue he said it is actually a bunch of global baloney and not global warming, if I recall.

Mr. ROHRABACHER. That doesn't mean that I am not for cleaning the air.

Mr. FALEOMAVAEGA. I also want to note that my good friend, the ranking member, who should be here in a minute to give his opening statement, made what I thought was a very appropriate statement to the effect that we are faced with global pollution, and I think that is well taken.

Mr. Global Pollution is right here. And I will note he will elaborate on this issue a lot more.

I do want to thank the ranking member of our subcommittee for being here as I will now give him the opportunity to offer his opening statement. The gentleman from Illinois, Mr. Manzullo.

Mr. MANZULLO. Well, thank you, Mr. Chairman, for calling this important hearing on renewable energy and the global environment. The importance of finding affordable reliable alternative energy sources is critically important as oil prices reach \$100 a barrel, so I commend you for raising this issue.

America and Europe's usage of renewable energy has increased significantly since the mid-1990s. While not panacea for all of our energy ills, renewable energy can form one part the solution to help America become more energy-independent.

I have got two pages to go, and so I am going to spare you, ask for leave to put this complete opening statement into the record.

Mr. FALEOMAVAEGA. Absolutely.

Mr. MANZULLO [continuing]. Dr. Clark, if you would let me introduce him, because he is my constituent.

Mr. FALEOMAVAEGA. Without objection, the gentleman's statement will be made part of the record. I thank the gentleman for joining us in this hearing.

[The prepared statement of Mr. Manzullo follows:]

PREPARED STATEMENT OF THE HONORABLE DONALD A. MANZULLO, A
REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. Chairman, thank you for calling this important hearing on renewable energy and the global environment. The importance of finding affordable and reliable alternative energy sources is critically important as oil prices skyrocket towards \$100 per barrel. So, I commend you, Mr. Chairman, for raising this issue before the Subcommittee.

America and Europe's usage of renewable energy has increased significantly since the mid-1990's. While not a panacea for all of our energy ills, renewable energy can form one part of the solution to help America become more energy independent. For example, ethanol production in the United States rose dramatically from 1 billion gallons in 1996 to 5 billion gallons in 2006. There are now a number of ethanol plants being built and ready to come on line, including some in the northern Illinois Congressional district I am proud to represent. Biodiesel is another renewable energy source that deserves our attention. I am proud that entrepreneurs in the 16th Congressional District of Illinois are contributing to the success of this fuel source. Blackhawk Fuels in Freeport, Illinois is one such company. The Department of Agriculture supported Blackhawk Fuels' efforts to produce 30 million gallons of biodiesel with a \$7.5 million loan this year. This is just one example of the good work being done by the Administration.

On the international front, I remind my colleagues that despite passage of misnamed "International Climate Cooperation Re-engagement Act" earlier this year, the United States is already doing a lot to boost the use of renewable energy by other pollutant countries. The Washington International Renewable Energy Conference, to be held in March 2008, is just the latest example of international initiatives on renewable energy. The President also hosted the Major Economies Meeting just last month in September to address the key issues of climate change, energy security, economic growth, and sustainable development. There is also the Asia-Pacific Partnership on Clean Development and the Asia-Pacific Economic Cooperation forum where the U.S. promotes renewable energies, particularly to China and India. I am also encouraged by the prospects of the Greenhouse Gas and Clean Energy

Initiative at the Overseas Private Investment Corporation. I know that our witnesses will describe these initiatives in more detail.

Renewable energy is just one area of energy security and pollution control that we need to address. Despite the promise of renewable energy, we must recognize that it is unlikely that this energy source alone will make a significant dent to reverse global climate change. The intensive use of carbon fuels by developing nations such as India and economic powerhouses such as China can easily negate America and Europe's investments in environmentally friendly products. The answer to the global pollution problem will not be found solely within our country and with renewable fuel sources. India, China, and other major developing countries, such as Brazil, South Africa, and Russia, must be on board. We must also be open to other clean sources of energy such as nuclear power. Illinois is one of the few states that generate over 50 percent of its electricity from nuclear power.

I want to take this opportunity to welcome Mr. Redmond Clark, President of CBL Industrial Services, to the Subcommittee. Red is an expert on climate change and he is also a successful businessman. His companies are responsible for many jobs in the 16th Congressional District of Illinois. Most importantly, Red is a dear friend of mine. I welcome his participation at this important hearing today.

Mr. FALEOMAVAEGA. We have a panel of some very distinguished guests of our subcommittee, and certainly in their own right to their expertise, and we really appreciate their presence for being here and giving us some insight into some of the issues that we are discussing now before our committee.

To my extreme left we have Ambassador Reno Harnish, also currently the Principal Deputy Assistant Secretary of State, the Bureau of Oceans and International Environmental and Scientific Affairs. Quite a record of service to our Nation, having formally served in Azerbaijan; also served in Kosova, served in Egypt, served in Sweden; was also involved in the Central Asian countries; also served in Germany, Austria, Nigeria, Italy. Where haven't you been, Mr. Ambassador?

Mr. MANZULLO. Samoa.

Mr. FALEOMAVAEGA. Well, maybe Samoa, but it is probably a little too small for him.

Ambassador Harnish is a graduate of San Diego State University, and two master's degrees from both American University, and well versed in the German, Italian and Swedish languages and some Azerbaijan language. I think we need have more members speak foreign languages as well.

Also we have will us Deputy Assistant Secretary for the Department of Energy Mr. John Mizroch, who is here with us. Mr. Mizroch is with the Department of Energy, previously served as the president/CEO of the World Environmental Center, and prior to that Mr. Mizroch promoted to the environmental technology transfer and worked extensively in Latin America, Asia, as well as in Eastern Europe. Mr. Mizroch also is a member of the Trade and Environmental Policy Advisory Committee to the U.S. Trade Representative's Office, is an attorney by profession of Foreign Service, served in South Africa. He received undergraduate degrees from the University of Virginia and a law graduate of the College of William and Mary here in Virginia.

Also with us is the executive vice president of the Overseas Private Investment Corporation, Mr. John Simon, currently serving in that capacity as vice president of OPIC. Prior to that Mr. Simon served as Special Assistant to the President of the National Security Council; received his education, his undergraduate studies, from Princeton University and a master's at Harvard University.

With the Department of Agriculture, Mr. Michael Yost currently serves as Administrator of the Foreign Agricultural Service. Mr. Yost is a farmer. It is always good to have farmers to join us. You probably understand more of the situation of the needs of our farmers than most people who never are farmers when appointed to these important positions.

Mr. Yost served previously as president of the Yost Farm from the State of Minnesota; was involved with several commodity associations, heavily involved with the American Soybean Association; and did his undergraduate studies at the University of Minnesota.

With us also, I am pleased to have with us, is Mr. Sanjay Puri, president of the U.S.-India Business Alliance, a bilateral trade promotion group. It provides advocacy to maximize investment and trade between the United States and India. Mr. Puri has been at the forefront of galvanizing the Indian American community which is approximately 2 million strong.

Mr. Puri pushed very hard the U.S.-India Civil Nuclear Cooperation Agreement; recently returned from India having met last week with Prime Minister Singh and other top officials to promote hopefully the acceptance of the proposed treaty in civil nuclear energy with the Government of India. I commend Mr. Puri's efforts in advancing United States-India interests and certainly commend Prime Minister Singh in doing this.

Mr. Puri is a CPA, certified public accountant, received his master's of business administration as well as his doctorate from the George Washington University.

Now it is my pleasure to have my good friend, the gentleman from Illinois, to introduced our next distinguished panelist.

Mr. MANZULLO. Thank you, Mr. Chairman.

I am really pleased and honored to have Red Clark, who is chairman of the CBL Industries, whose manufacturing facility is located in the congressional district that I represent. When we first found out about the nature of the hearing that was coming up, I said, "Let's get a hold of Red Clark"; he's one of the few people I know that really understands climate change. In fact, he has a master's and doctoral degrees in human-induced climate change and the effects of climate change on natural systems.

Just a little bit of wisdom there, I would say, Mr. Chairman, but he has applied that wisdom in very productive ways. Dr. Clark holds several patents. He taught at Boston University, Elmhurst College; travels around the world. He has some incredible technologies, including a technology for the auto industry that improves fuel economy, controls emissions and eliminates toxic emissions. Plus he has, I think, the only patent in the world whereby you can mix his secret formula with a water pressure system and use it to remove lead from ships and from water towers, and the residue is toxic free.

So I am just really pleased, along with this tremendous panel here. I look forward to seeing you guys on C-SPAN, I hope they pick this up and play it several times.

Mr. FALEOMAVEGA. I thank the gentleman for his introduction of Dr. Clark.

We will proceed now with your statements, gentlemen. If you could work within the 5-minute rule, I know my colleagues will

have several questions they may want to raise with you. So we would like to start with Ambassador Harnish.

STATEMENT OF THE HONORABLE RENO HARNISH III, PRINCIPAL DEPUTY ASSISTANT SECRETARY, BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS, U.S. DEPARTMENT OF STATE

Mr. HARNISH. Mr. Chairman, I am pleased you have asked us here today to discuss climate change, renewable energy and the environment, with emphasis on India. I have a longer statement that I would like to submit for the record.

The United States is taking an integrated approach to the foreign policy of promoting economic development, addressing clean energy needs and protecting the environment. This approach is designed to foster breakthroughs and clean energy technologies. It also encourages global activities that accelerate development and deployment of clean energy technologies across the globe.

Renewable energy will continue to play a key part in U.S. energy and environmental policy and is an increasingly important energy source worldwide. According to a recent study by the United Nations Environment Program, investments in renewable energy alone reached a record \$71 billion in 2006. That is up 43 percent over 2005, and we expect a similar kind of growth in 2007.

Of course, the United States and the EU accounted for more than 70 percent of this investment in 2006, and while much of this investment is concentrated in the OECD countries, as you said, Mr. Chairman, there is growing activity in the developing world, especially in China, India and Brazil. Indeed China companies are the second largest recipients of venture capital for renewable energy in 2006. Last year India was the largest net buyer for renewable energy companies abroad, mostly in European markets, and Brazil is the largest renewable energy market, where 75 percent of cars run on flex-fuel.

Recognizing this global nature and serious challenge, the United States has decided to work cooperatively with other nations across the globe. Active bilateral and multilateral initiatives and partnerships are identifying solutions that reduce greenhouse gas intensity, create new investment, build local capacity and remove the barriers to the introduction of cleaner technologies.

With regard to these partnerships, I would like to focus today on the Asia-Pacific Partnership and the Washington International Renewable Energy Conference. Both the APP and WIREC illustrate the President's strong commitment to clean energy technologies. And we heard him a few weeks ago in the State Department talk about the potential for low-carbon technologies such as wind and solar to provide up to 20 percent of the electricity needs of the United States. So in pursuit of that strategy, the APP brings together six major Asia Pacific countries. They are Australia, China, India, Japan, Korea and the United States. We have in this effort to increase energy needs—to address the increased energy needs and associated issues of air pollution, energy security and climate change.

Just a month ago at the New Delhi ministerial meeting, the partners brought in Canada as the seventh member of this Partner-

ship. Through engaging private industry as well as government officials from multiple ministries, the APP is building local capacity. It improves efficiency, reduces greenhouse gas emissions and creates new investment opportunities.

What makes this approach unique is that the APP activities are identified and supported using an innovative bottom-up approach. This focuses on concrete knowledge and technologies transfer. There are already more than 100 individual projects and activities included in our APP task force action plans, and they are yielding concrete results.

Our work on the Renewable Energy and Distributed Generation Task Force has been instrumental in identifying new business, finance and technological models. The State Department is currently providing cost-share funding for four of these APP projects that are accelerating renewable energy in India. For example, one is the commercialization of the solar photovoltaic systems in four Indian states that works with local business and banks. Another is the deployment of a 1-megawatt photovoltaic pilot power plant with the Tata Group. A third is the identification and removal of technical barriers to the deployment of renewable energy in three Indian states, and this is through a project that involves United States and Indian regulators and utilities. The fourth in India is the promotion of biomass and biogas power generation systems in rural areas of central India.

We believe these initiatives have exciting promise for newer and cleaner technologies in rapidly developing countries like India.

Let me turn to WIREC for just a moment, because the United States is going to host the Washington International Renewable Energy Conference in Washington, DC, this coming March 4 and 6th, 2008. This is the third interministerial, international project on renewable energy, and it will be a key opportunity for government, industry and civil society to advance the uptake, the market adoption of renewable energy and advance all of these shared goals which were discussed, climate, sustainable development and energy security.

We are going to build on the outcome of the two previous conferences, and I think this is an optimal time to do this conference because many countries now, as we said earlier, have established leadership positions in renewable energy, and this is a chance for us to come together, cooperate and share ideas.

We will focus on rural development, we will focus on finance, we will focus on market adoption, and we will focus on research and development and other cross-cutting issues. We will have a ministerial-level meeting which will include the private sector and civil society. And at the same time there will be a big trade show and exhibition at the Washington Convention Center. We think this conference will push renewables ahead throughout the world and bring shared experiences and best practices. Most importantly, we would like to see also a look at second-generation renewables, such as cellulosic ethanol.

The United States, I want to say, is well positioned to host this conference. We are a major producer of renewable energy, such as biofuels. We are a principal developer, and I know my colleagues will talk about this renewable energy technology, including solar,

wind and battery. And we are a substantial market for renewable-energy industries. We lead the world in venture capital advancing of the renewable energy projects.

Finally, we have a Federal system of government, and, therefore, our 50 States and hundreds of cities and counties are taking on models to advance the diffusion of renewable energy.

Mr. Chairman, honorable members, these are just two examples of our integrated approach in foreign policy of renewable energy. There are numerous other examples of how the United States and India work actively on these things in my longer written statement.

I want to thank you for the opportunity to discuss energy-related matters, Mr. Chairman, particularly in the context of United States-India cooperation, and I would be pleased to respond to any questions you may have.

[The prepared statement of Mr. Harnish follows:]

PREPARED STATEMENT OF THE HONORABLE RENO HARNISH III, PRINCIPAL DEPUTY ASSISTANT SECRETARY, BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS, U.S. DEPARTMENT OF STATE

Mr. Chairman, honorable Committee members, I am pleased that you have asked us here today to discuss climate change, renewable energy and the environment, with emphasis on India.

The United States is taking an integrated approach in promoting economic development, addressing clean energy needs, and protecting the environment. This approach is designed to foster breakthroughs in clean energy technologies and encourages global activities that accelerate development and deployment of clean energy technologies across the globe while also meeting the challenge of global climate change.

Renewable energy will continue to play a very key part in U.S. energy and environmental policy, and it is an increasingly important energy source world wide. According to a recent study by the United Nations Environment Program, investments in renewable energy reached a record \$71 billion in 2006, a 43 percent increase over 2005. A similar growth trajectory is expected this year.

The US and EU together accounted for more than 70% of this investment in 2006. While renewable energy investment is concentrated in the OECD, there is growing activity in the developing world, especially in China, India and Brazil. Indeed, Chinese companies are the second largest recipients of venture capital in 2006 after the United States. Last year, India was the largest net buyer of renewable energy companies abroad, mostly in European markets. Brazil is the largest renewable energy market in the world. More than 75 percent of Brazil's cars are flex-fuel.

Recognizing the global nature and the serious challenge of these issues the United States continues to collaborate with nations across the globe. Active bilateral and multilateral initiatives and partnerships are identifying solutions by reducing greenhouse gas intensity, creating new investment, building local capacity, and removing barriers to the introduction of cleaner technologies.

I want to briefly describe a number of international initiatives to illustrate the many forms of international partnerships we have to advance the up take of renewable energy by sharing technologies and best practices, and by encouraging more investment in renewable energy both bilaterally and through multilateral institutions.

These initiatives are complementary to President Bush's announcement in May of his support for an effort among major global economies to agree on a new international framework to address climate change, energy security, economic growth and sustainable development. Secretary Rice hosted the first Major Economies Meeting (MEM) on September 27-28 in Washington, D.C., which was attended by senior representatives of seventeen major economies and a United Nations representative. In his speech during the MEM, President Bush emphasized that these countries would work within the UN process to strengthen programs addressing energy efficiency and to advance the global transfer and adoption of clean energy technologies. The Asia-Pacific Partnership on Clean Development and Climate is one of numerous ways the U.S. is rising along with the international community to meet this enormous challenge.

The *Asia-Pacific Partnership on Clean Development and Climate* (APP) brings together six major Asia-Pacific countries Australia, China, India, Japan, Republic of Korea, and the United States, in an effort to address increased energy needs and the associated issues of air pollution, energy security, and climate change. At the New Delhi ministerial meeting in October 2007, the Partners warmly welcomed Canada as the seventh member of the Partnership. An innovative public-private sector effort, the Asia-Pacific Partnership was established to promote economic development, reduce poverty, and accelerate the development and deployment of cleaner, more efficient technologies.

Through engaging private industry, as well as government officials from multiple ministries, the APP is using public-private partnerships to build local capacity, improve efficiency and reduce greenhouse gas emissions, create new investment opportunities, and remove barriers to the introduction of clean energy technologies in the Asia-Pacific region. What makes the approach unique is that APP activities are identified and supported using an innovative “bottom up” approach. By focusing on concrete knowledge and technology transfer, more than 100 individual projects and activities included in the APP Task Force action plans are already yielding concrete results. Together, APP partner countries account for about half of the world’s economic output, energy use, and greenhouse gas emissions. APP provides the U.S. a unique opportunity to engage India and China in constructively moving their energy economies toward a more climate friendly direction.

The Asia-Pacific Partnership has created eight task forces to achieve the initiative’s goals: One of these task forces works on renewable energy and distributed power generation. Our work on the Renewable Energy and Distributed Generation Task Force has been instrumental in identifying new business, finance, and technology models to facilitate the increased diffusion of renewable energy through market transformation policies and practices.

The State Department is currently providing cost-share funding for four of these APP projects that involve accelerating renewable energy up take in India in the following areas:

- Accelerate the commercialization of a solar photovoltaic(PV) system in 4 Indian states by working with local business and banks;
- Deployment of a one mega watt PV pilot power plant with the Tata Group;
- Identify and remove technical barriers to the deployment of renewable energy in three Indian states through a project involving US and Indian regulators and utilities;
- Promote biomass and biogas power generation systems in rural areas of Central India.

Washington International Renewable Energy Conference (WIREC). The United States will host the Washington International Renewable Energy Conference (WIREC 2008) in Washington DC, March 4–6, 2008. WIREC 2008, the third international ministerial-level event on renewable energy, will be a key opportunity for government, industry and civil society leaders to advance the integration of renewable energy and advance shared goals for climate, sustainable development and energy security. The event builds upon outcomes from the 2002 World Summit on Sustainable Development and the Bonn (2004) and Beijing (2005) Renewable Energy Conferences. The timing for WIREC 2008 is optimal, because many countries have established leadership positions in renewable energy technology development, manufacturing and market adoption through innovative policies.

WIREC 2008 will focus on rural development, finance, commercialization/market adoption, research and development, as well as other cross-cutting issues. WIREC 2008 includes a ministerial level meeting for governments (federal and local), the private sector and civil society, and a co-located, but separately managed trade show and exhibition.

WIREC 2008 will also provide an opportunity to advance renewable energy globally by bringing world leaders together to raise issues, exchange information, share experiences and best practices, and provide a global platform to highlight and promote strategies for significant development and rapid scale up of renewable energy systems worldwide, including second generation biofuels.

The United States is well positioned to host WIREC 2008. We are a major producer of renewable energy such as biofuels, and a principal developer of renewable energy technology, including solar, wind and battery. The United States is a substantial marketplace for renewable energy industries, and we lead the world in venture capital financing of renewable energy projects. Also, our federal system of government means that we have 50 states and hundreds of county and city jurisdic-

tions experimenting with an array of models to advance the diffusion of renewable energy technologies.

US-India Energy Research Cooperation

S&T cooperation between India and USA is characterized by over fifty years of successful and productive exchange of scientists and scientific ideas, joint workshops and conferences, collaborative research projects, training and fellowship programs and technology transfer in virtually all areas of Science & Technology. An Inter-Governmental Science & Technology Cooperation Agreement between India and USA was signed on October 17, 2005 in Washington.

The two sides recognized and agreed to cooperate on expanding the unique role of science and technology in Indo-US relations. They agreed to set up an Indo-US Standing Science & Technology Joint Commission.

