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SOLAR ENERGY TECHNOLOGY AND CLEAN ENERGY JOBS

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON GREEN JOBS AND THE NEW ECONOMY

AND THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

JANUARY 28, 2010

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ONE HUNDRED ELEVENTH CONGRESS
SECOND SESSION

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SOLAR ENERGY TECHNOLOGY AND CLEAN ENERGY JOBS

THURSDAY, JANUARY 28, 2010

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON GREEN JOBS AND THE NEW ECONOMY,
Washington, DC.

The full committee met, pursuant to notice, at 9 a.m. in room 406, Dirksen Senate Building, Hon. Barbara Boxer (chairman of the full committee) presiding.

Present: Senators Boxer, Inhofe, Lautenberg, Sanders, Klobuchar, Whitehouse, Udall, Merkley, Barrasso, Bond, and Alexander.

OPENING STATEMENT OF HON. BERNARD SANDERS, U.S. SENATOR FROM THE STATE OF VERMONT

Senator SANDERS [presiding]. Good morning. We are convening the hearing, and I want to take this opportunity on behalf of Senator Boxer and myself to welcome all of our panelists, and especially the Secretary of the Interior, Ken Salazar.

At about 10:30, as I understand it, there are going to be votes on the floor, and we thought it would be appropriate to wrap up the entire hearing before then rather than to keep the second panel for an extra hour. We didn't think that would be fair. So we are going to try to move this along pretty quickly. We will start off with brief opening statements, then we are going to give the floor to our distinguished Secretary of the Interior.

Let me begin by suggesting that this hearing and this whole topic that we are discussing today, the need to move to sustainable energy, in particular solar today, is of extraordinary importance to our country and in fact to the entire planet. In my view, we are on the cusp of an energy revolution, a revolution which ends the absurdity of the United States importing some $350 billion of foreign oil every single year.

And as I think we heard last night from the President, we have heard from the Secretary, and we have heard from experts all over this country, we have the potential to move toward energy independence, to create over a period of time millions of good paying jobs. We have the potential to substantially cut back on greenhouse gas emissions and clean up our entire environment as we move toward energy efficiency and as we move toward sustainable energy.

I have a chart—which will suddenly appear—which shows that fossil fuel subsidies from the Federal Government totaled nearly

$71 billion, $71 billion between 2002 and 2008, compared to $1.2 billion for solar and $11 billion for other renewable energy sources.

We have another chart—because we have talk a lot about nuclear—which suggests that nuclear plants have received subsidies amounting to $625,000 per megawatt, compared to new solar plants, which receive $186,000 a megawatt.

If there is one point that I hope is made clear as a result of today's hearing, solar energy is no longer a fringe idea, it is mainstream, and every single year solar energy is becoming less and less expensive and more and more competitive with the older energy technologies. And we as move forward—and I hope we will move forward very boldly in solar and other sustainable energies—the cost is going to go down, down, down, as it has in recent years. And in the midst of a major recession, what excites me very much is the potential of creating a significant number of jobs in these new technologies.

Today the solar industry in the United States has more than 1,000 companies, and we are going to hear from several of them today, and they employ more than 40,000 workers, and those numbers are going up every single year. Every megawatt of solar installed annually in the United States creates 25 jobs. Compare that to nuclear, where you need 50 megawatts of nuclear capacity to create 25 jobs, or coal, where you need more than 100 megawatts to create 25 jobs.

Now my hope is that as a Nation—and the President has been very strong on this issue, we will understand the extraordinary potential out there. I will soon be introducing legislation calling for 10 million solar rooftops throughout this country, and that, in a significant way, will take us forward in solar.

So let me just conclude by thanking all of our witnesses. I look forward to an illuminating panel and illuminating discussion.

Let me now yield, give the mic over to Senator Bond.

OPENING STATEMENT OF HON. CHRISTOPHER S. BOND, U.S. SENATOR FROM THE STATE OF MISSOURI

Senator BOND. Thank you very much, Chairman Sanders.