A Joint Statement to this effect was issued on March 2, 2006 during a visit by President Bush to New Delhi. According to the Joint Statement, the Indo-US Standing Science & Technology Joint Commission will provide a framework and vigorous public-private partnership aimed at:

- Serving as a bridge for dialogues between the government science and technology agencies in both countries;
- Fostering R&D and scientific exchanges between government, universities, research institutions, and the private sectors;
- Encouraging the joint research and development of fast and medium track S&T projects for commercial products for mutual benefit of both countries;
- Encouraging commercialization of new technologies and identifying and reducing regulatory and bureaucratic barriers in both countries;
- Overseeing Indo-US Cooperation in Science and Technology implemented through existing and emerging arrangements, including the Indo US S&T Forum and the Bi-national S&T Endowment Fund.

About 15 energy-related cooperative research programs with heavy DOE engagement have been or are underway with Government of India counterparts. A few examples of a robust portfolio include:

- DOE's National Renewable Energy Laboratory is working with Indian counterparts to evaluate and possibly install a renewable-based hybrid power system in the Bay of Mumbai.
- The Cooperative Technology Implementation Plan for India promotes the diffusion of clean energy technologies. CTIP India works with the government to promote policies and financial pipelines to create an enabling environment for private investment. CTIP India works with communities to identify how the revenue stream from mini-hydropower can contribute to other water management projects.
- A power generation partnership with DOE's National Energy Technology Laboratory is working to advance research and development of clean and efficient power generation.

The *Renewable Energy and Energy Efficiency Partnership* (REEEP) is a multi-stakeholder partnership whose goal is to expand the global market for renewable energy and energy-efficiency technologies by structuring policy and regulatory initiatives for clean energy and facilitating financing for energy projects. To further REEEP's agenda, the United States has been especially active in developing best practices for financing energy efficiency and renewable energy projects and an open network of affiliated organizations for distributed peer production of models and tools for energy smart community planning and development.

To date, REEEP has funded over 100 projects in 44 countries that address market barriers to clean energy in the developing world and economies in transition. These projects provide new business models, policy recommendations, risk mitigation instruments, handbooks, and databases for advancing renewable energy and energy efficiency, in addition to delivering measurable greenhouse gas reductions.

M2M

Launched in 2004, the Methane to Markets Partnership is a multilateral initiative that promotes energy security, improves environmental quality, and reduces greenhouse gas emissions throughout the world. The Partnership consists of 21 Partners (including India) with the European Commission as the most recent partner to join the group. In addition, over 600 private-sector and other government and civil society organizations participate in the Partnership through the Project Network.

Capturing and using “waste” methane provides an additional energy source that stimulates economic growth while reducing global emissions of this powerful greenhouse gas. EPA estimates that this Partnership could recover up to 500-billion cubic feet of natural gas (183 million metric tons of carbon dioxide equivalent) annually by 2015.

IPHE

The International Partnership for the Hydrogen Economy (IPHE), initiated in 2003 by the Secretary of Energy, provides a mechanism to coordinate multinational research, development and deployment programs that advance the transition to a global hydrogen economy. The United States hosted the first Ministerial meeting of the IPHE and the Partnership’s 16 countries (including India) and the European Commission are working together to advance research, development, and deployment of hydrogen and fuel-cell technologies, and develop common codes and standards for hydrogen use. The IPHE Steering Committee has officially recognized 30 collaborative projects that advance the group’s goals. In addition, IPHE is working on common goals for hydrogen and fuel cell technologies and the technical objectives that support these goals.

CSLF

The United States hosted the first meeting of the Carbon Sequestration Leadership Forum (CSLF) in Virginia, in June 2003. The CSLF is focused on the development of improved cost-effective technologies for the separation and capture of carbon dioxide for its transport and long-term storage. CSLF membership has grown to 21 governments (including India) and the European Community since 2003. Policy and Technical committees and six task forces covering risk assessment, storage capacity estimation, projects interaction and review, legal issues, capacity building in emerging economies, and financial issues have been established to advance the work of the partnership.

Recent accomplishments include the release of a CSLF, Technology Roadmap, and several task force reports. The CSLF also has jointly sponsored workshops with the G8 and the International Energy Agency, and in May 2007, the CSLF sponsored a capacity building workshop attended by participants from six emerging economy members. To date, 19 collaborative projects have been recognized formally by the CSLF.

The *Global Bioenergy Partnership* (GBEP) was launched at Gleneagles in 2005 by the G-8 plus Brazil, China, India, Mexico and South Africa. GBEP is designed to power a cleaner future by supporting wider, cost-effective biomass and biofuels deployment, particularly in developing countries where biomass use is prevalent. The United States is actively supporting GBEP’s work including leading work on developing common methodologies for measuring the GHG benefits of biofuels. In addition to the United States, GBEP partners include Canada, China, France, Germany, Italy, Japan, Mexico, Russia, the United Kingdom, the Food and Agriculture Organization of the United Nations (FAO), the International Energy Agency, the United Nations Foundation, and the European Biomass Industry Association. The GBEP Secretariat is managed by the FAO.

The *International Biofuels Forum* (IBF), a joint project of Brazil, China, India, South Africa, the United States and the European Commission, was launched on March 2, 2007 to develop strategies to promote the sustained use and production of biofuels around the globe. The forum has created a mechanism to structure the dialogue among some of the biggest producers and consumers of biofuels to address energy security and global warming issues and to use biofuels as an instrument for development.

IBF is working closely with Global Bioenergy Partnership to create common standards and codes for bioenergy products, which should help facilitate world trade.

Thank you for your attention and I look forward to answering any questions you may have.

Mr. FALEOMAVAEGA. Thank you, Ambassador Harnish.
Secretary Mizroch.

STATEMENT OF MR. JOHN MIZROCH, PRINCIPAL DEPUTY ASSISTANT SECRETARY, OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, U.S. DEPARTMENT OF ENERGY

Mr. MIZROCH. Mr. Chairman and members of the subcommittee, thank you very much for the opportunity to appear today in front

of you and to offer comments from the Department of Energy upon our activities in the field of renewable energy and global environment.

The department's efforts in the area of clean energy technology are part of a comprehensive multiagency approach to climate change, air pollution and energy security. The President in 2006 launched the Advanced Energy Initiative to confront our Nation's addiction to oil, lessen dependence on foreign resources, and reduce emissions by developing clean sources of electricity generation.

Further, in the State of the Union in 2007, the President raised the bar by seeking legislative action to reduce gasoline consumption 20 percent in 10 years, the "20 in 10" plan.

At the President's request, Secretary Rice hosted a Major Economies Meeting on Energy Security and Climate Change just last month to discuss a post-2012 framework for improving energy security and reducing greenhouse gas emissions through international cooperation and the deployment of clean energy technology. Together these initiatives reflect the administration's serious commitment to transformational change in the way our Nation produces and consumes energy.

At my office, the Office of Energy Efficiency and Renewable Energy, we invest in a diverse portfolio of energy technologies to promote clean, domestic, renewable energy and energy-efficiency technologies. Our mission is to strengthen America's energy security, environmental quality, and economic viability by bringing clean, reliable, affordable energy technologies to the marketplace. We direct critical research, development, deployment and commercialization activities for advanced clean energy technologies, such as cellulosic ethanol, solar—which the member mentioned and wants some answers to—wind, geothermal and energy efficiency. In fiscal year 2007, our budget was about \$1.4 billion.

Technology deployment is a key component of a comprehensive approach to climate change. Asia and the Pacific region are essential to the success of international dialogue and the success of clean energy development. China and India are the world's fastest-growing economies and the fastest-growing emitters of carbon dioxide.

My friend and colleague Ambassador Harnish talked about the Asia-Pacific Partnership already. The Department of Energy has also been involved bilaterally with China and India in renewable energy as well as energy efficiency. We think that we improve our energy security when we decrease the need to depend on unstable areas of the world for petroleum. So efforts to displace petroleum use are crucial, and that informs some of our work in this area.

In China, the built environment is an area where we are employing energy-efficiency practices that will have an enormous impact simply by virtue of its vast size and rapid expansion. Seventy percent of the electricity in China is used by industry, and we are completing plans to work with leading organizations in China to provide some technical assistance to try to reduce this energy intensity.

In India, there are also some, in my view, very important strategic areas where should be working with the Indian Government. And, in fact, we have some very current dialogue going on. That

is in the built environment, industrial energy efficiency, and biofuels and bioenergy.

Solar resources, for example, are abundant in India, but the challenge, as in other regions, is to bring the cost of photovoltaic technology down and increase its availability. My group launched the Solar America Initiative, which is designed to do just that, and we hope through that initiative to have solar energy cost competitive with any form of energy by 2015, hopefully sooner than that. But solar energy, in fact, I believe could be a huge, important new renewable energy technology that would be widely deployed if we could reduce the cost and get production on.

The built environment in India is also an area that holds great promise. Organizations involved in construction in India, including large retailers, state governments and utilities, are working with us to make new buildings more energy-efficient.

Renewable energy technologies that merit further research in India include wind energy and biomass. Some believe that India has already tapped its wind potential, but others say that there is a great opportunity for low-speed wind turbines that has yet to be harnessed.

Similarly, biomass is a major energy source in India, but is largely limited to cooking fuels at this point. We think significant opportunities exist for the use of biomass feedstock for transportation fuel and power generation. The prospects for wind and biomass energy in India demonstrate the great potential for collaboration and dialogue between our two countries.

Just to give you an example that our department has come up with in terms of an opportunity to help India reduce energy intensity, there are four products that consume roughly 22 percent of all the electricity in India: Motors, refrigerators, window air conditioners and transformers. If we can work with the Indian Government and the private sector to make those four products more energy-efficient, and we already have the technology, we could begin to significantly reduce energy intensity there.

So I would say, Mr. Chairman, in conclusion, the department is involved in a variety of programs and partnerships to encourage the development and commercialization of renewable and other clean energy technologies. The effect of greenhouse gas emissions and the politics of fossil fuel dependence are global, and it only makes sense that cooperation to overcome these problems should be global as well.

This concludes my prepared statement, and I would be pleased to answer any questions later that you might have. Thank you, sir.

[The prepared statement of Mr. Mizroch follows:]

PREPARED STATEMENT OF MR. JOHN MIZROCH, PRINCIPAL DEPUTY ASSISTANT SECRETARY, OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, U.S. DEPARTMENT OF ENERGY

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to appear today and offer comments on Department of Energy (DOE) activities in the field of renewable energy and the global environment. This topic is one of great interest and national significance.

The Department's efforts in the area of clean energy technology are part of a comprehensive, multi-agency approach to global climate change, air pollution and energy security. In 2006, the President launched the *Advanced Energy Initiative* (AEI) to confront our nation's addiction to oil, lessen dependence on foreign resources, and

reduce emissions by developing clean sources of electricity generation. The central concepts of AEI are based upon the belief that new technologies can help change the way we power our homes, businesses, and automobiles. The President's Fiscal Year 2008 budget request contains a 26 percent increase in funding above the Fiscal Year 2007 request for AEI.

Further, in his 2007 State of the Union address, the President raised the bar by seeking legislative action for our country to reduce gasoline consumption by 20 percent in the next 10 years, the "20 in 10" plan, through a combination of improved vehicle efficiency and increased use of alternate and renewable fuels. Additionally, at the President's request, Secretary Rice hosted a Major Economies Meeting on Energy Security and Climate Change this past September to discuss a post-2012 framework for improving energy security and reducing greenhouse gas emissions through international cooperation and the deployment of clean energy technology. Together, these initiatives reflect this Administration's commitment to transformational change in the way our Nation produces and consumes.

DOE's Office of Energy Efficiency and Renewable Energy (EERE) invests in a diverse portfolio of energy technologies to promote clean, domestic, renewable energy and energy efficiency technologies. The EERE mission is to strengthen America's energy security, environmental quality, and economic vitality by bringing clean, reliable and affordable energy technologies to the marketplace. EERE directs critical research, development, deployment, and commercialization activities for advanced clean energy technologies, including cellulosic ethanol, solar, wind, geothermal, and energy efficiency. In Fiscal Year 2007, our budget was approximately \$1.4 billion. For decades, EERE has facilitated research, development, and deployment of renewable technologies to address climate change and preserve the integrity of the global environment.

In support of the President's major initiatives on clean energy and climate change, EERE has established a number of key milestones that drive our efforts. As a part of the AEI, the *Solar America Initiative* builds public-private partnerships to reduce the cost of solar photovoltaic technologies to make them cost-competitive by 2015. Our Building Technologies Program is focused on enabling Net-Zero-Energy Homes by 2020, and Net-Zero Commercial Buildings by 2025. In our Biomass Program, critical research, development and commercialization activities are underway to make cellulosic ethanol cost-competitive with corn ethanol by 2012. These near-term goals are focused on moving clean energy technologies into the mainstream, making substantial contributions to the diversification of our nation's energy portfolio.

Technology deployment is also a key component of a comprehensive approach to global climate change, and the Department has partnered with a number of countries to promote renewable energy technologies. Asia and the Pacific region are essential to the success of the international dialogue on clean energy development. China and India are the world's fastest growing economies and the fastest growing emitters of carbon dioxide, and air pollution is a serious and growing problem in many of their cities. The Department has worked toward the widespread application of renewable technologies in Asia and the Pacific through participation in the Asia-Pacific Partnership on Clean Development and Climate, as well as bilateral agreements and energy policy dialogues with China and India.

The Asia-Pacific Partnership on Clean Development and Climate (APP) is a novel approach to the promotion of clean energy technologies. Its member countries—the United States, Australia, China, India, Japan, Republic of Korea, and most recently, Canada—partner with private industry to meet goals for energy security, air pollution reduction, and climate change while sustaining economic growth. One of APP's eight sectoral task forces focuses specifically on Renewable Energy and Distributive Generation (REDG). EERE is providing technical support to REDG for a number of projects. In related ventures, EERE is helping to conduct a renewable resource assessment in India and has provided technical assistance for the implementation of geothermal heat pumps in China. Private industry involvement is a critical aspect of the success of the APP. The private sector members of the REDG task force have significant investments in China and India to increase the use of solar and wind energy. The accomplishments of the APP were highlighted at a recent ministerial hosted by India, during which Canada was accepted formally into the Partnership. To enable the APP to continue the promotion of renewables and other activities to combat global climate change, the Department requested \$15 million for Fiscal Year 2008 to support the important work of the Asia-Pacific Partnership, \$7.5 million each in EERE and the Office of Fossil Energy.

The Department has also been involved bilaterally with China in renewable energy, as well as energy efficiency improvements. Because energy security is heightened when the need to depend on unstable areas of the world for petroleum is lessened, advances that displace petroleum are crucial for its attainment.

Biofuel efficiency, availability, and infrastructure are part of a broader framework of potential advancements in vehicle technologies. Other important aspects include advanced battery storage, light weighting, and engine optimization. In 2006, China became the second largest consumer of vehicles in the world and the third largest producer, reflecting an annual growth rate of over 20 percent since 2004. As the vehicle population in China increases, oil consumption and carbon dioxide emissions associated with on-road transportation are rising dramatically. To address the far-reaching consequences of China's vehicle sector growth, while ensuring opportunities for the U.S. vehicle industry, DOE is working with the Chinese Ministry of Science and Technology (MOST) to ensure continued collaboration. This past September, DOE renewed its successful vehicle annex with MOST under the U.S.-China Protocol for Cooperation in the Fields of Energy Efficiency and Renewable Energy Technology Development and Utilization. Potential areas for technical cooperation outlined in the agreement include advanced and fast-charging batteries, advanced materials for vehicle systems, and vehicle charging and fueling infrastructure. Activities related to information exchanges, technology demonstrations, and professional training are already underway.

Recognizing the common interest in hydrogen research that many countries share, the International Partnership for the Hydrogen Economy—a U.S. initiative—was launched in November 2003. The Partnership's 16 member governments; among which are China, India, and the Republic of Korea; as well as the European Commission, are working together to advance research, development, and deployment of hydrogen and fuel-cell technologies, and develop common codes and standards for hydrogen use. IPHE has recognized 30 collaborative projects to advance the Partnership's goals, and through the IPHE, the U.S. has assisted China in developing a hydrogen roadmap.

The built environment in China is another area where employing energy efficiency practices will have an enormous impact, simply by virtue of its vast size and rapid expansion. Seventy percent of electricity use in China is attributed to industrial demand. EERE is completing plans to work with leading organizations in China to provide technical assistance and lessons learned from our on-site Save Energy Now industrial assessments. China is also home to half of the world's building construction. EERE has provided technical assistance to improve the energy efficiency of certain Chinese buildings, such as a training center for local government leaders. EERE has also provided technical assistance for China's Agenda 21 building, located in Beijing, helping with the design and technology that enables it to use 72 percent less energy and 60 percent less water than a typical Beijing building.

China also has a number of opportunities for wind and solar energy development. The 2008 Beijing Olympics will be a showcase of international cooperation on renewable technologies. The Olympic Games will be substantially powered by wind energy from Mongolia. EERE has provided technical assistance to make the Olympic Village more energy efficient and to construct a near-zero-energy building to welcome the athletes and serve as a child care center after the 2008 Olympics have finished. This high-profile near-zero-energy building is sure to advance interest in building-integrated solar energy worldwide.

Solar and wind energy also offer valuable opportunities for India because of the enormous growth in electricity needs it has recently faced. New Delhi claims to have 360 days of sunshine per year—the five cloudy days are particularly gloomy in comparison. Solar resources are clearly abundant in India; but the challenge, as in other regions, is to bring the cost of photovoltaic technology down and increase its availability. There is a great interest in utilizing solar power in India, but the likeliest use is in the area of solar domestic water heating. There is also a large interest in net-zero-energy buildings, further demonstrating the value of building-integrated photovoltaic applications.

The built environment in India is also an area that holds great promise for improvements in energy efficiency. Organizations involved in construction in India, including large retailers, state governments, and utilities, are working with EERE to make new buildings more energy efficient. Additionally, with the recent passage of energy efficient building codes, Indian government officials face the challenges of implementation and enforcement. EERE will assist India's government by sharing its experience in training building code officials as well as providing software to inspect buildings for compliance. It has provided training on building design simulation software called Energy Plus, which enables builders to discover options they can choose in components such as insulation and other aspects of construction to make buildings perform better while consuming less energy.

Building codes and the integration of renewable technologies in new construction provide the foundation for a strong buildings industry. The other area in which India's built environment can become more efficient is in appliance labeling and stand-

ards. Responsible labeling allows manufacturers and consumers to choose appliances that are more energy efficient. EERE is applying its experiences with Energy Star to help India establish its own energy efficient labeling system. There is also an agreement between EERE and the windows and glass industry in India to apply lessons learned in the United States regarding the rating and certification of windows.

Renewable technologies that merit further research and development in India include wind energy and biomass. Some believe that India has already tapped its wind potential, but others say there is still a great opportunity for low-speed wind turbines that has yet to be harnessed. Recent advances in science have made it possible for lightweight, low-speed wind turbines to be located in more places than previously thought. Similarly, biomass is a major energy source in India, but it is largely limited to cooking fuels at this point. Significant opportunities exist for the use of biomass feedstock for transportation. The existing prospects for wind and biomass energy in India demonstrate the great potential for collaboration and dialogues between our two countries in the field of renewable energy.

In conclusion, Mr. Chairman, the Department is involved in a variety of programs and partnerships to encourage the development and commercialization of renewable and other clean energy technologies. The effect of greenhouse gas emissions and the politics of fossil fuel dependence are global. It only makes sense that cooperation to overcome these problems should be global as well. I look forward to working with the Committee on Foreign Affairs, particularly with the Subcommittee on Asia, the Pacific, and the Global Environment, to address current and future challenges in renewable energy development, climate change, and environmental protection.

Mr. Chairman, this concludes my prepared statement. I would be pleased to answer any questions the Committee members might have.

Mr. FALEOMAVAEGA. Thank you, Mr. Secretary.

If I could just take a little break, I would like to welcome also a member of our subcommittee, the gentlelady from California, former Ambassador to the Federated States of Micronesia.

Diane, did you have a statement?

Ms. WATSON. I didn't want to disturb your flow.

Mr. FALEOMAVAEGA. Without objection, your statement will be made part of the record.

Ms. WATSON. Thank you so much, Mr. Chairman, for today's hearing on renewable energy and the global environment. It is being held after an especially difficult week in southern California, where, due to the historic number of wildfires, over 1,300 homes have been lost.

Forest fires throughout the region have darkened skies and polluted the air where millions of Californians live. There is little doubt in many scientists' mind that global climate change played a role in the unprecedented size and intensity of the fires. And one thing we noticed this time, we have fires in California all the time, particularly southern, because we are dessert, but our palm trees do not burn. This time the palm trees, the top of the palms, were burning, and that is because underneath where the roots go deep there was no water.

And so one of the major—recognized major contributors to global warming is fossil fuel consumption. Successfully reversing or slowing adverse impacts of global warming will require the developed world and the fastest-developing economies, many located in Asia, to look at other sources of energy, and in particular renewable energy sources, to power their modernization.

China, the emerging economic losses is a specific case in point. It is undergoing an incredible economic transformation, but at a dramatic cost to its environment. Sixteen of the twenty most polluted cities in the world are in China. Many of its cities are described as environmental disasters. The country is second only to

the United States in the output of carbon dioxide emissions. China's dust storms off the expanding Gobi Desert are now major contributors to pollution in nearby countries such as Korea. The dust from the Gobi Desert and carbon monoxide emissions in the upper atmosphere now reach the shores of the United States. As some have remarked the haze in Los Angeles isn't just from L.A. alone.

There's no doubt that we live in a global economy as well as a global environment. The problem we have is that our current model of energy consumption, the critical mainstay of developmental growth of any economy, is not sustainable. Again, China is a case in point. It now is one of the world's largest consumers. Approximately 250 million Chinese are part of the consumer class, but you have another billion-plus people who aspire to be consumers.

What will our world look like if five times the number of Chinese, not to mention the millions of Indians who are striving to enter the consumer class, what will it look like?

But we can hardly single out China alone for evaluation or criticism. After all, the United States is the world's biggest polluting culprit. With 5 percent of the world's population, it emits one-third of the greenhouse gas emissions worldwide.

Successfully reversing our current global crisis due to fossil fuel consumption will require the fastest-growing economies in Asia to modify their developing models and successfully deploy renewable energy sources. The U.S. must take a lead on developing and exporting these alternative energy sources, and I look forward to hearing from the rest of you. And we know that you are experts, and you are going to tell us how the United States and the Asian nations are working together to enhance and develop renewable energy resources.

And so, Mr. Chairman, thank you for allowing me this time to make these statements. And I would like to hear—I am listening very closely to the rest of our experts, and I hope that we hear a plan to address these most emergent concerns. Thank you, Mr. Chairman.

[The prepared statement of Ms. Watson follows:]

PREPARED STATEMENT OF THE HONORABLE DIANE E. WATSON, A REPRESENTATIVE IN
CONGRESS FROM THE STATE OF CALIFORNIA

Thank you, Mr. Chairman. Today's hearing on renewable energy and the global environment is being held after an especially difficult week in Southern California where, due to the historic number of wildfires, over 1,300 homes have been lost. Forest fires throughout the region have darkened skies and polluted the air where millions of Californians live. There is little doubt in many scientists' minds that global climate change played a role in the unprecedented size and intensity of the fires.

One of the recognized major contributors to global warming is fossil fuel consumption. Successfully reversing or slowing the adverse impacts of global warming will require the developed world and the fastest growing developing economies—many located in Asia—to look at other sources of energy, and in particular renewable energy sources, to power their modernization.

China, the emerging economic colossus, is a specific case in point. It is undergoing an incredible economic transformation, but at a dramatic cost to its environment. 16 of the 20 most polluted cities in the world are in China. Many of its cities are described as environmental disasters. The country is second only to the U.S. in the output of carbon dioxide emissions. China's dust storms off the expanding Gobi Desert are now major contributors to pollution in nearby countries such as Korea. The dust from the Gobi Desert and carbon monoxide emissions in the upper atmosphere now reach the shores of the United States. As some have remarked, the haze in L.A. isn't just from L.A. anymore.

There is no doubt that we live in a global economy as well as a global environment. The problem we have is that our current model of energy consumption, the critical mainstay of development and growth of any economy, is not sustainable. Again, China is a case in point. China now is one of the world's largest consumers. Approximately 250 million Chinese are part of the consumer class, but you have another billion plus people who aspire to be consumers. What will our world look like if five times the number of Chinese, not to mention the millions of Indians, who are striving to enter the consumer class? But we can hardly single out China alone for evaluation or criticism. After all, the U.S. is the world's biggest polluting culprit; with 5% of the world's population it emits one third of the greenhouse gas emissions worldwide.

Successfully reversing our current global crisis due to fossil fuel consumption will require the fastest growing economies in Asia to modify their development models and successfully deploy renewable energy sources. The United States must take a lead on developing and exporting these alternative energy sources. I look forward to the testimony from our panel of expert witnesses on how the U.S. and Asian nations are working together to enhance and develop renewable energy resources.

Mr. FALEOMAVAEGA. I thank the gentlelady for her statement, certainly noting the very serious problems that we are faced with, the fires in southern California, because the three major networks never seem to pay any attention. But I was going through some of the international channels, and one of them was the Russian channel. What was interesting was that the Russians have these cargo airplanes, larger than the C-5s. It is the largest cargo aircraft in the world, and they have the capacity to literally carry water sufficient—they say one cargo plane can do 2 days' work, equivalent to almost 2 weeks of what our current-capacity helicopters or whatever airplanes that can carry water to take care of the fires. And I understand that our Government turned the Russians down for their offer of help for the simple reason that we didn't have these kinds of aircrafts built especially to put out fires. Is the gentlelady aware of that?

Ms. WATSON. You know, we wouldn't even let them fly into our airspace. And what was so sad, and one of the reasons why this fire that we had and some of the fires are still going on as we speak, one of the reasons why they spread so is we weren't able to get our aircraft up off the ground.

Mr. FALEOMAVAEGA. Even getting the authorization to have our military being involved.

Ms. WATSON. And you know that our planes were so small, and the winds were very, very high speeds. Some of the winds were up to 111 miles per hour. So we had many factors that encouraged that fire to spread. We have lost almost up to 2,000 homes and several lives, but it breaks a family when you have total destruction of the place you called home. And so we have going to have to start planning ahead, and we think that probably out of all the States, we are the most prepared because we have a natural disaster quite frequently, earthquakes; we do have fires.

But I think, Mr. Chairman, we need to do better planning for the future, and we need to be sure that our infrastructure is such and our bureaucratic infrastructure is such that we can move in a crisis quicker, more effectively, and we can allow the best advances and best technology of other countries to be shared with our own.

Thank you so much, Mr. Chairman.

Mr. FALEOMAVAEGA. Thank the gentlelady.

Mr. Simon.

STATEMENT OF MR. JOHN A. SIMON, EXECUTIVE VICE PRESIDENT, OVERSEAS PRIVATE INVESTMENT CORPORATION (OPIC)

Mr. SIMON. Thank you, Mr. Chairman and members of the committee. I thank you for including my statement in the record so that I may summarize my remarks here. On behalf of OPIC President Robert Mosbacher, who is out of the country and sends his regrets, it is my privilege to appear before you today to discuss initiatives of and the record of the Overseas Private Investment Corporation in support of renewable energy and the global environment.

As you know, OPIC's mission is to mobilize and facilitate the participation of United States private capital and skills in the economic and social development of less developed countries and areas around the globe. Part of our broader mandate, as outlined in the Foreign Assistance Act, is to cooperate with developing countries in order to achieve environmentally sustainable development by promoting sound natural resource and environmental management policies. We take this mandate very seriously.

Over the years OPIC has developed a robust portfolio of clean energy projects, including renewable projects generating more than 2,400 megawatts of clean power annually, through the use of hydro, geothermal and wind technologies. Through OPIC's catalytic role in mobilizing the private sector, we can demonstrate how private investment and economic development can support commercial, profitable renewable energy in developing countries, reducing pollution and improving the quality of life for people living in those countries.

OPIC's clean energy commitment manifests itself in three parts: First, our innovative initiatives that curb greenhouse gas emissions and promote clean technology; second, our significant portfolio of clean projects; and finally, our efforts to work with our executive branch partners to pool resources, combine talent and focus on results to promote clean projects around the globe.

In June of this year OPIC President Robert Mosbacher, Jr., announced a major new four-part program to reduce greenhouse gas emissions and promote clean energy technology. Significantly, the initiative committed OPIC to reducing the direct greenhouse gas emissions associated with OPIC's projects in the active portfolio by 20 percent over a 10-year period, and established an annual emissions cap for all now GHG-emitting OPIC-supported projects. The initiative also committed the agency to encourage more clean technology projects around the world.

To document our progress in these areas, OPIC will enhance its accounting reporting on emissions, renewable energy, and energy efficiency in our annual environmental report. By making this commitment, OPIC is taking a proactive and responsible step to balance the requirements for energy development in emerging markets with the impact of additional GHG emissions, and to prioritize projects in a manner that maximizes development for a given amount of emissions.

In the 4 months since OPIC announced its GHG initiative, the agency has supported four new clean energy projects. This includes a wind generation project in India, and hydropower projects in Sri

Lanka, Serbia and Mexico. The details of these projects are included in my full statement. This is in addition to previously approved projects in our pipeline, such as wind and solar arrays in the Philippines.

In an innovative project approved earlier this year, OPIC is working in partnership with a financial services firm, AIG, to identify projects across the globe that will benefit from energy efficiency and performance upgrades, such as projects in refineries and power-generation plants, among others.

In implementing a renewable energy strategy, OPIC looks to our colleagues in the executive branch interagency process. As a small agency located in one location, OPIC cannot identify all the projects or potential private-sector partners that we can possibly work with, so we look to other government agencies as force multipliers to extend the reach and depth of our activities.

For instance, 2004, OPIC signed a Memorandum of Understanding with the Department of Energy that eventually led to the AIG framework agreement I referenced just a moment ago.

More recently, OPIC has sought out experts in the field of international renewable and clean technologies within the executive branch to better share information, leads and coordinate efforts in promoting the most cost-effective and developmental clean technology deployment as the next logical step of our efforts.

Mr. Chairman and members of the subcommittee, OPIC looks forward to working with the subcommittee and the Congress in full in promoting renewable technologies and projects through the private-sector lead development.

Thank you. I will be pleased to respond to your questions.

[The prepared statement of Mr. Simon follows:]

PREPARED STATEMENT OF MR. JOHN A. SIMON, EXECUTIVE VICE PRESIDENT,
OVERSEAS PRIVATE INVESTMENT CORPORATION (OPIC)

Thank you, Mr. Chairman, and Members of the Subcommittee. On behalf of OPIC President Robert Mosbacher, who is out of the country and sends his regrets, it is my privilege to appear before you today to discuss the initiatives and record of the Overseas Private Investment Corporation (OPIC) in support of renewable energy and the global environment.

As you know, OPIC's mission is *"to mobilize and facilitate the participation of United States private capital and skills in the economic and social development of less developed countries and areas. . . ."* However, part of our broader mandate, as outlined in the Foreign Assistance Act (FAA), is to cooperate with developing countries in order to achieve environmentally sound development by thoroughly assessing policies related to natural resources and the environment. We take this mandate seriously.

Through OPIC's unique catalytic role in mobilizing the private sector, we can demonstrate the transformative role that private investment and economic development can play in supporting renewable energy in developing countries and subsequently, the improvement in the quality of life for people living in those areas.

OPIC OVERVIEW

To put our activities on clean energy in perspective, let me briefly review OPIC's unique purpose and accomplishments. Created more than 35 years ago, OPIC's political risk insurance and financing help U.S. businesses of all sizes mitigate the risk of investing in 156 emerging markets and developing nations worldwide. Over its history, OPIC has supported \$177 billion worth of private investments that have helped developing countries to generate more than 800,000 host-country jobs and \$13 billion in host-government revenues.

It is noteworthy that OPIC's mission to promote development overseas does not come at the expense of our taxpayers here at home. Over the past 35 years, OPIC

projects have supported more than 271,000 U.S. jobs and generated \$71 billion in U.S. exports. Perhaps more importantly, by charging market-based fees for its products, OPIC operates on a self-sustaining basis at no net cost to the American taxpayer. As a matter of effective policy, OPIC does not compete with or crowd out the private sector.

Statutory Conditionalities:

OPIC assesses and monitors each project to ensure it complies with OPIC's statutory conditionalities, including those related to the environment. In this context, OPIC conducts an environmental assessment of each project and declines support for projects that would have an unreasonable or major adverse impact on the host country environment, or on the health or safety of workers in the host country. OPIC also does not support projects that contribute to violations of internationally recognized worker rights, are likely to harm the U.S. economy or have a negative effect on U.S. employment. In addition, in consultation with the Department of State, OPIC undertakes a human rights review on each project.

OPIC CLEAN ENERGY COMMITMENT:

OPIC has historically dedicated its financial wherewithal and the significant talents of its staff to encourage the adoption of clean and more energy efficient technology in the countries where we operate. However, it is important to note that OPIC's role in supporting clean energy projects in developing countries is ultimately demand driven. We can do no project without a U.S. private investor willing to put money at risk. Nevertheless, by working with our sister agencies on clean energy and strong outreach, OPIC has developed a robust portfolio of clean energy projects, including renewable projects generating more than 2,400 MW of clean power through the use of hydro, geothermal and wind technologies. Importantly, many of these renewable projects involve U.S. small businesses.

Building on that success, the agency has significantly enhanced its commitment to a cleaner environment through its recently announced Greenhouse Gas Initiative (GHG).

Greenhouse Gas / Clean Energy Initiative:

In June of this year, OPIC President & CEO Robert Mosbacher, Jr. announced a major, new four-part program to reduce greenhouse gas emissions and promote clean energy technology. The Initiative committed OPIC to reducing the direct GHG emissions associated with OPIC supported projects in the active portfolio by 20 percent over a ten-year period. Further, it established an annual emissions cap for all new OPIC-supported projects with significant GHGs in any given year to achieve the 20 percent reduction in aggregate portfolio emissions. The Initiative has also committed the agency to encourage more clean technology projects. By making these commitments, OPIC has taken a proactive and responsible step to balance the requirements of energy development in emerging markets by carefully assessing the impacts of potentially polluting plants, and prioritizing these projects in a manner that allows the agency to manage and reduce its portfolio of GHG emissions.

OPIC considers environmental improvement and the use of cleaner forms of energy a strong pillar of its developmental activities and its project portfolio includes significant green projects. In fact, in the four months since OPIC announced its GHG Initiative, the agency has supported four new clean energy projects:

India—Wind Generation:

OPIC has approved political risk insurance for a 250 kW wind generation unit in India that will feed into the Indian utility grid. The project serves as a useful model for additional wind generation projects in India.

Sri Lanka—Math Hydro:

OPIC is providing political risk coverage for a 5 MW hydroelectric power plant located near Bogandana village on the Weli Oya (Weli River) in south central Sri Lanka. The U.S. investor will build, own and operate the project. The project involves the construction of infrastructure and power supply equipment and transmission lines that will connect the plant to the national grid. This project will increase availability of power supply to local farmers by using water resources that are currently not harnessed.

Serbia DV Technologies—Mini-Hydro Projects:

OPIC has supported two mini-hydro projects in Serbia. The U.S. investor received political risk insurance for an investment in two small (250 and 315 kW) hydroelectric projects. Both projects are located near existing dams and extract energy from the water that is being continuously discharged from the dam. Prior to con-

struction of the small hydro facilities, the water was simply discharged into the river.

Mexico—Escalona Hydro:

OPIC is financing the La Escalona hydro project. The project will develop, construct and operate an 8.5 MW mini-hydroelectric power plant on the Las Minas River near Veracruz, Mexico. The project will re-use water flow that is currently being discharged from an existing 15 MW Mexican government-owned runoff river hydroelectric facility.

It is noteworthy that these three hydro projects represent enhanced energy efficiency and are environmentally low impact.

These new clean projects build on OPIC's longstanding commitment to pursue renewable energy technology projects, including financing for wind and solar arrays that will support rural electrification in the Philippines and energy recovery units in a water desalination plant in Algeria.

In addition to stand alone projects, OPIC has also provided support for an innovative framework agreement, where OPIC and American International Group (AIG) will risk share on downstream loans to projects dedicated to energy efficiency improvement. Specifically, the facility is available to support energy efficiency and performance upgrades to refineries, petrochemical plants, pipelines and power generation plants, as well as renewable and alternative energy projects with the goal of reducing greenhouse gas emissions in those projects.

Enhanced Inter-Agency Coordination on Renewable Energy:

In implementing a renewable energy strategy, OPIC looks to our colleagues in the Executive Branch inter-agency process. As a small agency in one location, OPIC cannot identify all potential projects or potential private sector partners, so we look to other government agencies as "force-multipliers" to extend the reach and depth of its activities.

For instance, in 2004, OPIC signed a Memorandum of Understanding (MOU) with the Department of Energy to promote environmentally sound economic investment in developing countries. The partnership between the two agencies was designed to promote investment in cleaner, more efficient energy technologies in emerging markets throughout the world. The efforts of staff at both OPIC and the Department of Energy led to the approval in 2007 of a framework agreement dedicated to funding energy efficiency and alternative fuel energy projects.

We also benefit from close cooperation and support from the Department of State. In addition to serving on OPIC's Board of Directors, the State Department provides foreign policy guidance and invaluable in-country assistance from the U.S. Embassy in the countries where OPIC operates.

More recently, OPIC has sought out experts in the field of international renewable and clean technologies within the Executive Branch to better share information, leads and coordinate efforts in promoting the most cost effective and developmental clean technology deployment

CONCLUSION:

Mr. Chairman and members of the Subcommittee, each passing year underscores the importance of fostering clean energy projects and greater use of clean energy technology at home and in the developing world. OPIC is able to help fulfill our nation's commitment to this goal by mobilizing U.S. private capital investment as a means to help create economic hope and opportunity around the developing world.

Entrepreneurship—risk taking to promote a better life—is part of our national character. Fully realized in our international development policy, and in cooperation with interested NGOs, it is also one of our most potent tools in promoting cost effective renewable energy activities.

As we are all responsible and dedicated to protecting our global commons, OPIC looks forward to working with the Congress in promoting renewable technologies and projects through private sector led development.

Thank you. I will be pleased to respond to your questions.

Mr. FALEOMAVAEGA. Thank you, Mr. Simon.
Mr. Yost.

STATEMENT OF MR. MICHAEL W. YOST, ADMINISTRATOR, FOREIGN AGRICULTURE SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. YOST. Mr. Chairman, members of the subcommittee, I am pleased to represent the U.S. Department of Agriculture in today's hearing.

Growing U.S. and world energy demand represents enormous potential for renewable energy. Renewable energy can help meet our increasing energy needs by using natural-occurring sources such as wind, biomass and biofuels from agricultural crops.

Ethanol is leading the renewables revolution. Ethanol production in this country could reach the 7½ billion gallons per year mandated in the 2005 Energy Policy Act this year, fully 5 years ahead of schedule. When clients currently enter construction, our completed annual production capacity in the industry will exceed 12 billion gallons. To reach the higher alternative fuel standard level, we must go beyond corn and soybeans to find practical and cost-effective ways to produce cellulosic ethanol from a variety of feedstocks.

The first generation of cellulosic ethanol plants are already under construction. This technology still has to be demonstrated on the commercial scale, but the groundwork is being laid. These second-generation products have the potential to produce more renewable energy and replace yet larger amounts of petroleum-based fuels.

To realize these opportunities, the administration proposed \$1.6 billion in new spending on renewable energy as part of this year's farm bill. Most of our proposals focus specifically on speeding the development and commercialization of cellulosic ethanol.

To advance renewable energy and build on farm bill energy programs, we seek a new Bioenergy and Biobased Product Research Initiative to advance fundamental scientific knowledge about production of renewable fuels and biobased projects; targeted loan guarantees to support commercial-scale cellulosic ethanol plants; a temporary program to give 100 million in direct support to cellulosic ethanol producers to help offset the cost of buying biomass feedstocks; a significant expansion of USDA's Rural Development Renewable Energy and Energy Efficiency Program; an acceleration of both government- and university-based research on a wide range of biofuel- and biomass-related issues; an initiative to encourage production of dedicated energy crops in an environmentally responsive way.