Welcome, Secretary Salazar and the other witnesses.

I appreciate you, Mr. Chairman, and Chair Boxer, in holding the hearing on green jobs and solar panel.

Last night, the President spoke of providing incentives for clean energy. I support incentives from the Government for nuclear power, accessing offshore energy reserves; biofuels, clean coals, and yes, solar power, the subject of today's hearing. However, we must guard against proposals that use the promise of these jobs but actually end up killing jobs and raising energy taxes, such as cap-and-trade legislation or back door EPA regulations.

American workers desperately need new jobs. U.S. unemployment rates are too high. Too many workers are suffering with no work or low wages. Green jobs are good, but Americans still really need red, white, and blue jobs. Unfortunately, most of the new good paying, middle class supporting manufacturing jobs in the solar industry are going overseas to countries like China and Malaysia. U.S. taxpayers are asking why they should subsidize big Government green jobs proposals to explode the debt, raise energy taxes,

and kill traditional manufacturing jobs when the good green manufacturing jobs they need will go mostly to Asia.

First Solar of Tempe, Arizona, is testifying here today. This is a poster of some of their newest employees. They are very proud of those new employees, but they are based not in the United States, but at the new First Solar plant in Malaysia. First Solar just finished construction of four solar manufacturing plants, employing 2,000 Malaysians, and have announced plans to add eight more production lines in Malaysia by 2011.

Well, that is good news for Malaysia, they are good friends, but what is reflected here in the chart of First Solar's manufacturing capacity shows that First Solar has some manufacturing in the U.S.—that is the blue line underneath—some in Germany, but most of the new solar manufacturing capacity, the red on top, is overseas in Malaysia.

Now, eSolar, also testifying today, may be a U.S. company but it imports most of its solar components from China. eSolar uses panels from China, gear boxes from Shinzan, and they just signed a new deal to outsource manufacturing to Pen-Gly, China, as you see in this poster.

Evergreen Solar, another prominent U.S. solar company that has taken millions of dollars in taxpayer subsidies, recently announced that it is expanding its solar manufacturing not at its Massachusetts home but instead in Wuhan, China, as shown in this.

BP is closing their manufacturing operations in Maryland and moving that work to China.

GE is shutting down its Delaware solar facility.

An Evergreen Solar executive put it succinctly: "It's much, much less expensive inherently to produce in China. All of our expansion will be in China."

Indeed, China is a country where they pay electrical engineers $7,000 per year; manufacturing workers a fraction. Power is subsidized, financing is subsidized, and government regulations are nonexistent.

The few solar manufacturing jobs we are getting in the United States come at extreme expense to the taxpayer. United Solar took $96.9 million in taxpayer subsidies for one plant in Michigan that created a mere 350 jobs. Evergreen took $44 million and created 700 jobs. That is tens of millions of dollars in taxpayer subsidies for only hundreds of green jobs when we lost 2 million manufacturing jobs and 7 million jobs total since the recession began.

Now, don't get me wrong, I am not critical of the companies here today. They are doing what they do, which is find where they can manufacture their products the cheapest. Likewise, I am sure that the workers they employ in Malaysia and China are fine workers who will do a good job for their employers, and they will strengthen ties between our countries. But at a time of great economic need for America's workers we need proposals that will maximize the creation of jobs here in America, not in Asia, when we are talking about Federal subsidies.

Granted, some American workers will get jobs installing solar panels as we will hear today. Those are not the high end manufacturing or engineering jobs. But we cannot sit here and honestly say that solar power will create the high number of blue collar, good

paying, middle class supporting manufacturing jobs that America needs. Thus, green solar jobs certainly cannot justify imposing massive job killing and energy tax, raising cap-and-trade legislation or back door EPA climate regulations.

Thank you, Mr. Chairman.