USDA is cooperating with other countries on energy security, climate change, air quality, and sustainable developmental goals. The recent United States-Brazil MOU on biofuels is one example. It pledges greater bilateral, regional and multilateral cooperation, including closer collaboration on researching alternative energy production, promoting alternative fuels in the region, and developing industry-wide standards and codes that could lay the groundwork for a global biofuels market.

We are also holding bilateral discussions with China on biofuels cooperation. We are engaged in a number of international fora, including the International Biofuels Forum and the Global Bioenergy Partnership. In Asia we are participating in several initiatives to

promote renewable energy. In particular we are engaged in the Asia Pacific Economic Cooperation Task Force on Biofuels and the ASEAN–U.S. Enhanced Partnership, which includes biofuels collaboration. As a result of recent OPIC meetings, the Asia Pacific Network for Energy Technology will soon be established, which will further our renewable energy collaboration in this region.

To the joint U.S.-India Agriculture Knowledge Initiative, we are targeting capacity building and joint research on use of bioproducts and biofuels from biomass. Under this initiative USDA has funded two Indian scientists to attend and present their research at USDA's Global Conference on Agriculture Biofuels: Research and Economics, held in August, to discuss the latest scientific, technological, economic and environmental development in biofuels. USDA has also provided funding over the past few years for five Indian scientists to come to the United States under the Norman E. Borlaug International Agricultural Science and Technology Fellows Program to conduct biofuels research.

While each country will choose a different path, the development of renewable energy is accelerating around the world. I believe that this technology will not only benefit a whole generation of producers involved in agriculture around the world, but also will stimulate economic growth in rural communities globally.

This concludes my statement, and I look forward to answering any questions you may have. Thank you.

[The prepared statement of Mr. Yost follows:]

PREPARED STATEMENT OF MR. MICHAEL W. YOST, ADMINISTRATOR, FOREIGN
AGRICULTURE SERVICE, U.S. DEPARTMENT OF AGRICULTURE

Mr. Chairman, members of the subcommittee, I am pleased to represent the U.S. Department of Agriculture (USDA) at today's hearing to discuss renewable energy in the global context, especially as it relates to the Asia and Pacific regions. I am also pleased to be testifying with my colleagues from the U.S. Department of State and the U.S. Department of Energy (DOE), with which USDA is cooperating closely on this issue.

I am the Chairman of the Foreign Energy Issues Subcommittee of USDA's Energy Council. This group coordinates the international renewable energy activities of the Department. Activities include development of memorandums of understanding (MOUs) on biofuels cooperation with countries such as Brazil. In addition, the subcommittee also reports on world production, consumption, and policies involving renewable energy.

While it is true that agriculture has been a leading voice for renewable energy for a number of years, the fact is renewable energy is not just an agricultural issue, but one that cuts across many sectors and indeed many countries. I believe USDA's participation in this hearing is illustrative of how important renewable energy has become to the global community. I look forward to sharing with you USDA's perspective on this important topic, with a particular focus on biofuels.

RENEWABLES CONTRIBUTION AND U.S. EXPERIENCE

As administrator of USDA's Foreign Agricultural Service (FAS) and a farmer from Minnesota, I have witnessed firsthand the steady expansion and tremendous growth in the use of, and interest in, renewable energy in the United States and around the world.

In the agricultural context, it is undeniable that the growth in total U.S. and world energy demand represents an enormous potential for renewable energy, including renewable fuels, with critical implications for agriculture, forestry, and rural America. Renewable energy can help meet our increasing energy needs by using naturally occurring sources such as wind and biomass. While biomass energy from wood and waste has long been an important source of renewable energy, biofuels from agricultural crops and wind are currently the most rapidly growing sources of renewable energy.

Renewable energy can reduce our dependence on fossil fuels, diversify energy sources, improve the trade balance, reduce environmental impacts, and generate income for farmers, ranchers, and whole rural areas, which are able to harness these natural energy sources. Growth of the renewable energy sector is expected to continue well into the future, substantially increasing worldwide demand for agricultural feedstocks like corn and sorghum over the short term to produce grain-based fuel.

Ethanol, as you know, is leading the renewables revolution. Between 1996 and 2006, U.S. production of ethanol rose fivefold from 1 billion gallons to 5 billion gallons of ethanol per year. As of August 1, 2007, there were 124 ethanol plants in production with an additional 83 plants under construction. When these are completed, total U.S. production capacity will total 12.9 billion gallons, a roughly eightfold increase since the beginning of the decade.

A misperception of corn ethanol I want to debunk is that it takes as much energy to produce as it gives out. The latest USDA studies show that, considering the full life cycle, new dry-mill ethanol plants produce 1.8 units of energy out for each unit of fossil fuel input. By comparison, gasoline refining yields 0.8 units of energy out per unit in. In other words, corn ethanol from these new plants has an energy ratio more than double that of gasoline. As our farmers and ethanol producers continue to get more and more efficient, they will need even less energy to produce both corn and ethanol. While corn ethanol is not a silver bullet, it has been strongly developed in the United States because it can be produced efficiently due to our climate and agronomics. And we are only going to get better at this.

In the United States, biodiesel production using grease wastes, animal fats, and vegetable oils has risen from 2 million gallons in 2000 to 246 million last year and is projected to reach 379 million this year, on the way to 680 million by 2010.

Some of this growth is driven by policy. President Bush made a comprehensive national energy strategy an initial priority in 2001. That was followed by the Energy Title of the 2002 Farm Bill, a series of pro-renewable tax incentives, the Energy Policy Act of 2005, the President's Advanced Energy Initiative of 2006, his "Twenty in Ten" Initiative announced this year, and the pro-ethanol initiatives in this year's Farm Bill proposals.

In his 2007 State of the Union Address, President Bush announced his vision for our nation's energy independence, calling on our nation to reduce gasoline consumption 20 percent in 10 years, in large part by creating a new Alternative Fuels Standard, which contains a requirement for sources produced by American farmers and ranchers, as well as an automatic "safety valve" to protect against unforeseen increases in the prices of alternative fuels or their feedstocks.

To reach the Renewable Fuels Standard (RFS) level that is being talked about and debated in Congress—whether it is the 10-year, 35-billion gallon goal for alternative fuels proposed by the President or the 15-year, 36-billion gallon standard for renewable fuels adopted by the Senate—we need to go beyond corn and soybeans as feedstocks. The challenge is to find practical and cost-effective ways to produce cellulosic ethanol from a whole variety of feedstocks depending on the region of the country. Harnessing this potential will require not only scientific breakthroughs, but innovative approaches to the logistical, planning, and infrastructure challenges that cellulosic ethanol production brings.

The first generation of commercial-scale, cellulosic ethanol plants are already under construction in the United States. We still have to demonstrate this technology on a commercial scale, but the groundwork is being laid now. These second-generation products have the potential to produce more renewable energy and replace yet larger amounts of petroleum-based fuels. It remains a priority across USDA to continue to support this development.

NEXT PHASE

To realize these enormous opportunities, the Administration proposed \$1.6 billion in new spending on renewable energy as part of this year's Farm Bill. The focus of most of our proposals was specifically on speeding the development and full commercialization of cellulosic ethanol. We seek to advance renewable energy through:

- A new Bioenergy and Biobased Product Research Initiative to advance fundamental scientific knowledge about production of renewable fuels and bio-based products requiring funding of \$500 million over 10 years.
- More than \$2 billion in targeted loan guarantees to support the commercialization of commercial-scale cellulosic ethanol plants.
- A new, temporary program to provide \$100 million in direct support to producers of cellulosic ethanol. This program would help offset producers' costs

associated with purchasing biomass feedstocks, such as corn stover or switchgrass, to make cellulosic ethanol.

- A significant expansion of USDA's Rural Development Renewable Energy and Energy Efficiency Program, which supports investment across a wide range of renewable energy technologies, including biofuels.
- An acceleration of both government- and university-based research on a wide range of biofuel and biomass related issues.
- An initiative to encourage the production of dedicated energy crops in an environmentally responsible way through USDA's Conservation Reserve Program.

The House-passed Farm Bill incorporated most of our renewable energy proposals. The House did include authorization for the new Bioenergy and Biobased Product Research Initiative, but it did not provide the funding. Obviously, authority without funding does not get us very far in terms of research, development, and commercialization. This initiative is a critical part of our overall renewable fuels program. It would link DOE laboratories and large universities into a single network, using the strengths of each to the best advantage. It would also competitively source many of our research dollars. For these reasons, USDA supports mandatory funding for this initiative.

We have been taking steps in recent months at the Department level to establish some of the framework and begin some of the fieldwork needed to bring renewable fuels to the next level. We revamped our Biomass Research and Development Board by inviting more senior officials from participating agencies to help support the two co-chairs—Tom Dorr, USDA's Under Secretary for Rural Development, and Andy Karsner, DOE's Assistant Secretary. The Board serves as the Federal Government's main coordinating body for promoting biofuels and biobased products. The Board is also examining how to advance all phases of the biomass production cycle, from plant science and feedstock production through the distribution phase to the end-use infrastructure. Several agencies on the Board are investigating whether higher blends of ethanol might be acceptable for use in non-flex-fuel vehicles.

While I cannot predict what the Congress will ultimately enact in the next Farm Bill, the President has again set the bar high. We will continue to build on current programs and turn the corner on renewable energy. With biofuels coming to the forefront, American agriculture faces the greatest opportunity of a generation to lead a future in which we get our energy by the bushel and not by the barrel.

INTERNATIONAL COOPERATION

Clearly, renewable energy presents remarkable opportunities for job and wealth creation in rural economies throughout the world. The U.S. experience with biofuels production over the past few years has been very positive—it has helped reignite economic growth in some previously declining rural areas of the United States. We believe other countries can potentially benefit from the same experience. Increased demand for agricultural commodities as renewable energy resources raises economic activity in rural communities. It creates new, value-added industries throughout the production, conversion, transportation, and distribution chain.

In support of the President's international initiatives, USDA is cooperating with other countries on energy security, climate change, air quality, and sustainable development goals, including agricultural and rural development. The recent MOU the United States reached with Brazil on biofuels shows our willingness to cooperate on building biofuels markets. The MOU pledges greater bilateral, regional, and multilateral cooperation on a number of fronts including closer collaboration on researching alternative energy production, promoting alternative fuels in the region, and developing industry-wide standards and codes that could lay the groundwork for a global biofuels market. We are already making significant progress across all three of these areas. We are also holding bilateral discussions with China on cooperation in the biofuels arena.

In addition, we are engaged in a number of international fora to support increased biofuels production and consumption, including the International Biofuels Forum and the Global Bioenergy Partnership. In the Asia region, we are participating in several initiatives to promote the further use of renewable energy. In particular, we are engaged in the Asia Pacific Economic Cooperation (APEC) Taskforce on Biofuels and the Association of Southeast Asian Nations (ASEAN)-U.S. Enhanced Partnership, which includes biofuels collaboration. As a result of recent APEC meetings, the Asia Pacific Network for Energy Technology (APNet) will soon be established, which will further our renewable energy collaboration in this region.

Through the U.S.-India Agricultural Knowledge Initiative—a joint initiative announced by President Bush and Indian Prime Minister Singh in 2005 to revitalize our strong partnership in agriculture born of the Green Revolution of the 1960s—we are targeting capacity building and joint research on the use of byproducts and biofuels from biomass. As part of this initiative, USDA provided funding for two scientists from India to attend and present their research findings at the “USDA Global Conference on Agricultural Biofuels: Research and Economics” held last August in cooperation with the University of Minnesota to discuss the latest scientific, technological, economic, and environmental developments in the biofuels arena. Key scientists, economists, and policy experts representing government and public institutions from more than 40 liquid biofuels producing and consuming countries met in Minneapolis. USDA also has provided funding over the past few years for five Indian scientists to come to the United States under the Norman E. Borlaug International Agricultural Science and Technology Fellows Program to conduct biofuels research.

In addition to the USDA Conference on Agricultural Biofuels, the United States will host the Washington International Renewable Energy Conference 2008 (WIREC 2008) in cooperation with the American Council on Renewable Energy next March in Washington, D.C. This will be the third global ministerial-level conference on renewable energy. More than 100 countries will be represented at the conference to chart the course for meeting the global energy needs of tomorrow.

CHALLENGES

The rapid growth of biofuels production has stimulated debate over its global implications for food markets. Some have characterized this debate as a food-versus-fuel issue, while others believe the global agricultural system is more flexible and capable of responding to both the growing demand for biofuels as well as the growing demand for food. We believe that U.S. and global agricultural producers are capable of responding to both. Growth in demand will boost crop prices over the next decade, and we expect producers to respond by increasing production, both of which should increase farm incomes around the world. In fact, the global price outlook for many crops is brighter than it has been in decades, thanks in part to increased demand for biofuels.

CONCLUSION

As this new industry grows, new issues will become evident, and certainly one of them is sustainability. As a government we are looking at this important issue. A number of studies are underway and discussions are ongoing to determine how best to help this industry to continue to grow in a sustainable fashion. Our hope is that as this technology grows, a few core principles will shape the discussion. In particular, we would support policies that are market driven, technology and feedstock neutral, and have strong private sector involvement. We cannot forget that research has shown that as long as best practices are used, biofuels contribute positively towards greenhouse gas reduction and are much better for the environment than burning fossil fuels.

While each country will choose a different path, the development of renewable energy is accelerating around the world. I believe that this technology will not only benefit a whole generation of producers involved in agriculture around the world, but will ignite economic growth in rural and urban communities worldwide.

This concludes my statement. I look forward to answering any questions you may have. Thank you.

Mr. FALEOMAVAEGA. Thank you, Mr. Yost.
Mr. Puri.

STATEMENT OF MR. SANJAY PURI, PRESIDENT AND CEO, U.S. INDIA BUSINESS ALLIANCE

Mr. PURI. Chairman Faleomavaega, members of the subcommittee, thank you very much for the opportunity to appear before you today discuss the very important and timely topic of collaboration in the field of renewable energy between the United States and India. My comments are a summary of the testimony that has been submitted to the committee.

I appear before you at a critical time in the history of the United States-India relationship. Operationalization of the U.S.-India Civil Nuclear Agreement has been delayed due to internal debate in India. The nuclear deal represents a watershed event that would lead India out of its nuclear isolation. I just led a team to India and met with the Prime Minister, members of his cabinet and leaders of the opposition.

We would like to see the deal be put back on track. While the nuclear deal may appear unrelated to the discussion of renewable energy, its continued limbo status shines a further spotlight on other areas of collaboration in the field of energy security. Both countries depend heavily on fossil fuel imports for their energy needs. India, like the United States, imports 70 percent of its crude oil. Unlike the United States, it also suffers a major natural gas shortage; and India's economic growth story of 9 percent-plus economic growth speaks to a huge need for energy, a need that was a major catalyst for the U.S.-India Civil Nuclear Agreement in the first place.

In acknowledgment of their mutual need to wean themselves off fossil fuel dependence, both countries set up the U.S.-India Energy Dialogue, which some of my colleagues here referred to. The mission of this dialogue is to strengthen energy security and to promote the development of stable and efficient energy markets in India. There have been actions taken by India in the sphere of renewable energy, and I will highlight a few of them.

India has set up the Ministry of New and Renewable Energy, which is a Government ministry charged with the administration of policy on renewable energy.

The Government of India had set up the Indian Renewable Energy Development Agency in 1987 as a Government entity charged with project finance for renewable energy projects in India. As of March 2007, this agency had approved 1,816 projects, with loan commitments of \$2 billion.

The Government of India has also set a target of 10 percent of the country's grid-integrated power generation, or 10,000 megawatts, to be from renewable or nonconventional energy sources by 2012. As of March, 2007, the Government reported that 10,251 megawatts from renewable sources had been achieved.

The Government this year has decided to move forward with the adoption of a 10 percent ethanol mandate by October, 2008; and the Government has set an ambitious national biodiesel mission to meet 20 percent of the country's diesel requirement by 2011 and 2012. With the demand for edible vegetable oil exceeding supply, jatropha has emerged as the primary candidate for biodiesel.

How is India going to be getting companies and investors to engage in this?

Through incentives and investments, they have set up a 100 percent income tax exemption for any continuous block of power for 10 years in the first 15 years of operation. They are providing interest rate subsidies. They are providing lower duties. They will also establish a special economic zone dedicated to the manufacture of renewable energy technologies. This special economic zone provides tax and other incentives from manufacturers.

How can the United States and India work together at a high level?

The United States and India should collaborate on further research into portable technologies, using both governments' commitment to the mission. With India's large pool of scientific and technical talent, this will provide a boost also to R&D in the United States. The United States and India should develop a biofuels roadmap, including the global adoption of jatropha biodiesel, in which India can play a critical role. United States industry and capital can also help India to scale up its sugar-based ethanol industry to meet the ethanol mandate in India and the scale-up of biomass cogeneration technology.

In my organization, which I am involved with, the U.S.-India Business Alliance, we are doing our part by hosting a first-ever U.S.-India Renewable Energy Summit tomorrow on Capitol Hill. This event is going to feature United States and India technologists, United States and India Government officials, private sources of capital and entrepreneurs talking about actually engaging and building renewable energy businesses together.

In summary, I would say that we should set the bar higher for the future not just of low emission transport but also of fossil fuel independence.

Thank you, and I would welcome the opportunity to answer questions, Mr. Chairman.

[The prepared statement of Mr. Puri follows:]

PREPARED STATEMENT OF MR. SANJAY PURI, PRESIDENT AND CEO, U.S. INDIA
BUSINESS ALLIANCE

Chairman Faleomavaega, Members of the Committee:

Thank you very much for the opportunity to appear before you today to discuss the very important and timely topic of collaboration in the field of renewable energy between the US and India.

I appear before you at a critical time in the history of US-India relations. Operationalization of the US-India Civil Nuclear Agreement has been delayed due to internal debate in India. The nuclear deal represents a watershed event that would lead India out of its nuclear isolation. I just led a team of Indian-Americans to India and met with the Prime Minister, members of his cabinet and the leaders of the opposition. We would like to see the deal be put back on track.

While the US India Civil Nuclear agreement may appear unrelated to the discussion of renewable energy, its continued limbo shines a further spotlight on other areas of collaboration in the field of energy security. Both countries depend heavily on fossil fuel imports for their energy needs. India, like the US, imports 70% of its crude oil. Unlike the US, it also suffers a major natural gas shortage. India's economic growth story speaks to a huge need for energy, a need that was a major catalyst for the US India Civil Nuclear Agreement in the first place.

In acknowledgement of their mutual need to wean themselves off fossil fuel dependence, both countries set up the US-India Energy Dialog in 2005. The mission of this Dialog is to "strengthen energy security and promote the development of stable and efficient energy markets in India with a view to ensuring adequate, affordable energy supplies and conscious of the need for sustainable development." Among the focus areas of this dialog have been clean energy technologies, such as Coal-Bed Methane (CBM) and clean-coal technologies, and renewable energy sources.

India has an abundant pool of technical talent and lower labor costs than those in the Western hemisphere. On the basis of these attributes alone, the US and India should be able to develop synergies in renewable energy research, development and manufacturing.

I. INDIA AND RENEWABLE ENERGY

India has an ambitious program to develop renewable sources of energy. The Ministry of New and Renewable Energy is the government ministry charged with the

administration of policy on renewable energy. In the 2007–8 Indian budget, it was given a budget estimate of 1012 crore rupees or greater than \$250m.

The Government of India set up the Indian Renewable Energy Development Agency (IREDA) in 1987 as a government entity charged with project finance for renewable energy projects in India. IREDA directly reports to the Ministry of New and Renewable Energy

As of March 2007, IREDA had approved 1816 projects, with loan commitments of 8055 crore rupees or over \$2b, and loan disbursements of over 4400 crores, or over \$1b. IREDA-supported projects alone contributed 2927 MW of power generation capacity.

The Government of India had set a target of 10% of the country's grid-integrated power generation or 10,000 MW to be from renewable or non-conventional energy sources by 2012. As of March 2007, not counting distributed solar installations, the government reported that 10,251 MW of grid-interactive power from renewable sources had been achieved.

Capacities and potential

The most widely adopted sources of grid-interactive renewable energy power generation in India today are:

- 1) Wind—7092 MW
- 2) Small hydro power—1975.60 MW
- 3) Bio-energy
 - a) Biomass 524.80 MW
 - b) Bagasse co-generation 615.83 MW
 - c) Waste-to-energy 43.45 MW

These installed capacities are only a small percentage of the estimated potentials for each type of renewable energy source (both distributed and grid-interactive) in India.

Source	Approx. Potential (MW)
Biomass energy	19,500
Solar energy	20,000
Wind energy	47,000
Small hydropower	15,000
Ocean energy	50,000

II. INDIAN GOVERNMENT ACTION AND INCENTIVES ON RENEWABLE ENERGY

The Ministry of New and Renewable Energy has the following incentives for promoters of renewable energy projects:

- 2/3rd of the project cost subject to a maximum of Rs. 2.00 crore /\$500,000 per 100 KW for procurement of modules, structures, power conditioning units, cabling etc. to the implementing agency. The balance cost on land, extension of grid lines, transformers, civil works, foundation and erection and commissioning, etc. is met by the implementing Agency.
- Up to Rs.1.0 lakh for the preparation of Detailed Project Report (DPR) for the grid interactive SPV power projects
- 2.5 percent of its share of project cost, subject to a maximum of Rs.5 lakhs for performance evaluation, monitoring, report writing, etc. to the State Nodal Agency
- Interest subsidy of up to 4 percent to Financial Institutions including IREDA, Nationalized Banks etc. for captive power projects of maximum capacity 200 KW by industry

Additionally, the Ministry has put in place the following incentives:

- 100 percent income tax exemption for any continuous block of power for 10 years in the first 15 years of operations
- providers of finance to such projects are exempt from tax on any income by way of dividends, interest or long-term capital gains from investment made in such projects on or after June 1, 1998 by way of shares or long-term finance

- accelerated 100-percent depreciation on specified renewable energy-based devices or projects
- accelerated depreciation of 80 percent in the first year of operations
- interest rate subsidies to promote commercialization of new technology
- lower customs and excise duties for specified equipment
- exemption or reduced rates of central and state taxes

In September 2007, a draft law was proposed—the Renewable Energy Act—that calls for India to change its targets to 10% of electricity generation from renewable sources by 2010, not 2012, and 20% by 2020.

Other features of this proposed law are:

- Solar water heating to be made mandatory throughout the urban areas of the country by 2012, in a phased manner
- A time-bound programme of demonstration of solar rooftop lighting systems in 10,000 government buildings by 2010, also incorporating building integrated photo-voltaics
- Conversion of fossil fuel based industrial heating to solar thermal heating using new solar concentrator technology or its hybrids
- Time-bound conversion of 18,000 MW of captive diesel-based generating units to bio fuel based generation. This will save large amounts of diesel
- Provision for small biomass based energy systems for rural areas
- Indigenous development of small wind power systems upto 25 kW (and hybrids) for stand-alone applications
- Widespread application of co-generation concepts (heat and power) for lighting, heating and cooling

A renewable energy Special Economic Zone

The government of India has also proposed a Special Economic Zone dedicated to the manufacture of renewable energy technologies.

While the discussion of the Asia-Pacific Network on Energy Technology (APNet) in India is still formative, and focusing on clean-energy IGCC (Integrated Gasification Combined Cycle) and Carbon-Capture technologies, there is the potential for manufacturers of renewable energy technologies to consider establishing R&D, scale-up and manufacturing facilities in an SEZ in India. SEZ's provide tax and other incentives for manufacturers to be able to deploy in India.

Biofuels and Biodiesel mandates

In 2003, the government of India put forward a mandate that all gasoline had to be blended with 5% ethanol. However, by 2004, it became clear that the availability of sugar, the primary feedstock in ethanol production, was a limiting factor to enacting this mandate.

Still, the government this year has decided to push forward with adoption of a 10% ethanol mandate by October 2008. There is presently a sugar surplus in India, depressing sugar prices. The government believes that added demand from ethanol blending will also help to spur prices of sugar.

The government of India has an ambitious National Biodiesel Mission to meet 20% of the country's diesel requirements by 2011–2012. With the demand for edible vegetable oil exceeding supply, jatropha has emerged as the prime candidate source for bio-diesel. Jatropha grows widely in India, requires low water and fertilizer, has high seed yield, and produces high protein manure.

The government intends to use the time period from 2007–2012 to commercialize bio-diesel from jatropha and build several trans-esterification plants.

Studies indicate that ethanol and jatropha biodiesel can be produced for under Rs. 21/liter, which compares favorably with the cost of production of gasoline and diesel from crude oil.

Biomass energy

India has a huge available potential in biomass-based generation of electricity, because of the availability of agricultural, forest-based, and agri-industry based residue. The figures show that the installed capacity falls far short of the anticipated potential.

In the area of small-scale biomass gasification, significant developments in technology have made India a world leader. Biomass gasifiers capable of producing power from a few kilowatts up to 500 kW have been successfully developed indigenously and are have been exported to by India to Asia and Latin America, and also to Europe and the USA.

A large number of installations for providing power to small-scale industries and for the electrification of a village or group of villages have been undertaken. Such examples include the installation of a 100 kW capacity rice husk-based gasifier in a rice mill in Andhra Pradesh, and a 5×100 kW biomass gasifier on Gosaba Island in the Sunderbans area of West Bengal, which is being successfully run on a commercial basis to provide electricity to the inhabitants of the island through a local grid.

The Ministry of New and Renewable Energy administers the National Program on Biomass Power/Cogeneration, under whose aegis technology development is supported.

III. HOW THE US AND INDIA CAN WORK TOGETHER

In 2006, President Bush announced the American Competitiveness Initiative, a key component of which is the Advanced Energy Initiative (AEI).

AEI's Biofuels Initiative and Solar America Initiative are funded through the Office of Energy Efficiency and Renewable Energy in the Department of Energy. One of the missions of the Solar America initiative is to lower the cost of adoption of photo-voltaic technology.

The Indian Ministry of New and Renewable Energy has been supporting R&D in solar photovoltaic technology. The belief is that the cost of solar photovoltaic modules can be brought down to about Rs. 120 (\$3) per Wp (Watt peak).

Research, design and development efforts that the Ministry will continue to support focus on the development of (i) poly silicon and other materials, (ii) efficient silicon solar cells, (iii) thin films materials and solar cell modules, (iv) concentrating PV systems, and (v) PV system design, with the objective of significantly reducing the ratio of capital cost to conversion efficiency.

The US and India should collaborate on further research into photovoltaic technology, using both government's commitment to the mission.

Additionally, the US and India can work together on developing a BioFuels roadmap, including the global adoption of jatropha bio-diesel, in which development in India is a critical part.

The roadmap needs to draw in the biggest stakeholders in US and Indian industry and focus on mandates and legislation that would incentivize the market penetration of biofuels in both countries.

US industry and capital can also help India to scale up its sugar based ethanol industry to meet the ethanol mandate in India and in the scale-up of biomass co-generation technology. India already has an active industry and academic research collaboration in this field. The US can provide access-to-markets that Indian developers of such technology desire.

THE US-INDIA BUSINESS ALLIANCE AND THE US-INDIA RENEWABLE ENERGY SUMMIT

My organization, the US-India Business Alliance, taking cognizance of the need for a common forum to discuss government and business issues in this sector, has set up the first US-India renewable energy summit on Capitol Hill on October 30th and 31st.

The event will feature US and Indian technologists, US and Indian government officials and private sources of capital. Our chief invited guest, the Minister of State for New and Renewable Energy, Mr. Vilas Baburao Muttemwar, was unable to make it to Washington, but has sent a letter of support for the event. I ask that it be entered into the record.

SUMMARY

The US and India have several synergies that predict increasing collaboration in the field of renewable energy. India is attractive as a partner, not merely because of its large market, but because it takes the cause of research, development and indigenous manufacturing seriously.

For instance, India has a growing capability in the wind-energy technology sector. One of the world's largest manufacturers of wind turbines, Suzlon, is an Indian company. They have set up a manufacturing facility in Pipestone, MN with a \$14m investment, and the creation of around 100 jobs.

From the US standpoint, renewable energy co-operation with India does not have to be limited to the transfer of technology and capacity to India. There should also be discussion of how Indian companies such as Suzlon can be encouraged by US incentives to continue to look at the US as a manufacturing waypoint.

With projects in India in mind, the government of India itself has in place several incentives for foreign promoters of renewable energy projects.

Both governments should deepen their discussion of how joint research projects, not just those focusing on power generation, can be undertaken and financed.

Finally, as two of the largest consumers of fossil fuels, both the US and India should consider adoption of a joint path toward a Bio-Fuels RoadMap, including transportation fuels for vehicles like trains.

In doing so, they would set the bar high for a future of not just low emission transport, but fossil fuel independence.

Mr. FALEOMAVAEGA. Thank you, Mr. Puri.
Dr. Clark.

**STATEMENT OF MR. REDMOND CLARK, CHAIRMAN AND CEO,
CBL INDUSTRIAL SERVICES**

Mr. CLARK. Thank you, Mr. Chairman. Thank you for inviting me here to speak today.

I have submitted detailed testimony. I will summarize a few remarks here today, and I will be available for questions, obviously.

As Congressman Manzullo mentioned, I have a Ph.D. in the area of climate change; and I have been working in and around the environmental field for 35 years. I was just looking at that figure of 35 years, 35 years. That is a long time. My hair was brown at one time, too.

Over the past 20 years, although I have worked in the educational sector and I have worked in the public sector for the past 20 years, I have been the CEO of a number of companies, all dealing with significant environmental issues directly or indirectly tied to some of the issues we are discussing here today. So I have seen a great deal of development and a great deal of market change. Our companies specialize in moving technologies from the concept stage into market entry. In other words, we are the pointed end of the commercialization stick. We deliver the technologies into the market after the inventors are done and after the capital is raised.

We have been very successful here in the U.S. and in North America. We are working internationally right now, but we are in the process of expanding our technologies over into Asia; and I believe that Congressman Manzullo felt that, in addition to my personal background, our experiences would be relevant for the committee here today.

Global warming is a huge political and scientific issue right now internationally; and, as one of the committee members mentioned a moment ago, it is also an issue of pollution. It is also an issue about energy availability. These are all very, very significant issues that we are going to have to come to deal with as a global community. We are not going to be able to handle this as an individual country or as individual countries.

Here in the U.S., we are generating about 2 billion tons, give or take, of carbon that is being put up into the atmosphere every year. Over the next 40 or 50 years, that number is going to move in the direction of doubling. If we are going to try to control carbon emissions, we have got to find a way to limit that, which means that we are, essentially, going to have to conserve or we are going to have to develop alternate energy sources to replace the carbon-based energy that we are using right now. That is a huge task.

If you break down the individual tasks, you will very quickly see that the U.S. is probably going to be hard-pressed to solve the

problem within its own borders. It means that we are going to be working internationally with a lot of other players.

Just to give you a rough feel for it, if you want to reduce one-seventh to one-eighth of the U.S. carbon emissions by using renewable fuels, we are going to need 130 million acres of land in corn above and beyond our current needs for our food supply. We currently have, I believe, 20 million acres in corn for ethanol now. We would have to increase that acreage six-fold. We do not have the land here in the United States to do that.

We would need solar cells that would cover a significant portion of the State of New Jersey in order to supply another one-seventh to one-eighth of our needs. I do not think anybody here is from New Jersey on the committee. I was not picking on New Jersey in particular.

We would need about 440,000 wind turbines standing on pedestals, operating, in order to take another one-seventh to one-eighth of our problem; and when you begin to look at where we are at right now you will see that we have come a very, very short distance on what is going to be a very long journey, but we are making some good progress. Solar is clearly a wild card right now, but as one of the other panel members has indicated, we are just about ready to see just how much potential we will be able to pull from that technology or group of technologies.

The big problems are coming offshore. With respect to Ms. Watson, the data that I have says that China has passed the United States in carbon emissions this month, if my information is correct. If it is not correct, it is very, very close. China is not using the same amount of energy, but the energy China is using is much more carbon-intensive and, as a result, they are now the world leader, I believe, in global warming emissions.

Our manufacturing community has, by and large, moved to China. When it was here, carbon issues aside, it was under a very significant, a very challenging environmental regulatory umbrella that all companies had to operate with, and it was factored into their cost of operations. Today, those manufacturing operations that have moved no longer have those restrictions; and so, as we begin to dissect the problem, we understand that not only do we have the challenge of not being able to resolve our own carbon emissions issues within our borders, but we also have a whole series of international challenges dealing with where energy is going to be consumed in the future and what other countries are going to do with their environmental regulatory agendas.

Our companies are trying to move pollution control technologies into China today. In 3 or 4 days, I am going to be leaving to go to Southeast Asia to begin negotiating some contracts and moving proprietary technologies over into the Asian marketplace.

One of the biggest problems that we face is that intellectual property rights are, by and large, not respected; and if I have a proprietary technology that I have spent a fortune developing—one that works, one that we know will do the job—and I carry it over to another country where it can be replicated, I lose my technology. I lose my opportunity. We lose our investment. That is an issue that is keeping us away from the China market at the present time.

Another country that we are negotiating with now has had patent laws in place since 1924; and, through today, no foreign party has ever won an intellectual property lawsuit in that country. It makes me wonder why we are discussing issues with them, but that is an issue that we have to face right now.

So what do we do as a nation? What can we do?

Our consumption drives the economy of many of these countries, and in particular, China. Our consumption today is critical in the expansion of their manufacturing capacity. We do not use that. We do not use that leverage, from my limited point of view, and mine is truly a worm's-eye view. We do not use that leverage to ask that our intellectual property rights be respected. We have the ability to solve many of the tremendous problems that are occurring in China right now, and we cannot get the technologies in the door without losing them.

So when we look at Government roles, one possibility that we need to consider is using our own manufacturing demand or demand for manufactured goods as leverage to improve a trading relationship that also has to include environmental regulation and environmental restrictions. That is an international issue.

Other international positions are understanding here in the U.S. that spending money not only onshore but offshore is going to be necessary to help us resolve the problem. So whether we like it or not, if we choose to address carbon emissions, we are going to have to step up and begin to invest money in both developing nations and in third-world nations; and it is there, I think, that we are going to find some of the land capability and diffuse energy capability that will help us resolve our own problems here.

From a domestic standpoint, over the past 10 to 15 years, in addition to a lot of very positive developments that have been addressed today, we have seen one role in Government begin to atrophy, and it is something that I would like to suggest that the committee takes a careful look at. The venture capital industry here in the U.S. is a very, very heavy supporter of alternative energy products and technologies. I believe, in the past year, we had \$35 billion flow into that sector from the venture capital community, but the venture capital community has so much money that they cannot afford to provide seed stage investment, and that marketplace is dried up. Seed capital is a role that has been played by many of the Federal agencies, including the Department of Energy, the Department of Commerce and the Department of Agriculture in the past, and it is a role that the Government is going to need to take a careful look at. Because, without seed capital, the likelihood of new technologies coming up is going to be severely limited.

I would also suggest that, although it is very tempting to do so, the Government take care not to try to cherry-pick technologies early on and heavily fund them all the way through the process. In the venture capital community, where I have done a great deal of work, the very best pickers of technologies are happy if they can get 25 percent right. The Government's track record, I believe, has been significantly lower than that in the past; and, therefore, before heavy bets are made on individual technologies, you need to take a very, very careful look at market conditions on some of the issues that we need to all be aware of.

The Government can also, in my opinion, push very hard on conservation activities domestically and internationally; and I think it is going to give us another significant step forward.

That is a brief summary of my comments, Mr. Chairman, and committee members. I appreciate the opportunity today. I will be available to answer questions.

Thank you.

[The prepared statement of Mr. Clark follows:]

PREPARED STATEMENT OF MR. REDMOND CLARK, CHAIRMAN AND CEO, CBL
INDUSTRIAL SERVICES

INTRODUCTION

The International Committee on Climate Change has identified global warming as a serious threat to future environmental and economic systems throughout the world, and based on comments from a number of political leaders, the issue has gained enough momentum to support various public and private sector efforts designed to reduce the rates and volumes of carbon emission into the atmosphere. Here in the US, support for immediate action is somewhat impaired because there are still broad public divisions on the need to act immediately. A recent Newsweek poll indicated that only 38% of sampled US citizens believed that global warming was the most serious environmental issue facing the world today, while a recent CNN poll suggested that 52% of the public supported either immediate or near-term action to address the problem (<http://www.pollingreport.com/enviro.htm>). Although support for some sort of action is growing, confusion about the causes of warming, primary sources of greenhouse gasses, impacts of developing economies, disagreements within the scientific community and the potential costs of partial solutions all act to fragment support for major preventative efforts.

US public confusion aside, this is a political, economic and an environmental issue, and it is truly global in scope. Although the US is one of the largest GHG emitters, it has been or will shortly be surpassed by China, and other developing nations will follow a similar path. The sheer magnitude of the problem is driven by the marriage between access to cheap energy and the resultant economic growth. We have it, they want it, but if the developing nations follow our developmental and carbon consumptive footsteps, the challenge of global warming will never be addressed until we face truly draconian environmental change.

There is a second issue that is somewhat less visible, but of far greater near-term concern. In the past 35 years, the world has periodically seen shortages of at least one energy source (Oil during the embargo, natural gas earlier this decade). When those events occurred, economic impact was minimized because we had alternate, readily available forms of energy that served as a replacement (i.e. gas for oil, gas for coal), and we had access to offshore sources and services—refining, unused coal mining capacity—that allowed us to make up differences between available supply and demand. As China and India have expanded their presence in the energy markets, options for flexibility are disappearing, prices are rising across the board for fossil fuels, and as we approach peaks in readily available supply, we run greater risks of energy shortages and/or sharply higher prices during periods of market uncertainty. We also run the risk of higher energy prices if there are extensive delays in opening up new resources (like tar sands and oil shale). The world is not going to run out of oil, but the prices to bring the next two large sources of oil (tar sands, shale oil) to market will probably be considerably higher than present average oil costs. As we get closer to peak production of readily available supplies, any disruption in supply may well have very significant shorter-term impacts on both price and availability of fuels.

Global warming aside, the development of renewable and other alternate fuels is an imperative in order to help ensure the long-term health and stability of the US economy. When global warming is added to the mix, energy and environmental security become both national and global security concerns. Renewable fuels, non-carbon based alternate fuels and conservation become critical portions of our strategic energy plans for a rapidly approaching future.

This document will try to briefly restate the problems of energy security and global warming from the standpoint of more likely currently available solutions, and I will then offer a few policy priority suggestions for consideration by the subcommittee.

GLOBAL WARMING CAUSES AND POTENTIAL SOLUTIONS

Greenhouse gas (GHG) emissions to the atmosphere substantially exceed the environmental capacity to remove them, so the atmosphere is now serving as a massive, growing carbon storage cell. The changed transmission characteristics of the atmosphere absorb more earth (LW) radiation, thus acting to warm the atmosphere. The current use of fossil fuels as sources of cheap energy releases approximately 7–8 billion tons of carbon to the atmosphere each year. The US and China each emit slightly less than 22% of that total. Most of the future growth in global carbon emissions is expected to come from developing nations, especially India and China.

The US is the lead consumer of oil (just over 1/3 of the world total), while China is the lead consumer of coal (just over 1/3 of the world total). The US and China consume about 1/3 of the global fossil fuels produced and consumed annually. China consumes about half of the energy amounts consumed by the US, but China matches US carbon emissions to the atmosphere because China uses a much higher proportion of coal. Both countries emit approximately the same amounts of GHGs: about 1.7 Billion Tons per year.

Although there are ample supplies of coal in both Asia and in North America, *readily available* oil supplies are approaching peak, which is expected within 5 to 25 years. At that point, readily available oil supplies are expected to decline, and those markets using that oil will have to either continue a migration towards newer, easy-to-move/use fuel sources or users will have to pay a premium for oil supplies. These new sources will probably include CTL fuels, hydrogen, shale oil and/or biofuels, not to mention non-carbon based electricity.

Table 1: Current Fossil Fuel Consumption, World, US and China

(Source, EIA, 2007 International Energy Annual Report)

	World	US	China
Billion Barrels of Oil	20	7	2.6
Billion Tons of Coal	6.5	1.1	2.3
TCF of Natural Gas	100	24	1.5
Total Energy Consumption (Quads)	450	100	53

<http://www.cslforum.org/china.htm>

No matter which scenario you select, the world economy will either face a shortage-enforced, cost-enforced or environmental impact-enforced transition in energy source utilization. The impacts we all face as a result could be substantial. The Energy Information Agency (EIA) of the US Department of Energy (DOE) forecasts a growth in global energy demand of 54% by 2030, and scientists at Princeton suggest that global energy demands will increase by 100% (over current consumption rates) by 2050. Over the next 40 years, the world economy is going to have to pay progressively higher premiums for oil while supporting a 54% expansion in energy demand.