[The prepared statement of Senator Bond follows:]

U.S. Senator for Missouri
Kit Bond
NEWS

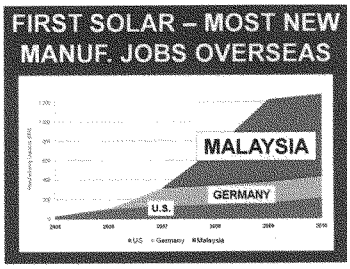
STATEMENT OF SENATOR KIT BOND
EPW HEARING ON GREEN JOBS AND SOLAR POWER
January 28, 2010

Thank you, Chairman Boxer and Subcommittee Chairman Sanders for hosting this hearing on green jobs and solar power.

Last night, the President spoke of providing incentives for clean energy. I support government incentives for nuclear power, accessing offshore energy reserves, and even solar power, the subject of today's hearing. However, we must guard against proposals that use the promise of jobs, but actually end up killing jobs and raising energy taxes, such as cap-and-trade legislation or backdoor EPA regulations.

American workers desperately need new jobs. U.S. unemployment rates are too high. Too many workers are suffering with no work or low wages.

Green jobs are good, but what Americans really need are red, white and blue jobs. Unfortunately, most new, good-paying, middle-class supporting manufacturing jobs in the solar industry are going overseas to countries like China and Malaysia.



U.S. taxpayers should ask why subsidize big government green jobs proposals to explode the debt, raise energy taxes and kill traditional manufacturing jobs when the good paying green manufacturing jobs they need will go mostly to Asia.

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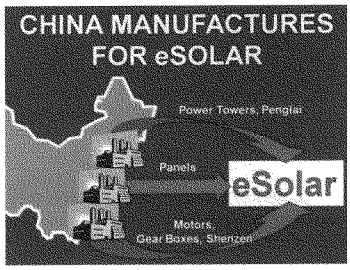
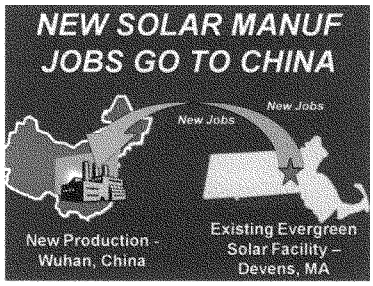


First Solar just finished construction of four solar manufacturing plants employing 2,000 Malaysians and have announced plans to add eight more production lines in Malaysia by 2011.

That is reflected here in a chart of First Solar's manufacturing capacity. First Solar has some manufacturing in the U.S., the blue on the bottom and we are thankful for that. However, most all of its new solar manufacturing capacity, the red on the top, is overseas in Malaysia.

eSolar, also testifying today, may be a U.S. company, but it imports most of its solar components from China. eSolar uses panels from China, gear boxes from Shenzen, and they just signed a new deal to outsource manufacturing to Penglai, China.

Evergreen, another prominent U.S. solar company that has taken millions of dollars in taxpayer subsidies, recently announced that it is expanding its solar manufacturing not at its Massachusetts home but instead in Wuhan, China.



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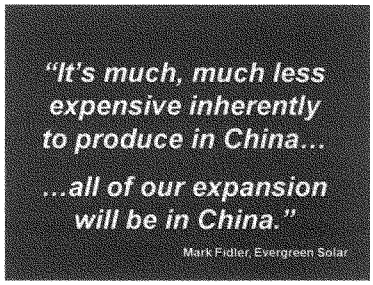
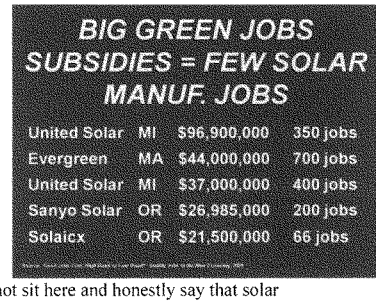


Indeed, China is a country where they pay electrical engineers $7,000 per year and manufacturing workers a fraction of that. Power is subsidized, financing is subsidized and government regulations are nonexistent.

The few solar manufacturing jobs we are getting in the U.S. come at extreme expense to the taxpayer. As I described in a report I issued this spring entitled *Yellow Light on Green Jobs*, United Solar took $96.9 million in taxpayer subsidies for one plant in Michigan that created a mere 350 jobs. Evergreen took $44 million and created 700 jobs.