No one knows where these changes would take us without GHG issues, but GHG issues add an additional layer of complexity. Doing nothing on greenhouse emissions has some specific and significant costs associated with that strategy, but so does moving too quickly, forcing use of inefficient technologies and locking out newer, better options for GHG controls in the future. There is no doubt that energy supply changes are coming, and there is little doubt that the world will make serious efforts to reduce carbon emissions. It would probably be fair to assert that we would like to see lower GHG emissions without radically increasing costs of energy or radically decreasing the quality of life in the US.

How can we accomplish that goal? The answer is simple: we do not know. There will be a complex interplay between markets, improved energy acquisition technologies, expanding alternative energy sources, regulations, conservation, and new technology development. They make prediction a very difficult process, and they should encourage us to move carefully before committing to a course of action.

Nevertheless, it is helpful to look at the problem from the standpoint of currently available solutions and progress to date. It is not a happy picture.

If we set a goal of limiting future GHG emissions to current levels (about 8 Billion tons of carbon annually), we have a host of reduced carbon, carbon-neutral or carbon free technology options currently in various states of development and/or implementation. They include (not in order of importance) renewable fuels, alternative energy generation, conservation measures, nuclear power, carbon sequestration, and natural carbon sink development. There are many more options in development, but

it is helpful to understand the magnitude of the problem compared to currently available solutions.

Tables 2 and 3 provide a preliminary look at the problems we face. Table 2 looks at the efforts that might be required to keep global carbon emissions roughly steady for the next 30 years. Five general options were considered, and at this moment, we have completed about 5% of the work and investment necessary to prevent those emissions from occurring. We have a long way to go before the global carbon emission rates level off.

GOVERNMENT POLICY DIRECTIONS FOR RENEWABLE ENERGY DEVELOPMENT

Global warming and global energy supply security/cost/stability may seem like two large, interrelated problems, but their reach includes a number of very different markets in different stages of evolution. Therefore, there is an enormous array of options to address pieces of these problems before federal state and local governmental bodies, and the solutions that eventually evolve are going to express a balance between many different market and political forces. In spite of the substantial resources available to the federal government, the government does not have the ability to solve these problems independent of the private sector. But the federal government has the ability to shape and influence market evolutions. Our collective desire is to see that these problems are addressed as efficiently and as quickly as possible, hopefully without damaging our economy and our global environment. The areas of greatest governmental leverage probably include the following: support of new technology development, assisting in the transfer of technology across industry and political boundaries, influencing or directing the application of capital towards specific elements of the problem, encouraging the broadest collaborations and agglomeration of resources (international cooperation and pooling of resources and technologies), and creation of environmental standards that free market forces to work on the problem.

Although I cannot provide detailed recommendations about the approaches most likely to succeed across all of these markets, there are a number of observations and recommendations I can suggest for your consideration.

This challenge is not going to be resolved soon. If we are proposing to keep atmospheric carbon at present levels, we are going to have to either eliminate carbon emissions totaling just less than 5 billion tons of carbon annually—or 54% of our current carbon consumption—by 2030. Short of banning additional carbon fuel consumption, available data clearly show that global carbon use in fuels is still on the rise and those increases will continue indefinitely without further regulation or radical changes in fuel costs. According to the US DOE, carbon fuels will satisfy about 85% of all energy demand in 2030, which is about the same percentage share carbon based fuels have now.

Table 2: Targets to Maintain Current Global Carbon Emissions Rate in 2030

All status figures represent the estimated progress in technology deployment within the past two or three years.
Each option would reduce global carbon emissions by 1 Billion tons.

Option	Requirement	Status
Alternative Fuels	600 Million Acres in production (16% of Arable Land)	30 MM acres in corn/cane ¹ (5% of target)
Alternative Energy: Wind	2 Million 1 MW towers	50,000 MW in operation ² (2.5% of target)
Alternative Energy: Solar	2 Million acres of panels	2400 MW ³ (<0.01% of target)
Conservation Auto	Fleet fuel economy of 30 mpg, 10,000 miles/yr	Peak fleet efficiency=26.2 mpg (1987)
Nuclear Power	700 1,000 MW plants	Planned, proposed or building=321 ⁴
Total Reduction: 5 Billion tons of carbon per year by 2030		

Table 3: Status of US Efforts to Manage Carbon Emission Rates
(Proportioned to Current US Energy Consumption Rates)

Each option would reduce US carbon emissions by 0.22 Billion tons.

Option	Requirement	Status
Alternative Fuels	132 Million Acres in production (30% of Arable Land)	14 Million acres in production (10% of target)
Alternative Energy: Wind	440,000 1 MW towers	8000 MW in production (1.8% of target)
Alternative Energy: Solar	440,000 acres of panels	440 MW ³ (<0.01% of target)
Conservation Auto	Fleet fuel economy of 30 mpg, 10,000 miles/yr	Peak fleet efficiency=26.2 mpg (1987)
Nuclear Power	154 1,000 MW plants	Planned, proposed or building=32 (21% of target)

¹Luhnow, D., Samor, G. 2006. "As Brazil Fills up on Ethanol, It Weans Off Energy Imports." *The Wall Street Journal*. 16 Jan. 2006

²AWEA (2005): *2004 Global Market Report*, <http://www.awea.org/pubs/documents/globalmarket2005.pdf>

³US DOE (2006) Solar America Initiative: A Plan for the Integrated Research, Development, and Market Transformation of Solar Energy Technologies. http://www1.eere.energy.gov/solar/solar_america/pdfs/sai_draft_plan_Feb5_07.pdf

⁴World Nuclear Society (2007): "Nuclear Power Reactors and Uranium Requirements" <http://www.world-nuclear.org/info/reactors.htm>

We are entering the land of unintended consequences. By further integrating our energy and food supply systems through biofuels (producing fuel from a food crop in substantial volumes), we began a process that allowed oil markets to significantly influence food markets. The spot market for oil will help set the cost of hamburger. Iowa State University recently suggested that the US could produce over 30 billion gallons of ethanol annually, but no one understands the impact that production would have on commodity markets (including soybeans, beef, pork and cotton), not to mention impacts on global exports of food products and our domestic balance of trade.

We are in the process of changing risks to our energy supply sources. By moving from a mined resource (oil, coal and gas) towards wind energy and agricultural crops for energy supply, we partially expose our energy supply lines to impacts from changing climate, disease and longer-term soil degradation. In managing one set of risks, we expose ourselves to others.

Alternative energy sources are typically very land intensive. Commercial solar collection and renewable fuels require use of significant quantities of land. In theory, we could consume one third of the world's arable land in order to reduce global carbon emissions by 2 billion tons per year and in order to moderately reduce the rates of growth in consumption of carbon-based fuels. As noted above, the impact of such a reallocation of land use would probably result in some shortages in agricultural production.

Renewable energy is an important part of the solution, but with the market penetration levels of current technology, it is not likely to allow holding US or global carbon emissions at current levels near-term

The primary projected sources of atmospheric carbon emissions growth are from the world's developing nations. In the past fifty years, there has been an unprecedented migration of the manufacturing base from the developed nations to Asia; China in particular. China has been externalizing their costs of environmental management in order to support rapid economic growth, and they are now the largest CO₂ emissions source in the world. This is occurring in spite of the fact that their GDP, their per capita energy consumption rates and their aggregate energy consumption rates are well below those of the US. India lags well behind both the US and China, but their economy and carbon emission rates are expected to grow rapidly. In both cases, they appear to be developing energy-intensive economies that mimic developed nation energy consumptive characteristics. Neither the world supply of readily available oil/natural gas nor the global environment can support that growth long-term. The reader should note that because of the shifts in global manufacturing capacity, the consumptive requirements of the developed nations are helping to drive the acceleration in GHG emissions from developing nations at this time.

National Actions and Guidance

The near-term effects of global warming are expected to be negligible. Political pressure to act is very high, but we have time to be smart and effective in mapping

out a strategy to minimize carbon emissions while protecting national economic interests.

The long-term value of rapid movement to reduce GHG emissions without attention to expected economic benefit will be less likely produce long-term benefits to the US. If we push forward aggressively with the deployment of low carbon or carbon-neutral technologies before the market identifies likely winning technologies, we run the risk of wasting both time and resources moving down one or more wrong paths. The US DOE does not expect that anything we do today will have a material impact on carbon emission rates over the next 25 years. We have some time.

Government programs and regulations should be technology neutral. It would be a mistake to try and predict what approaches would be best suited to market needs, especially since the markets can change dramatically following unplanned or unexpected events. Ethanol serves as a case in point. Now that the ethanol industry is producing large volumes of high-quality product, chemists are looking to find the highest use for the industry feedstock. DuPont recently opened a production facility that manufactures corn-based 1,3 propanediol for use in such diverse applications as detergents and heat transfer liquids. Dow Chemical has developed a cane-based polyethylene and has built a production facility. Now ethanol and sugarcane fuel markets will have to compete for feedstock with oil, plastics and detergents. In the end, the feedstock will be allocated to the most economical uses, not just to oil replacement because it is good for the environment. A review of the success rates in venture capital investment shows that the very best investment managers get it right about 25% of the time. There is real risk in trying to select the winning technology ahead of time.

The government can and should play a critical role in supporting the development of new and emerging energy-related technologies. This would include both basic research, prove-out and technology demonstrations. The private sector national risk capital investment pools have become so large that small seed-level investment funds focused on emerging technologies—especially in areas like conservation and energy efficiency—have effectively disappeared. Government programs can fill a portion of that void. Efforts like the DOE NICE3 (Industrial Competitiveness through Energy, Environment and Economics) and The Inventions and Innovations Programs (both de-funded or eliminated in the current budgetary year) have had long-term success in bringing new technologies to market through seed capital support, as have DOE OIT energy efficiency and conservation programs. These efforts take promising energy-saving products or services that might not survive a technology launch without modest fiscal support. With proper oversight and control, investments in research, development, technology demonstration and market launch preliminaries should be a central part of the plans to address these challenges.

The very first priority should be far reaching and aggressive conservation and energy efficiency programs. Cost-effective energy conservation and energy efficiency programs will provide a solid return on investment. They will reduce energy consumption immediately, and they can be implemented at all levels of our economy. They should be our first line of national attack. The bulk of such costs can be borne by the energy consumer because the consumer will reap the benefits of any cost-savings.

Direct support of technologies that are clearly approaching parity with carbon based fuels should also be considered. Government support during initial market penetration (through the use of tools like production tax credits and renewable energy portfolio standards) should be considered when a specific technology is making significant progress towards energy production costs that are competitive with currently used options.

Government programs should focus on the reduction of investment risk in order to attract more capital to specific problems In all government-driven efforts to support specific technologies, attention to risk reduction provides a powerful incentive for investment, and that approach can be used to jump-start technology deployment where appropriate.

International Actions and Guidance

For the foreseeable future and with current technology, the US will probably not be able to address both the carbon emissions issue and meet energy self-sufficiency and carbon emission reduction goals working solely within our borders. The US DOE projects domestic energy demand growth at 31% and global energy demand growth at 54% through 2030. Even with progress in all of the renewable energy, conservation and carbon-neutral technologies under consideration, the net use of carbon-based fuels is expected to increase nationally and globally. This is a global problem, and we cannot address it effectively if we act alone. If we remain committed to find-

ing a solution to GHG emissions and/or issues with the costs of hydrocarbons, we will have to work with other large carbon-consuming nations.

Developing and third world nations are at greatest risk from global warming impacts and higher energy prices. If we have to look offshore to help manage our own carbon emission issues, modest amounts of investment in poorer nations may provide a greater return than onshore investment alone.

If GHG emissions represent a threat to world environmental quality and global economies, then the world cannot allow the developing nations to build highly energy-intensive economies similar to the US and Western Europe. Free trade is not a suicide pact.

This issue will not be addressed unless the developed and developing nations meet and reach agreement on how the emissions and energy consumption pies are going to be divided in the future. In several analyses, it appears that developing nations run the risk of absorbing punishment whether they try to address these problems or not. If global temperatures are allowed to rise, developing nations will lose far more than fully developed nations, primarily because the developing nations have more resources to support adaptive responses to the problem. If cheaper, carbon-based fuel consumption is curtailed in order to reduce GHG emissions, their economic growth rates could be curtailed. They have fewer resources to invest in a new, low carbon energy infrastructure. And finally, their people look forward to the time when they can emulate the living standards of the developed nations. Increasing energy costs and/or reducing energy availability means that their citizenry are being denied a lifestyle available to wealthier, more powerful nations. This is a potential roadblock to true international carbon trading market development. This is a barrier to international collaboration on this problem.

If the US chooses to accept a leadership position in addressing this issue, then it should consider two key points: developed nation manufactured goods consumption drives the economies of many developing nations, and free access to our markets by developing nations makes these energy and environmental problems worse. Given our economic presence in the world markets, we have a great deal of leverage to encourage change. China has absorbed much of our manufacturing infrastructure, taking manufacturing capacity from an area of heavy environmental regulation and producing goods with minimal environmental oversight. We are now seeing the leading edge of those practices, both in product quality and in regional/international environmental quality. Without unimpeded access to our markets at this time, they would not be able to sustain their rate of growth, which is vital to the interests of the sitting government. This gives the US significant leverage to require change in environmental management standards as a condition of market access.

If US-developed solutions to specific energy/environmental issues are to be deployed internationally, and if access to IP rights and the rule of law are denied to the technology developers, international technology transfer and private sector capital investment rates in those technologies will slow or stop. We are in the business of deploying three patented air-quality control technologies into the Asian market. We are certain that if we go into specific countries, we will experience outright theft of our technologies in short order because the barriers to entry—beyond IP rights—are low, and because technology theft is common. In the case of one country that we considered, no foreign patent infringement claim has been upheld in almost 100 years of litigation. Although we believe that our technologies would help to improve productivity and environmental quality anywhere they are used, we cannot justify the risk of technology deployment in those jurisdictions. Federal and state governments and private sector entities have already invested heavily in new technology development, but they need rights protection in order to fully utilize the developed technologies.

Finally, third world nations will be hardest hit by global climate change and rising energy prices. For those nations, access to affordable, clean energy is literally a life-or-death matter. We need to attend to their needs as well, and through joint efforts to provide an energy infrastructure, we might be in a position to offset some of the impacts caused by our own consumptive economy.

SUMMARY

Managing global warming and energy supply issues is an incredibly difficult task because it places international economic and environmental quality issues into a negotiation where some large group of people will have to settle for less. From an energy consumption standpoint, most leading national economies do not operate in a sustainable manner. There are many more nations that wish to share the lives of privilege found in the developed nations. There are growing calls to act from many

different quarters. Our challenge is to represent the true interests of our constituents in a manner that can be accepted by other nations.

There is considerable pressure to act now on domestic carbon issues, and there are very high expectations for renewable energy sources. I have suggested the following strategies and priorities:

1. This is not just an environmental impact problem. It is an energy supply and cost issue as well.
2. The problems we face are both complex and global, and they will not be addressed without substantive international cooperation. We cannot do it on our own.
3. Immediate/continuing attention to domestic conservation and energy efficiency should be a first priority.
4. Special attention should be paid to providing strong financial and technical support to new technology R&D, technology demonstrations and new technology early market entry. Early selection of "winning" technologies is not advisable.
5. Management of risks surrounding renewables during early market entry is also important (PTC, REPS, etc).
6. The world cannot sustain another 2.2 billion people living in the consumptive lifestyle of the developed nations.
7. International agreement on carbon reduction targets, international cooperation and method development/deployment will probably not proceed until the most impacted parties (third world and developing nations) agree on how their future energy and economic development needs will be met.
8. Developed nations market access will be a useful tool in negotiations to resolve these issues.
9. Third world nations will need access to the evolving clean energy infrastructure as it develops, but free international exchange of new technologies will require rule of law and strong IP protection.

I hope these thoughts have been helpful and somewhat responsive. This is a very sizable undertaking, and I am afraid that I have barely touched the surface of the many issues and challenges we face. I would be more than willing to continue to support committee efforts as you move forward, should you need my assistance. Thank you for giving me an opportunity to speak today.

Mr. FALEOMAVAEGA. Thank you, Dr. Clark.

The gentleman from Illinois for his questions, 5 minutes.

Mr. MANZULLO. Thank you, Mr. Chairman.

This is an overwhelming amount of information to fathom. Let me see if I understand, Dr. Clark, what you said. I know it is in your testimony, but I cannot find it.

You said that if we eliminated our carbon energy sources, then, to compensate for that, we would have to—do you want to fill in the rest of that? One needed more than 20 million acres of corn, at present, for ethanol.

Go ahead.

Mr. CLARK. Yes. If we were to take the current emissions' characteristics of the U.S. economy and essentially say that we want to try to hold the line here and not grow it over the next 40 or 50 years, you could break the problem up into pieces. One piece could be ethanol, you know, a form of renewable energy or renewable fuel.

In order to have an ethanol production stream capable of handling about one-eighth of that total volume, we would need to, roughly, double the total acreage in corn in the United States, actually, more than double it, up to about 132 million acres of land in corn for ethanol, plus the 70 million acres, I think, that we currently have in corn for food, direct or indirect food products now.

So we would be up to around 200 million acres of farmland just in corn to satisfy one-eighth of our fossil fuel demand.

Our energy demand is going up in the United States at a much slower rate, in part because we have lost so much manufacturing capability to other countries. Our energy growth rate is quite a bit smaller, and that is one of the reasons why China and the other developing nations are passing us by. We are going to continue to increase our CO₂ output, but I believe the DOE is forecasting that we will be up, I believe, in the mid-30 percent range by 2030 and, if I am not mistaken, 54 percent by 2050.

Mr. MANZULLO. Okay. Everybody here is looking at the big picture, and it is overwhelming, but let me ask whoever would be interested in responding, what is the first step, the easiest step, that can be done to try to bring about a cessation of carbon emissions and yet, at the same time, not jeopardize the amount of energy that we are going to need? Does anybody want to take a stab at that?

Go ahead, please. Mr. Mizroch, right?

Mr. MIZROCH. Mizroch.

Mr. MANZULLO. Mizroch. Okay.

Mr. MIZROCH. I think the approach to solving both energy security and climate change, both of which are compelling issues that are informing us today, are technology development, the financing of that technology for deployment, and policy. And I would suggest, on the technology side, that there is probably pretty good news. The U.S. can develop technology very well. It is one of our great accomplishments.

I would say, on the finance side, the U.S. is probably better than any other country. I know that we are better than any other country in the world in terms of our ability to finance and/or to commercially support things.

I think the policy side is, perhaps, one of the more difficult issues; and I think this is where we need to discuss how we are going to accomplish the first two, you know, and do so in a way that, as you have suggested, we continue to grow our economy and we continue to make sure that we keep and maintain job growth and our standard of living.

Mr. MANZULLO. Anybody else?

Dr. Clark.

Mr. CLARK. I would like to remind all of us here of some things that have happened in the course of my career that speak, I think, to the problems that we are facing right now.

In 1980, after the passage of the Resource Conservation and Recovery Act and the Superfund Act, the United States was generating approximately 300 million tons of hazardous waste annually, 300 million tons of hazardous waste annually. That is solid waste. Today, that number is down somewhere below 4 million tons per year.

Now, what happened? The costs of generating and of managing the material and the liabilities associated with it were high enough that industry, essentially, engineered those waste products out of their processes. They are gone. Industry has changed the way they make things; and they have essentially eliminated a very, very large and complex problem.

If you go to individual States and you look at the quantity of solid waste that they generate and you look at yard waste, you find that wherever there are composting operations, a major fraction of solid waste going into landfills has disappeared. We have an adaptive capability here that is second to none in the world as long as we have a combined set of policies and the financial wherewithal in order to go after problems.

The question you asked is, How do we break this up into bite-sized pieces, and what can we do?

Well, the cheapest and the fastest way to get things rolling is conservation. Eliminate the incandescent bulb—something that you have worked on. That is a clear, significant step in the right direction. Change some of the basic design requirements for homes and industries.

The Department of Energy has a great program. They will go through and they will do energy conservation audit support inside companies. Expand the programs. Right now, if you are an industrial hazardous waste generator, you have to sign a certification every time a shipment goes off your site saying, “I am minimizing the amount of this waste that I am generating, and I am taking an active step on continuing to make it smaller still.” Well, why don’t we begin looking at energy conservation from the same standpoint and give everyone the freedom and the resources necessary to go forward and to begin addressing the problems?

Conservation is the first step. The second steps are under way, and the programs that these gentlemen have all been addressing are all moving in that direction, which is to begin building a new energy generation infrastructure. And there are 1,000 different ways to go about that, and I am sure this committee and others are going to be working on that for years to come, trying to find the right number of requirements and inducements that they can put in place in order to make them happen. But you have got to start with leadership, you have got to start with a plan, you have got to start with goals, and there has got to be a collective sense of what the problem is in order to get things addressed and on their way.

Mr. MANZULLO. Thank you.

Mr. FALCOMA. Dr. Watson.

Ms. WATSON. Dr. Clark, in looking at your complete statement—you summarized it in your presentation—it caught my attention when you said that the long-term value of rapid movement to reduce GHG emissions without attention to expected economic benefit would be to less likely produce long-term benefits to the U.S. and you also went on to say, “The U.S. DOE does not expect that anything we do today will have a material impact on carbon emission rates over the next 25 years. We have some time.”

I am troubled by that statement, because I come from the largest State in the Union—38 million people, California—and we are suffering, as I mentioned before, a drought, and we had fires as a result, and we expect, as soon as the rains come, to have landslides that will destroy property. So it appears to me that we have an urgent matter. I do not think we have 25 years.

Can you explain that in more depth?

I know you go on to say, "There is real risk in trying to select the winning technology ahead of time." I do not understand that. I think now is the time.

Mr. CLARK. Well, let me try to respond to the first half of the question and then the second.

It would be a fair analogy to look at the world's energy economy as a fully loaded supertanker that is doing 30 knots through the water, and the captain decides "I have got to make a turn, and I have to make a turn right now." He can throw his wheel over 90 degrees to turn that ship, and it will take him 30 to 40 miles before that ship is going in the direction that he wants. It is an issue of momentum, not of will.

Ms. WATSON. Then there is the Titanic.

Mr. CLARK. Yes, ma'am. The Titanic, if they had seen it far enough in advance, they could have turned the wheel. If they do not see it far enough in advance and if they do not act, then, yes, there is a catastrophe that could occur.

My comment that you were referring to was referring directly to the fact that it is not simply a question of whether we can produce ethanol or whether we can produce any of a host of other alternatives. The question is the amount of time, effort, dollars and further technology development that are required in order to make it happen.

I am not making light of the issues that we are facing here. I think that they are extraordinarily important, especially for the United States because of the way we consume energy, and we have integrated that so deeply into our society that taking it away in one form or another or changing economics is going to have a truly significant effect on the way we live here today, 10 years from now, 30 years from now. So I am not making light of that. I would like to see things happen very quickly, but I am recognizing the reality.

Ms. WATSON. Are you underscoring what you said here, that we have some time, that it is going to take us two or three decades?

Mr. CLARK. Well, the reference to time refers to the fact that, right now, I believe that there is tremendous political pressure to begin to make decisions and to commit capital to—

Ms. WATSON. May I interrupt you?

Political pressure? Look, I represent a city—I represent Los Angeles, and we had an enormous destruction of property. We are not getting rain. What is happening? Our weather has, indeed, changed; and I marked your presentation, because you are the first one who I saw have in writing "global warming." Before I read your statement, I wrote down, "Why isn't anyone talking about global warming?"

We are seeing a temperature change, and we are seeing our land—we are in desert. We are seeing it dry out. I mentioned the palm trees' burning, and you think we have, as it says, the next 25 years. We have some time. That boggles my mind because we are seeing the melting of the northern ice cap. We are seeing the natural animal life dying or having to move to other places to find food, and you say that we have the next 25 years.

Mr. CLARK. We have the next 25 years to effect the changes. If we decide today—if we were empowered to do so, if we decided today that we were going to change the world's global energy econ-

omy, if we made that decision today, if we picked all of the technologies that we were going to use today to effect those changes, it would take us 20 to 30 years to begin to implement those.

Need I remind you that if we were to say—and I am not suggesting any particular approach—but if we were to say that we want to build nuclear power plants as part of the solution, how long will it take us to build a nuclear power plant?

Ms. WATSON. I do not know if we are going to say that, you know.

Mr. CLARK. I am just simply saying that, whether it is a coal-fired power plant, a nuclear power plant, an ethanol production facility or any of a host of other things, it takes time. It takes time to build the——

Ms. WATSON. Sir, I think the reason why the chair is having this hearing is because he has assembled all of you who are experts to come and bring us information because he, like I—and I am sure there are other members, too—is concerned. We are the political piece of this. There is an economic piece and we know economically somebody is going to be impacted, but we all have to work together, and I do think that we do not have the kind of time that you would suggest in this paper, and I would have to have more scientific support that we need to wait and to not find a way to address this problem. I do not think we have time on our side, because we can see the effects of not addressing changes on the land, and we are involved in it in my State. Now, maybe there are other States that are not but certainly in my State.

Mr. FALEOMAVAEGA. The gentlelady's time is up.

I would encourage the members of the committee—we do have other panel members who, I am sure, could offer expertise on this subject matter, and I would encourage that they—I know Dr. Clark is really being inundated with questions.

My good friend from California for his questions.

Mr. ROHRABACHER. Oh, I was just about to ask Dr. Clark something. I will ask it.

You have been involved with this for 35 years, climate change. Were you one of the ones who 35 years ago was telling us there was going to be global cooling and now you have switched to global warming?

Mr. CLARK. I have to admit that in 1976, 1977, 1978 and 1979, I was doing early stage personal research in the area of global warming.

Mr. ROHRABACHER. Okay.

Mr. CLARK. At that time, we were unable to determine whether there was any trend that could be sorted out from the record to suggest that there was a problem.

Mr. ROHRABACHER. But, at that time, many of the experts who now are claiming global warming——

Mr. CLARK. Yes, sir.

Mr. ROHRABACHER.—were at that time warning us there would be global cooling.

Can anyone on the panel tell me when the hottest day of the last 100 years was in the United States? NASA now, that has received so much attention, claimed—it was not recently—in fact, that it was in 1931 when it was the hottest day on record.

How many of the last hottest days—you know, if you have 10 of the hottest days for the last 150 years, how many of them were in the last 10 years? One.

We are not going through a massive time of warming. I am afraid not. I mean, you know, this is, you know, absurd. I mean, if you look at the end of the mini ice age of 1850 to now, it has been 1½ degrees warmer. At the same time we are experiencing it, we see that we have had similar cycles in the past, and we see similar cycles on Jupiter and Mars, and for us to suggest that it is human activity that is creating it is absurd.

Again, that does not negate “let us try to make sure we handle global pollution,” which can be harmful to human beings. I have three children. I want our activity not to be aimed at some nonsense about our changing the climate but in making sure my children are healthy and that the children in India and that the children in China are healthy. That, to me, seems all right.

One of the things that disturbs me most about how the advocates of “global warming” have gotten us focused in the wrong direction is the talk of carbon. Engines right now produce—internal combustion engines produce things that are very harmful to people—NOx, for example. You know, an internal combustion engine is what puts NOx into our air, okay? We have nitrogen in the air already. By putting it in an internal combustion engine, it becomes NOx, which is very harmful.

If we focus instead on carbon, which has not, from my understanding, been proven to be detrimental to one’s health—unless, of course, you put your tailpipe into your car and you just sit there and wait until you are asphyxiated—I have not seen anything suggesting that that carbon is harmful.

Am I wrong in that? Has carbon been proven to be in any way damaging to people’s health?

Mr. CLARK. If you are in a situation where the total quantity of carbon or carbon dioxide present in the atmosphere goes above particular limits, you will asphyxiate yourself.

Mr. ROHRABACHER. It is like if you are in a fire, like the fires that we have been talking about, if you were right there, with the carbon you would breathe in, you would asphyxiate yourself. But, as of yet, the carbon content of the air is so minimal as compared to other elements in the air that it is not anywhere close to being harmful to people. But the attack on carbon is basically worrying about the change in the climate of the earth and not in the health of the people of the earth, and that is the point I would like to make.

I am here and others are here to help work with you on other things that we could do to make the air cleaner, and to the degree that we can use these various solar panels—for example, I think that space solar power, which is a very, I think, futuristic concept would be something that would, of course, address the carbon issue. But, more than anything else, I mean it would permit you to have electricity without having to breathe other things in that are harmful to kids and to other people.

So, number one, one of the things that I found disturbing—I was trying to listen, but I was in some other meetings back there as well—was that during the testimony I heard we have meetings, we

have meetings, we have this group getting together with that group and this meeting after this meeting. I have found that, quite often, when Government people get together and talk, the result is actually less progress and hindered progress than if they did not get together and talk. I will give you an example.

CARB in California right now—I am trying to help an inventor with an attachment to the internal combustion engine that will dramatically reduce pollutants across the board, including the greenhouse pollutants, I might add, and that will increase the efficiency of the engine. Most notably, by the way, I might note, every other time they have tried to handle NOx, in order to get a reduction in NOx, you have to reduce the efficiency of the engine. This guy's invention actually increases the efficiency and reduces NOx.

CARB, which is the Government agency there to make sure that we have clean air, has mandated that you cannot put anything on an engine in California and test it without their permission first. So he cannot test his attachment until he fills out 2-inches' worth of paperwork; and if he has anything wrong in that paperwork, you had better watch out because then he is liable, right?

Now, CARB is supposed to be an agency aimed at trying to help clean the air, and I would hope that when we are talking about these meetings that we have gone through—we had this meeting there and this meeting here—that the end result is the fact that there has been more technology deployed.

What I was hoping to hear more of today is that in this country and in India, et cetera, we have a biomass factory now. We have 10 biomass factories that produce this much electricity. Ten years ago, we did not have any of them, and that electricity is a model for the rest of the country.

Let me ask the fellow from India about that.

Mr. MANZULLO. I was going to ask if you would yield for 20 seconds.

Mr. ROHRABACHER. Yes.

Mr. MANZULLO. That was the testimony of OPIC.

Mr. ROHRABACHER. Okay.

Mr. MANZULLO. I know you were in a meeting back there, but—

Mr. ROHRABACHER. I will go to the OPIC guy, but let me go to the India guy first, because I heard him talk about biomass.

In the last 5 years, have we had the creation of biomass factories? I know you mentioned it. How many of them do we have and what has it produced? Has it produced gasoline, electricity or what?

Mr. PURI. Well, thank you, Congressman. I am an American who happens to be of Indian origin.

In the area of small-scale biomass gasification, India has become a world leader. I mean, you know, the small-scale gasification projects have really been very, very effective; and it has been entrepreneurs who are getting in and doing things. It is not, as you suggested, Government people sitting around the table, not that there is anything wrong with this kind of a discussion, but India is exporting now to Latin America, Asia and others of small biomass.

Mr. ROHRABACHER. What does the biomass create? Educate me.

Mr. PURI. Pardon?

Mr. ROHRABACHER. The biomass, what does it do? Does it create some type of propane gas? What does it create, the biomass?

Mr. PURI. It creates some kind of fuel.

Mr. ROHRABACHER. Well, what fuel?

Mr. PURI. I am not a biomass scientist. I am sure the others would know.

Mr. ROHRABACHER. Can someone tell me what biomass creates? Feel free. How about our gentleman from OPIC then? If OPIC is going to finance these things, what does biomass create?

Mr. SIMON. My understanding is it creates ethanol.

Mr. ROHRABACHER. Biomass creates ethanol. Okay.

Mr. MIZROCH. Congressman, can I just ask you a question?

Mr. ROHRABACHER. Please, go ahead.

Mr. MIZROCH. For what use? I mean, biomass is just material that biodegrades.

Mr. ROHRABACHER. Right.

Mr. MIZROCH. So you can take biomass, it will naturally degrade. You can convert it via degasification or enzymatically into a fuel. You can burn it conventionally, and it will create energy, and I think carbon dioxide, among other things.

Mr. ROHRABACHER. Okay. So have we now reached a stage where the price of oil has gone up to the point that biomass and solar energy—I specifically want to say “biomass” because I want to know more about it—now can actually create energy that will be competitive with whatever we get from oil?

Mr. MIZROCH. I think that corn ethanol is cost-competitive, there are subsidies, but it is evidenced by the fact that there are significant amounts of ethanol being produced that are at or below market of what gasoline is selling for now.

On a commercial scale, cellulosic ethanol, which is technically and scientifically feasible, has not been invented yet in terms of the large-scale commercial development of cellulosic ethanol. That is what my group in my department is working on. They are spending significant time and money and collaborating with the private sector on that.

Biodiesel is being created. It, apparently, seems to be cost-competitive. We are not doing it, but the private sector is making biodiesel, so—

Mr. ROHRABACHER. Ethanol does not have a deleterious environmental side effect?

Mr. MIZROCH. No, sir. Our information is that it does not.

Mr. ROHRABACHER. Okay, because one of the witnesses mentioned incandescent bulbs, and I understand that there is an environmental impact side in that there is some sort of hazardous material that is a by-product of that. Am I wrong?

Mr. CLARK. Well, I think we have an expert on the committee. But with regard to incandescent bulbs versus the alternatives, it is just a question of the quantity of energy they burn versus the light output, and that is the only reason I brought it up as a way to conserve energy. Every manufacturing process is going to produce a certain amount of side products that are not necessarily desirable. Light bulbs are no different.

Mr. ROHRABACHER. Thank you very much, Mr. Chairman.

I am very happy that OPIC is moving forward and is making sure we are financing energy projects overseas that are clean energy projects.

Mr. FALEOMAVAEGA. I thank the gentleman from California.

I am getting a tremendous amount of education here about as broad a subject that it could ever be.

I would like to ask a couple of questions to our friends representing the administration. I think, for this fiscal year, the administration is asking for \$1.6 billion to be utilized in the development of renewable energy sources. Am I correct in this? That is a lot of money.

Mr. YOST. Mr. Chairman—

Mr. FALEOMAVAEGA. Mr. Yost.

Mr. YOST.—in our Farm Bill proposal, we are asking for \$1.6 billion over 10 years.

Mr. FALEOMAVAEGA. Are they to be used with our private sector or is this for R&D purposes only or is it to be used for the benefit of other countries? I am curious if we should be using it and focusing on our needs domestically.

Mr. YOST. We have eight different proposals included in that \$1.6 billion. Most of it is focusing on the next generation of feedstocks that come up with an alternative to grain-based ethanol and vegetable-based biodiesel. Some of the proposals also include subsidies for buying some of these feedstocks.

When it comes to gathering feedstocks for cellulosic ethanol, that is one of the major hurdles that we have to face. It is not cost-effective to gather them and to bring them in from the field or from the forest.

Mr. FALEOMAVAEGA. I am curious. As I understand it, the last time I visited Brazil—maybe Dr. Clark could help me on this. You say we currently have the capacity of only producing 20 million acres to produce corn and that we do not have that much more, as far as the availability of land, to increase the production of corn to produce ethanol?

Mr. CLARK. I am not going to claim a great deal of expertise here. The present level of corn production is not at the outer edge of the envelope for how much additional corn we could grow in the country, but you should remember that, in addition to growing corn on that acreage, we grow soybeans, cotton in some areas. There are years when the soil has to remain fallow in order for it to recover so that it can support the crop again. So that when you begin to rotate crops and change crops over a period of time, the actual amount of acreage that is available to you to grow corn is going to be limited.

I think the total arable land in the United States, including land that would have to be irrigated, is around 400 million acres; and I stand corrected if I am wrong. Out of that, we are currently using one-quarter of our arable land for corn now. The idea of doubling that without impacting other agricultural markets is not likely, meaning it will impact other markets.

I was looking at a commentary by an agricultural economist of some note, and he said we are entering a land of consequence that we do not really understand right now. We are linking our food supply to the cost of oil, not completely, but we are further inte-

grating our food supply with the cost of oil; and, by doing so, we create other challenges, other risks that we may not fully understand right now.

There is going to be some physical limit on how much corn we can grow. I do not know what that number is. I have heard others opine as high as 30 billion gallons. I cannot speak with authority as to what the upper limit is.

Mr. FALCOMA. I want our friends from the administration to—I think what we are trying to seek here, gentlemen, is the idea that we are so dependent on fossil fuels. The entire world is dependent, including our own country. So with regard to the idea of coming up with renewable energy sources I think this is the bottom line that we are trying to get to.

My understanding is that solar and wind energy are the lowest as far as not only technology but even as to the availability of the sources right now, globally, is my understanding. Fossil fuel is the number one source right now of energy, not only by our country—I am sure—but by other parts of the world.

My question to all of you and to especially our friends from the administration is: What priority is the administration really giving to renewable resources other than our dependence on fossil fuel?

Here is the other thing that I wanted to raise as a question. We have taken all of these initiatives in dealing with the regional Asian-Pacific region. I am sure the European Union economies do it on a regional basis, but don't you think that this really has to be a global issue, rather than just the United States' taking a bunch of countries together and saying, "Oh, they are the best; we ought to deal with them." What about the rest of the world?

I just wanted to pose this question to our friends from the industry. OPIC is saying you have the capital. I think you are sitting on about \$6.2 billion worth of assets, but is it being utilized, I wonder, other than, perhaps, by the big corporations and by the big banks that go out and make investments in these foreign countries that really need it?

I just wanted to pose this to our friends.

Ambassador.

Mr. HARNISH. Yes. Thank you, Mr. Chairman.

I wanted to say, in answer to some of the questions and in particular to your question, Mr. Chairman, that any money we get from the American taxpayer we are using well to advance these goals of reducing energy dependence, to reducing our addiction to crude oil and to fossil fuels.

In our own department, we receive something like 32—we are going to receive something like—we have just received \$32 million to do this Asia-Pacific partnership program which I testified about earlier; and it is a model for bringing together—I must take exception—the private sector with foreign partners and the U.S. Government, to the extent we can be helpful, to transfer technology.

As a number of the honorable members have testified, we have to be concerned about what is happening in China, what is happening in India, what is happening in South Africa, what is happening in Brazil. Therefore, if we can invest these kinds of monies in programs that transfer the latest technologies—and it is not just in renewable energies, Mr. Chairman. It is also in large manufac-

turing—steel, aluminum. There is a lot of up-to-date technology to allow the carbon footprint of these prices to go down and to allow them to become less dependent on imported oil at \$93 a barrel.

Mr. FALEOMAVAEGA. Ambassador Harnish, how do you tackle the problem that Dr. Clark had mentioned earlier about intellectual property? The violation of it is so prevalent in not only China but in many other countries. How do we go about protecting our technologies on renewable energy?

I mean, as much as we would love other countries to transfer the technology, what assurances are there that our technologies and the people who spend the time and the effort and the expense in producing this technology are not going to be taken? Pirating, I guess, is another way of saying it.

Mr. HARNISH. Well, in addition to the good work of the United States Trade Representative, we are supportive. This is a role that we play in these programs with Asian nations. The United States Government can do good as it presses foreign governments, with the full ability of the United States, to honor their intellectual property rights in the passage of this technology; and so it is a public-private partnership. The private sector is bringing the latest technology. Our part is often to do either that, the intellectual property rights, or to ensure the rule of law to change the regulatory structure around in which these projects are done.

Mr. FALEOMAVAEGA. Secretary Mizroch, probably no other department other than yours has more money in talking about energy sources and for probably even the development of renewable energy. Can you expand on exactly what the Department of Energy is doing?

Mr. MIZROCH. Yes, sir.

Let me just say that our group within the department is making America's principal investment in renewable energy and energy efficiency. We have got 11 different programs in stationary power generation. We work in wind energy, solar energy and geothermal. In transportation, we are doing work in biofuels, principally, cellulosic ethanol development, advanced battery research for hybrids and then hopefully plug-in hybrid batteries. We have the world's largest program in hydrogen, and Japan is behind us, but we have—

Mr. FALEOMAVAEGA. How much is the Department of Energy currently investing in this whole—

Mr. MIZROCH. Last year, our investment was about \$1.4 billion.

Mr. FALEOMAVAEGA. \$1.4 billion?

Mr. MIZROCH. Yes, sir.

Mr. FALEOMAVAEGA. How much of that comes to our own domestic R&D and the research and all of that?

Mr. MIZROCH. It is all invested for the United States.