That's tens of millions of dollars in taxpayer subsidies for hundreds of green jobs when we've lost 2 million manufacturing jobs and 7 million jobs total since the recession began.



Don't get me wrong, I am not critical of the companies here today. They are doing what they do, which is find where they can manufacture their products the cheapest. Likewise, I am sure that the workers they employ in Malaysia and China are fine workers and will do a good job for their employers.

But, at a time of great economic need for America's workers we need proposals that will maximize the creation of good jobs here in America.

Granted, some American workers will get jobs installing solar panels, as we will also hear today. But we cannot sit here and honestly say that solar power will create the high numbers of good paying, blue-collar, middle-class supporting manufacturing jobs that America needs.

Thus, green solar jobs certainly cannot justify imposing massive job-killing and energy tax-raising cap-and-trade legislation or backdoor EPA climate regulations. Thank you.

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Senator SANDERS. Thank you, Senator.
Senator Lautenberg.

OPENING STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM THE STATE OF NEW JERSEY

Senator LAUTENBERG. Thanks, Mr. Chairman, for holding this hearing. I know what an advocate you have been, and it is with respect and support that we gather here today, and it is good to see our friend, Ken Salazar, in his position. Can we call him the warden of the environment? We really appreciate what he has done. We miss him here.

I think that Senator Bond made a very clear picture of where we are going with the jobs and our money, but the President last night I think made it clear that putting jobs out of the country cannot simply be rewarded by bringing cheaper products into our society, lowering the standard of living here as we do that. When we reduce incomes here, we commensurately lower standards of living.

One of the best ways to stop global warming and to get our economy back on track would be a wind farm environment, wind farm economy. We can create thousands of new clean energy jobs while protecting our planet against health threatening temperature increases, rising sea levels, resource shortages, and declining species. Fossil fuels are not only dirty, but they are finite; eventually we are going to run out, leaving us dependent on other nations and with outdated technology. On the other hand, renewable energy—wind, solar, and geothermal power—is endless.

Renewable technologies are clean, they will free us of our dependence on other nations, and they will create jobs. These new technologies need workers to build the components, install them, keep them up and running. These are skilled, good paying jobs that will last for decades to come.

I now want us to look for a moment at what is already happening in New Jersey. New Jersey, by the way, where the solar panels were developed in 1954, New Jersey took an active and an early lead in developing clean energy technology. In fact, solar panels, as I mentioned, invented in our State more than 50 years ago, and forward thinking laws have helped keep New Jersey at the forefront of solar technology and creating clean energy jobs.

In our State, New Jersey, for example, it requires 22.5 percent of electricity comes from renewable sources by 2021. Since that law was enacted in 2001, the number of solar installations in our State has grown from simply 6 to more than 4,000 since 2001, making us second in the Nation in solar capacity to power our homes and businesses.

In July 2007, former Governor Corzine signed a law calling for New Jersey's greenhouse gas emissions to be reduced to 1990 levels by the year 2020 and 80 percent below the 1990 levels by 2050. New Jersey was one of the first States to adopt such a law, and the laws span innovation across our State, innovation that has created jobs.

The Pew Environment Group found that more than 2,000 clean energy companies in New Jersey employ more than 25,000 people. That was in 2007. Right now, Atlantic City is installing the country's largest roof mounted solar array on top of its convention cen-

ter. This massive project will clean up the air by reducing pollution and putting New Jerseyans to work.

If States like New Jersey are acting, then the Federal Government must act, too. That is why I am proud to be an original sponsor, cosponsor of Senator Sanders' 10 Million Solar Roofs bill. While the bill is a good start, what America needs is a comprehensive solution to this environmental and economic challenge. Putting a cap on global warming pollution is the fastest, cheapest way to clean up our atmosphere, reduce our dependence on oil, and create jobs. That is what we have been fighting for, and that is what we must ultimately do.

I thank you.

Senator SANDERS. Senator Lautenberg, thank you.

Senator Inhofe.

OPENING STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. Thank you, Mr. Chairman.

You know, I am trying to get an earlier flight out today because today we are going to set the second all-time record in Oklahoma for cold weather. I just would tell my good friend from New Jersey, where is global warming when you need it?

Chairman Sanders, let me thank you for scheduling the hearing today to examine whether solar energy can fuel our economic recovery. As I have stated many times, I support all of the above approach.

Oh, let me also say welcome to my good friend, Secretary Salazar. You are one of the real bright places in this Administration. I always enjoy visiting with you.

I also want to mention that while we don't have much solar in Oklahoma, we are a leader in Oklahoma in wind and geothermal technologies. I take people all the time in my little airplane going out west in Oklahoma. In any one place you can see 500 of these generators cranking away in Oklahoma. On January 8th, the Oklahoma Corporation Commission issued two orders authorizing OG&E, Oklahoma Gas & Electric, to purchase electricity from two new wind farms currently being developed in northwest Oklahoma. Both are expected to be in production by year's end, will provide an additional 280 megawatts to the State's already existing 1130 megawatts of capacity.

I welcome all the witnesses, especially Secretary Salazar, to this hearing, as well as Professor Andrew Morriss. Professor Morriss will focus his comments on current and proposed policies to promote solar and other types of renewable energy rather than on the technologies themselves.

We know that cap-and-trade and other schemes that raise energy prices are not the solution that America wants. We know the votes aren't there also, speaking practically. But to promote clean energy you don't have to hammer conventional energy sources. The notion that energy companies will not invest in clean technology without Government programs is a myth. According to the Pacific Research Institute, the U.S. based oil and gas companies invested an estimated $121.3 billion from 2000 to 2007 on emerging energy tech-

nologies in the North American market, and I know there are several more partnerships under development.

Mr. Chairman, we need an all-of-the-above energy strategy including renewables but not at the expense of other domestic sources. Last fall, the Congressional Research Service released a report which revealed that America is No. 1 in combined recoverable oil and natural gas and coal resources. No. 1. Not China. This is America. The largest recoverable resource on earth. CRS shows that if America opened access to its own resources, we could produce 167 billion barrels of oil. 167 billion barrels of oil. That is the equivalent of replacing America's current imports from OPEC nations for 75 years. The report also shows that at today's rate of use, America possesses a 90-year supply of recoverable natural gas.

I have to tell you I was excited last night when the President said we are going to start drilling offshore. If people are serious about being energy independent, all we have to do is develop our own resources. There is not another country in the world that doesn't develop its own resources.

While I appreciate the opportunity to talk about this issue today, I am hopeful, Mr. Chairman, that you will begin to schedule hearings on other issues, especially those concerning infrastructure. I have been concerned about this committee. We have the largest jurisdiction in the Environment and Public Works Committee of any of the committees; we have the WRDA bill, we have the transportation and reauthorization bill, all these things that we need to be paying attention to.

I should also note that we have 11 nominees pending before this committee. Four of those are for the TVA alone, while three more are for the Nuclear Regulatory Commission, the NRC. It is imperative that we get these guys on the job. If the majority wants to create green jobs, let's proceed with these nominees so that the NRC can effectively complete reviews of 17 applications pending before the agency for new reactors. The nuclear industry has already created 15,000 jobs and has yet to begin actual construction of a new plant, which could create 3,000 to 4,000 jobs per site.

This is our first hearing in 2010. We know enough about climate change and cap-and-trade to put that aside. We know that cap-and-trade means fewer jobs and higher energy prices, so let's focus instead on advancing issues that will put people back to work and adopt an all-of-the-above policy that will make us independent here in the United States.

Thank you, Mr. Chairman.