Our model, principally, is partnering with the private sector. Up to six commercial-scale cellulosic ethanol biorefineries and up to 10 pilot cellulosic ethanol biorefineries are all being done in partnership with the private sector, where we put up 40 percent and where the private sector puts up 60 percent or more. The technology, when it is, hopefully, proved up, will be commercialized immediately, as opposed to just inventing something in the laboratory.

It is the same for the Solar America Initiative which was announced. We announced 12 teams of companies—some small, some very large—specifically for the purpose of driving down the cost of photovoltaic solar and increasing the amount of photovoltaic in manufacturing.

Also, we are investing in next-generation thin film and nanotechnology.

Also, we are going to begin significantly investing in concentrated solar, in which I believe California is going to play a significant role. California has announced that they are going to buy 500 to 800 megawatts of solar energy, I think principally concentrated solar, which we think is a brilliant and an elegant technology.

On the energy efficiency side, Congressman, which is as important as the renewable energy side, we have significant programs under way in residential, commercial and industrial energy efficiency—appliance standards, building materials, design. We have two what I think are seminal programs called Zero Energy Homes and Zero Energy Buildings. These are homes and buildings that will produce as much energy as they use.

We are already about 60 percent of the way toward designing homes at a reasonable cost that will produce as much energy as they use. This is using integrated, active photovoltaic solar, together with design techniques, high-efficiency appliances, materials, windows, and HVAC. So this is all designed for America.

Now the benefit is that our technology and, obviously, the part that is protected intellectually is protected. All of these technology advances can conceivably be used internationally as well. As we invent our way and conserve our way toward much more energy efficiency and solving climate change and energy security, we think that a lot of the lessons learned will be used and will be invaluable to the rest of the world.

As you have suggested, this is very much a global problem. I mean, apart from the fact that America uses 25 percent of the world's energy, we are less than 5 percent of the world's population, and energy security will only be solved globally, climate change will only be solved globally. And so the work we are doing is for America. Because, on energy security, which is petroleum use, we have about one-third of the world's fleet of vehicles. And it is our problem to solve, and it is a significant problem, but the work we are doing, hopefully, will help China and India and others as they begin to grow their fleets, which, fortunately or unfortunately, they are doing and very rapidly.

Mr. FALCOMA. I want to get to the other gentleman, if I could, because my time is up.

Mr. Secretary Mizroch, could you submit for the record just an overview of exactly the things that the Department of Energy is doing and accomplishing? Because I think that what you just said is very important.

Mr. MIZROCH. Yes, sir, we would be happy to do that.

You know, I am just a manager now. This department has been working for several decades to do, really, seminal work in developing renewable energy for solar, wind, nickel-metal hydride batteries, geothermal, high-energy efficiency materials and things. So

we are pleased to be recognized. We are pleased that our time has come. We are pleased that many have recognized that this is important, and we are very interested and passionate about this. So I am more than happy to give you any and all information I have.

Mr. FALCOMA. Mr. Simon, my time is up, but I will get back to you if I can.

I want to give the gentleman from Illinois his 5 minutes.

Mr. MANZULLO. Thank you, Mr. Chairman.

This is one of the most intriguing hearings we have ever had, and yet it really goes to show that we are just scratching the surface on technologies.

I want to share with you, Mr. Chairman, what is going on in the congressional district that I have the honor to represent. It follows what Dr. Clark has been saying. I would call your attention to his written testimony wherein he says, just to sustain the present level of carbon output for the next 30 years, what has to be done is to replace carbon emissions. It is quite interesting because he really tracks out how far we have to go, not that we necessarily must take that much time, but he just shows it on a blueprint of how big the job is.

In our congressional district, I believe what we are trying to do there is, first, conservation, with those compact fluorescent light bulbs. I have two degrees and my wife has two degrees in science, and it was not until I ran into a gentleman from Philips who explained how these light bulbs actually work that I really got excited about it.

A fluorescent light bulb uses one-third the energy of an incandescent light bulb, and it lasts four times longer. So you have the savings in the amount of consumption needed to put out the same amount of wattage, but also a significant savings in the fact that you do not have to manufacture as much. It cuts manufacturing by 75 percent, so you save on energy there.

The new LED bulbs that are coming out use 1/100th of the energy of an incandescent bulb. I mean, this is just incredible.

Mr. FALCOMA. Somebody is going out of business.

Mr. MANZULLO. Well, no. What happens is—if I could just take another minute, because I am really excited about this. We have two methane digesters. We have a large agricultural area. This is waste from 300 dairy cattle that can literally provide all the energy for a town of 500. The Department of Agriculture is way out front on that, but the problem is getting it onto the grid system.

In the City of Rockford, they are using methane from human waste to run generators to run their own electrical system, and they are bringing in waste from different areas. It just goes on and on.

The last thing, Mr. Chairman, is that all the world's machinery is made in McHenry County. Have you ever visited a manufacturing plant and see the big tanks—the big air tanks that are necessary for pressure, where there is always an electric motor that runs continuously to keep the pressure up? They invented a machine in my district, an on-demand electric motor, that only turns on whenever you need it. That saves about 75 percent of the cost of electricity. If we just concentrated on conservation, and at the

same time develop these new technologies, then everybody could have a stake in a better, cleaner world. How about that?

Mr. FALEOMAVAEGA. I thank the gentleman for a keen observation. The gentlelady from California.

Ms. WATSON. Thank you so much, Mr. Chairman. I will try to go quickly, but I am addressing this to Mr. Simon and I was interested in reading your full statement. You are saying that in June of this year you have a four-part program to reduce greenhouse gas emissions and promote clean energy technology, and you go on to say that OPIC support of projects in the active portfolio for 20 percent over a 10-year period of time.

Can you expand on that? I am quite interested in the technology that you have already identified.

Mr. SIMON. Absolutely. We have made a commitment that over the next 10 years we will reduce the greenhouse gas emissions emitting from projects that we support from about 55 million tons to about 44 million tons, about 20 percent reduction. We are going to do that by capping on an annual basis the amount of emissions that we will allow from new projects to less than 3 million metric tons of carbon emissions.

And so every year if we see projects that exceed that amount, we will have to put some of those projects off to the next year and we will have to decide which of those projects we think will have the greatest development impact, which of those projects will fulfill our statutory mandate to promote economic and social development around the world. And those are the ones we will do and the others will wait until next year. And then next year we will have to take a look at all the projects we receive from potential investors and those that we see as having the highest development impact are again the ones we will do.

At the same time, we have increased our focus which actually already existed. As I pointed out, we have done 2,400 megawatts of renewable energy already. We have increased our efforts to do more renewable energy in the area of wind, hydro, geothermal, solar, recognizing given the high price of fossil fuels on the one hand and the interest around the globe in these technologies that we are seeing a greater demand, and we intend to capitalize on that greater demand so that we can help deploy, as the chairman said in his opening statement, commercially deploy these technologies to the places where they can do the most good.

Ms. WATSON. I am sorry that my colleague who raised the question about global warming, and so forth, but you are showing here in the private sector being able to do a better job than the public sector. Maybe there is truth in it, because you are saying you can produce—or reduce 20 percent over a 10-year period of time. That catches my interest, because I do think we are almost at a crisis period. And if technologies have been tried and they can do that, then I think we ought to start looking toward—and this goes to the people from the department, we ought to look toward those technologies and start moving on them now, and then as others are developed we can also look into them.

You are out there with private funds and some partnership and I think what you are being able to do is addressing the problem now and, you know, there is a new technology being invented every

hour in our society. And I would say, and this is for the chair and my colleague, that we ought to really get this information out broad based, because I don't think we have a whole lot of time if we are going to improve the conditions on this globe.

Thank you so very much, Mr. Chairman.

Mr. FALEOMAVAEGA. Thank you.

I wanted to ask Mr. Yost as the Administrator of the Foreign Agriculture Service, probably one of the biggest programs in USDA that we have, is basically lending assistance to foreign countries by way of our technology through the USDA?

Mr. Yost?

Mr. YOST. We do some trade capacity building with various less developed countries around the world. In the area of renewable energy, I just want to highlight one observation. I was in Kenya this past February and we have a program called Food for Progress, where we monitor United States commodities. It was done to basically help develop the dairy industry in Kenya. The interesting part was the young man who had five cows and had a methane digester, and he was providing methane for cooking. Not only was it environmentally friendly, but the interesting part was the vast improvement in lifestyle. His wife spent 6 to 8 hours a day gathering wood because she had to go so far to cook with everyday.

We don't spend a lot of money on global projects on renewable energy, but we are gathering a lot of information and knowledge about what is going on in the world, what type of policies are being implemented, talked about, discussed. And the paradigm shifts the demand from several major commodities. What does it mean if we are going to use a significant amount of vegetable oil for biodiesel production, what does it mean if we are going to continue to move forward in a sugar cane-based ethanol in Brazil?

Mr. FALEOMAVAEGA. Sometimes I get the impression that there is so many interlocking projects and programs going on between the various Federal agencies, I get to the point are we duplicating a lot of this work or is it being done in a way that is being helpful directly to the need? I just wanted to ask our friends here representing the various agencies, or is my observation wrong in that respect?

Mr. HARNISH. I think, Mr. Chairman, that in fact what you see—instead of overlap you see cooperation that is beneficial to the whole. For example, in our International Biofuels Forum Project where we are spreading technology again, reducing greenhouse gas through these renewables, it is the Trade and Development Agency cooperating with the State Department, and so I think we are really in the world quite admired for our ability to work together as agencies, not to overlap, but to complement each other.

Mr. MIZROCH. Mr. Chairman, our role is principally to develop and try to deploy technology. And so we are a research development and deployment group. We are collaborating with others presumably once our technology or techniques are developed. I would say that there is actually a pretty high level of collaboration in this area. It has gained a great deal of interest and perhaps for the first time in a long time around renewable energy and energy efficiency we are beginning to talk amongst agencies and see how we can work together.

Mr. FALEOMAVAEGA. Mr. Simon.

Mr. SIMON. I would just like to second that the Department of State sits on our Board of Directors and is very aware of all the activities that we do. Our friends at the Department of Energy recently had a delegation from OPIC out to the National Renewable Energy Laboratory in Colorado to understand the technologies there. In fact, John Mizroch was in our offices not too long ago to talk about opportunities for us to work with each other and collaborate.

And so I see a tremendous amount of, as we said, force multiplying, making 1 plus 1 equal 3 as opposed to redundancy.

Mr. FALEOMAVAEGA. That is new math, 1 and 1 equals 3. I like that.

Mr. Yost.

Mr. YOST. I would like to add that there are several of the initiatives we have been working with other departments. We worked with the State Department on the MOU with Brazil on Western Hemisphere biobased fuels, with China and the Department of Energy on a memorandum of agreement with China on how to share information and technology, and we are also working with the State Department on the WIREC conference this coming winter.

Mr. FALEOMAVAEGA. I would like to ask Mr. Puri, you have been involved for the past couple of years of this whole thing about the nuclear civil proposed agreement between India and the United States. We are talking about a \$4 billion economic benefit to our country in terms of this trade or this agreement goes through between India and the United States. Nuclear energy, is this something that India as a country, of course they have already developed quite a bit of their nuclear capability, but why deal with the United States in this respect?

Mr. PURI. Well, I thank the chairman for the question. I was just there in August, there is a lot of opposition, but in order for them to get into the NSG, which is the Nuclear Suppliers Group, they have to deal with the United States. And the point that we were making to some of the people who were thinking that this would get them into too much of an audit with the United States was once they are in the NSG they are open to buy from whomever they want, whether it is the French or it is the Russians or whoever else. So that is a point obviously the United States does stand to hopefully compete on opportunities that will come up, and the numbers have been as large as 300 billion in terms of nuclear equipment, uranium and other things.

Mr. FALEOMAVAEGA. Does India currently have the capacity to or does it depend on the United States technology for this nuclear civil agreement? Can they do it alone or does it have to have U.S. technology as part of the process?

Mr. PURI. It has got to be a member of the Nuclear Suppliers Group to kind of get access to this technology. It is barred from getting some of the dual use technology that it needs, so currently it cannot.

Mr. FALEOMAVAEGA. What are the implications? If this agreement doesn't go through, what does it mean for U.S. technology as far as nuclear construction and reactors to provide electricity, I suppose, because you already have the nuclear bomb so this is obvi-

ously for peaceful purposes. What are the implications? If this nuclear civil agreement goes through, what does this mean to the people of India as far as providing electricity? Is this the only source or is this a primary source that the Government of India really has a need for?

Mr. PURI. I don't claim to speak for the Government of India, but this agreement would provide an additional 4 percent in terms of energy for a period of time. So it is not the only source of energy.

As far as where does United States stand? Well, the United States history is the nuclear industry has kind of been winding down and now it is coming back up. So if you take the French and Russians, they are pretty well positioned in terms of winning business if this happens.

Mr. FALCOMA. Dr. Clark, have we been consistent in our policies not only with this administration but the past administrations, about protecting intellectual property? I note that you have made this very, very clear, that this has been one of the biggest problems. If we are ever to have technology transferred to other companies, how do we go about protecting the intellectual property or the patent rights of our inventors and companies that do produce technologies that could be great help to third world countries?

Mr. CLARK. I don't think I can speak to the consistency between administrations other than to say that I think it has been widely reported that especially in China intellectual property issues have been around for a long time.

There are in a number of Asian cultures, to my knowledge, or at least in terms of what I have read, a number of Asian cultures simply have a different view of what intellectual property means and that is reflected sometimes in the way their laws are enforced. So I don't think I could add a whole lot in terms of the quality of enforcement.

I do believe that it is becoming a bigger issue in part because we are moving away from a manufacturing economy, which involves lots of investment on the ground making products, and we are moving more toward a knowledge economy where a good part of the value that we create out of our economy is going to be ideas, concepts, technologies that are then going to go through someone else's manufacturing process.

So I think this is an emerging issue. It has been around for a long time, yes, but it is more and more important as we move forward. So there is plenty that needs to be done.

Obviously I have used the catch-phrase "rule of law" in intellectual property protection. Legal systems are different all over the world from country to country. And I believe that if we were going have a positive trading relationship with a country, we both have to benefit from that relationship.

We are in a position today that we will not be in, in my opinion, 20, 30, 40 years from now; that is, that we are a huge market that is critical for global domination, any particular market you want to look at. If we are not involved in it, then those other companies are at risk of having competitors form here in the U.S. and come and compete with them in the world scene.

If China continues to grow as it has been and has no setbacks in terms of economic development, then China will be able to sustain its own infrastructure with its own market, much like we do today. When that happens, our leverage is gone. So this would be the time to act. If there is an opportunity to go forward in the next 5, 10, 15 years, I think it would be very important in that regard.

Mr. FALEOMAVAEGA. I learned that someone once shared with me this statement, if we are not on the table, we are going to be on the menu. And I wanted to ask you gentleman, I realize it is probably more difficult for our friends representing the administration because they cannot unilaterally offer recommendations by way of legislation or maybe something that the Congress needs to do. I certainly welcome your suggestions and maybe, by the way, there are some weaknesses in the current laws and how we can better do our part as far as the legislative branch of our Government, and of course Mr. Puri and Mr. Clark are totally free to offer any overdue suggestions of what Congress could do to address the serious needs of renewable energy. You cannot talk about India and not talk about China, and then it goes right down the line to Indonesia, with all the most populous nations of the world. I like to think the smaller countries and the third world countries are just as important; collectively they do make a difference.

If I may, just a real quick, what do you call it—wing it? What do you suggest of what we could do as far as the Congress is concerned to better address this issue of renewable energy, Ambassador Harnish?

Mr. HARNISH. Thank you, Mr. Chairman. I would just invite you and other Members of the Congress to come to the Washington International Renewable Energy conference.

Mr. FALEOMAVAEGA. Please invite us. If you invite us, I think we will come.

Mr. HARNISH. Very good, there will be parliamentarians from around the world sharing ideas on how they have solved problems of advanced renewable energy at lower costs. I think the United States has a very good story to tell. So we will be sure to get you an invitation.

Mr. FALEOMAVAEGA. Please let Secretary Rice know that the distinguished ranking member and myself will be more than happy to attend.

Mr. HARNISH. Thank you, Mr. Chairman.

Mr. FALEOMAVAEGA. Secretary Mizroch?

Mr. MIZROCH. Yes, sir. I won't give you specific recommendations today, I think I might be constrained from doing that, except to say that we have been working very closely with both committees, both energy committees in the House and Senate, offering our comments and suggestions and recommendations on both renewable energy and energy efficiency. I think our dialogue has been actually fruitful and our comments have gone well with both committees, and I think there is much in our particular space that we agree and like in the energy bills.

More broadly, I want to thank you for convening this meeting. I think the fact that we can exchange ideas and information and talk about this, I view this in the mainstream as relatively new. Renewable energy and energy efficiency have been around for a

while, but the fact that we are now considering it as a significant part of how America might go forward and its impact in the world I think is in my view relatively new, and I think that having this sort of attention paid to it is going to benefit everybody in terms of how we make decisions going forward.

Mr. FALEOMAVAEGA. Thank you.

Mr. Simon.

Mr. SIMON. I would like to thank you for having the opportunity to discuss what we at OPIC are doing along with our esteemed colleagues. And in terms of going forward, if we could continue this dialogue either with your staff or yourself about what it is we can do better with regard to our own programs, we would be happy to do that. We are very interested in that input and I think that would be tremendously helpful.

Thank you.

Mr. FALEOMAVAEGA. Mr. Yost?

Mr. YOST. USDA has put forward several solutions in the farm bill proposal, many of those incorporated in the House bill that has been passed. I would encourage you and your colleagues to make sure they are in the final bill and also are funded.

Mr. FALEOMAVAEGA. Thank you.

Mr. PURI. Thank you, Chairman, for having me participate in this wonderful and important hearing. I think Congress obviously is doing a lot, as you hear from my colleagues. I think the United States and India, I think the perspective is obviously there is an economic opportunity, but there is a more geopolitical opportunity in terms of energy security with India, with continued dependence on foreign oil from dubious sources. There is also an issue with environmental issues, whatever the views may be on that.

Congress obviously has a role in terms of appropriations. You are looking at funding agencies with some of my colleagues representing USAID, Department of State, the Department of Commerce and many other agencies who have that kind of impact. If an emphasis can be made on renewable energy projects, whether it is an OPIC or Ex-Im Bank—Ex-Im is currently looking at some of these kinds of mandatory requirements, or funding projects in there—I think Congress can play a pretty proactive role, and I would hope that you would look at that.

Thank you so much.

Mr. FALEOMAVAEGA. Dr. Clark.

Mr. CLARK. Mr. Chairman, I have had the opportunity as a business leader to work with Commerce, with State, with the Department of Energy and with the Department of Defense. And I can tell you that in my personal dealings there has been an awful lot of support. Once people understand what the problem is, they bend over backwards to get things moving, and that includes even getting seed capital in one case to bring a technology forward that is helping us to improve our overall energy efficiency.

In terms of what Congress can do, the agencies ultimately I believe take a good deal of their funding out of the bills that you pass, pour more horsepower into conservation, pour more horsepower, more funding into energy efficiency operations, and expand the breadth of what is available. Try to provide additional funding and to take a hard look at individual programs that, especially

given the war, have been sidelined or reduced in scope simply because money has been limited and push it in.

There has been discussion about global warming and about whether you believe it or you don't believe it. I think the comments of the committee, of the attendees today—excuse me—on the panel and I know my comments, I think it would be fair to say from my standpoint that it is not that it is not an important issue, it is a question of relevance. We are changing our energy economy, that is what we are about. As a side effect, we are going to address global warming, that is what we are doing. As long as people keep a clear eye on exactly where we are going, then we steer clear of what might otherwise turn into partisan debate and we deal with what is truly one of the strategic issues of our time.

It is an incredible opportunity and challenge at the same time and if we do our jobs well collectively I think we can make some wonderful things happen. I can speak for my own time and the resources of my company, and we are available to help the committee as you folks move forward. I would welcome you to call me any time for any assistance.

Mr. FALEOMAVAEGA. Gentlemen, thank you so much for your testimony and your statements. I thank my good friend, the ranking member of our subcommittee. It is kind of a weird setup. We are responsible for the global environment, and that is why you gentlemen are here. I sincerely hope that we will continue the dialogue and hopefully resolve some of the problems facing our Nation.

Thank you. The hearing is adjourned.

[Whereupon, at 4:25 p.m., the subcommittee was adjourned.]