[The prepared statement of Senator Inhofe follows:]

STATEMENT OF HON. JAMES M. INHOFE,
U.S. SENATOR FROM THE STATE OF OKLAHOMA

Madam Chairman, Chairman Sanders, thank you for scheduling this hearing today to examine whether solar energy can fuel our economic recovery. As I've stated many times, I support an all-of-the-above energy policy, which includes using renewable resources such as solar energy to power our economy. While we don't have much solar in Oklahoma, my State has been a leader in wind and geothermal technologies simply because it makes economic sense to do it there. In fact on January 8th the Oklahoma Corporation Commission (OCC) issued two orders authorizing OGE to purchase electricity from two new wind farms currently being developed in northwestern Oklahoma. Both are expected to be in production by year's end and

will provide an additional 280 megawatts to the State's already existing 1,130 megawatts of capacity.

I welcome all the witnesses, including Secretary Salazar and representatives from the various solar energy companies as well as Professor Andrew Morriss. Professor Morriss will focus his comments on current and proposed policies to promote solar and other types of renewable energy rather than on the technologies themselves.

We know that cap-and-trade or other schemes that raise energy prices are not the solutions that America wants or needs. To promote clean energy you don't have to restrict or penalize other energy sources. And the notion that energy companies will not invest in clean energy without Government programs is a myth. According to the Pacific Research Institute, U.S. based oil and gas companies invested an estimated $121.3 billion from 2000 through 2007 on emerging energy technologies in the North American market.

Madam Chairman, we need an all-of-the-above energy policy that includes renewables but not at the expense of other domestic resources. Last fall, the Congressional Research Service released a report on America's combined recoverable oil, natural gas, and coal resources. CRS found that they are the largest recoverable resources on Earth. CRS shows that if America opened access to its own resources we could produce 167 billion barrels of oil, which is the equivalent of replacing America's current imports from OPEC for more than 75 years. The report also shows that at today's rate of use America possesses a 90-year supply of recoverable natural gas. To remain competitive we need access to this resource base, which will help fuel our economic recovery and create thousands of jobs.

While I appreciate the opportunity to talk about this issue today, I am hopeful, Madam Chairman, that you will begin to schedule hearings on other issues, especially those concerning infrastructure. As I've said repeatedly, building highways and bridges can provide an immediate economic stimulus and create thousands of new jobs.

This is our first hearing in 2010. We know enough about climate change and cap-and-trade to put them aside—we know cap-and-trade means fewer jobs and higher energy prices. So let's focus instead on advancing issues that will put people back to work and get our economy moving again.

Senator SANDERS. Thank you, Senator Inhofe.

We are very pleased to have with us our former colleague and Secretary of the Interior, Ken Salazar.

Mr. Secretary, thanks for being with us.

STATEMENT OF HON. KEN SALAZAR, SECRETARY, U.S. DEPARTMENT OF THE INTERIOR

Mr. SALAZAR. Thank you very much, Chairman Sanders. And thank you to my good friends, Senator Inhofe and Bond and Senator Lautenberg. It is good to see you all here this morning.

Let me say at the outset, from day 1, the President's priority with respect to coming up with a comprehensive energy and climate change legislation has not changed. We believe we need to have that framework for the long term. We understand that there is still a lot of work to be done, and obviously our hope is that we will get to bipartisan legislation that will address these issues. Our impetus for getting to that kind of framework is simple and clear: we want to create millions of jobs here in America; we want to get us to energy independence as a Nation; and we want to protect our children and our planet from the dangers of pollution.

Now, how we move forward and address the issue of energy is obviously a complex matter, and I believe, as all of you heard President Obama last night in his presentation, he spoke to the Nation in the State of the Union about the importance of a broad array in the portfolio of energy that we must address, and in that portfolio of energy one of the things that we are focused on is what we can do with respect to solar energy development, and it is in that context, Chairman Sanders, that I very much appreciate your giv-

ing us the opportunity to put the spotlight on the potential on solar energy for our country.

Let me say that as the Secretary of the Department of the Interior, I have the important responsibility to be the protector of America's natural resources and America's heritage, and I work on that very hard every day. As we look at how we protect America's resources, part of it is development, including the development of our oil and gas resources and other resource that we have but also our opportunity to use 20 percent of the land mass that we have in the United States of America to develop renewable energy. And how we develop solar energy on the public lands really is what I would like to spend some time speaking with this committee this morning, today.

If I may, Chairman Sanders, at this point, I would ask the Chairman and the committee consent to have Bob Abbey, the Director of the Bureau of Land Management, join me at the table.

Senator SANDERS. Without objection.

Mr. SALAZAR. Bob Abbey, by the way, is the Director of the Bureau of Land Management, and he oversees 250 million-plus acres of public lands where many of these facilities will be located. Thank you, Bob.

Let me say that we have over the last year been working hard to stand up renewable energy on our public lands, and today, at the beginning of 2010, I can report to you that we have 128 applications for solar energy facilities on our public lands. These applications, if they were to be brought to fruition, would generate some 77,000 megawatts of power; they would cover an area that would be a very significant area within our public lands. In addition to solar energy applications, we 95 pending geothermal energy applications; we have 24 pending wind project applications on our public lands.

With respect to solar energy, we believe that there are 23 million acres on our public lands which are highly suitable for solar energy production. This last year we set aside, through an order which I executed, 1,000 square miles of that land for a programmatic environmental impact statement because what we want to do is we want to stand up these renewable energy projects in the right places. We don't believe that we ought to put these renewable projects everywhere, and I am sure if Senator Alexander were here he would remind us that there are important landscapes that we need to protect, as well as Senator Feinstein, who has been very instrumental in helping guide us on this issue.

Let me say that at this point we are moving forward with a set of applications which we are fast tracking for permit approval, and by the time that we get to December of this year, 2010, we hope to have permitted 13 commercial scale solar energy projects which will have the capacity of producing 4,500 megawatts of power by the time that they are built out.

When you compare 4,500 megawatts of power in terms of just a generic comparison to coal, that would be the equivalent of about 15 mid-sized coal-fired power plants. We also believe, as the President said last night, that we have a future for clean coal technology and are deploying significant resources in the development of clean coal.

But looking at just solar energy alone, by the end of this year, our hope is that we will have permitted 4,500 megawatts of solar energy power.

Those projects as they are built will, in our estimation, create over 40,000 jobs here in America. That is 40,000 jobs in the construction of these solar energy facilities that will help us move our way toward energy independence, that will help us create jobs here at home, and that will help us deal with the dangers of pollution.

Besides the solar energy projects which we are fast tracking in the States of Arizona, California, and Nevada—it is in those States that we accumulate the projects to the 4,500 megawatts of power—we also are fast tracking applications for transmission because we know that we must find a way of taking the energy from the place that it is produced to the place where it is going to be consumed. So we have applications for about 5,000 miles of transmission lines on public lands and we are fast tracking those applications as well.

So let me just conclude, Mr. Chairman, by saying that we very much appreciate your and this committee's putting the spotlight on solar energy as one item in the portfolio of renewable energies and other energies that we believe very strongly will be a part of this Nation's future.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Salazar follows:]

STATEMENT OF KEN SALAZAR
SECRETARY OF THE INTERIOR
ON
DEPLOYMENT OF SOLAR TECHNOLOGY ON THE PUBLIC LANDS
JOINT HEARING BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
AND ITS
SUBCOMMITTEE ON GREEN JOBS AND THE NEW ECONOMY
UNITED STATES SENATE

January 28, 2010

Chairmen Boxer and Sanders, Ranking Members Inhofe and Bond, and Members of the Committee, I am pleased to appear before you today to discuss deployment of solar technology on the public lands and the Department of the Interior's role in building a new energy future. Thank you for giving me the opportunity to speak with you about these important issues.

A New Energy Future

During the first year of his Administration, President Obama has led the United States toward a clean energy future. A primary reason for delivering this change is that the United States cannot afford to fall behind in the energy technologies that will shape this century. We spend hundreds of billions of dollars each year on imported oil – our oil dependence poses risks to our national security.

I see many reasons for hope. Renewable energy development is one of President Obama's highest priorities, and the United States has come far in development of renewable resources this past year under the President's leadership. As the President mentioned just last week in Ohio,

new jobs are being created and many more are coming in the clean energy sector. And I know that America's abundant natural resources will help us rise to meet the challenges we face.

The great promise of solar energy and other renewable resources has led us at the Department of the Interior to change how we do business. For the first time ever, environmentally responsible renewable energy development is a priority at this Department. Until now, our deserts, plains, forests, and oceans have been largely unexplored for their vast clean energy potential.

The possibilities are immense, and the opportunities are great. The Department oversees 20 percent of the Nation's lands and 1.7 billion offshore acres. The Department of Energy's National Renewable Energy Lab estimates the wind potential off the East Coast of the United States in the Atlantic Ocean to be more than 1,000 gigawatts, greater than our entire national electricity demand. Turbines are already springing up to capture the energy of the wind that blows so hard across the Great Plains. We have huge solar potential in the deserts of the Southwest containing an estimated 2,300 gigawatts of energy capacity, not far from the great cities of Los Angeles, Las Vegas, and Phoenix. Geothermal energy opportunities are bubbling up across the country. We have great opportunities to increase hydropower production through improvements in efficiency, by adding power generation units to existing facilities, and through pumped storage.

During the past year, we offered new areas for oil and gas development, but instituted reforms to ensure we are offering leases in the right places and in the right way. Importantly, and relevant to today's hearing, we have also opened the new renewable energy frontier – not just for solar

power, but also for wind, geothermal, and hydropower – on America's lands and waters that will help power our clean energy economy.

As we open this new energy frontier, new development and new technology deployment on public lands will help solve key challenges in reliability, storage, and transmission of renewable energy and ultimately could mean lower costs to the private market in meeting energy demands.

The Promise of Solar Energy

Solar energy is the most widely available source of energy on earth.

There are two ways that solar energy can be converted to electricity. The first, known as "concentrated solar thermal," uses the sun to heat fluid, producing steam that is used to power an electric generator. This technology generally uses mirrors arranged in an array that concentrates the sun's rays to heat the fluid, and is often used for large, utility-scale projects. The second system uses photovoltaic cells – what most would identify as solar panels – that are made of special materials that change sunlight directly into electricity. Because of this property, they are available for many different uses, such as powering calculators and lights; small arrays can power a home; and large arrays make up large power plants. New and more efficient generations of these cells are being developed. It is a truly exciting technology that holds much promise.

The amount of sun available for the creation of solar energy depends on several variables, including the time of day, time of year, and the location. The Department manages a significant amount of the public land in the southwestern United States, and because of the amount of

sunlight that region receives it is an ideal location for the development of solar energy on a utility-level scale.

I mentioned that we cannot afford to fall behind. Over the past year, as we have worked to make the President's vision a reality, there has been much discussion in the media about the development of these technologies in other nations. We have heard that China is now the world leader in the manufacture of solar panels and wind turbines, and it has targeted the development of renewable and low-carbon energy as a priority. A number of European countries, including Spain and Germany, have developed aggressive policies that have led to expanded development of renewable, specifically solar, energy.

The Department's vast land ownership and the breadth of our management responsibilities over those lands has put us in a unique, and important, role with regard to the domestic development and transmission of solar energy. The possibility of capturing the sun's abundant energy and making it usable as a clean, non-polluting source of power; the potential of American ingenuity to drive more efficient applications; and the promise of additional jobs for the new energy economy are ensuring that we at the Department are moving quickly to responsibly develop this tremendous energy potential on our public lands.

DOI's Role in the Development of Solar and Renewable Energy

Renewable energy was the subject of my first Secretarial Order, back in March 2009. That Order made facilitating the production, development, and delivery of renewable energy, including solar energy, on public lands and the Outer Continental Shelf top priorities at the

Department. I have pledged that these goals will be accomplished in a manner that does not ignore, but protects our signature landscapes, natural resources, wildlife, and cultural resources.

I believe that actions speak louder than words.

We are redoubling our efforts to evaluate existing applications for renewable energy projects, including solar projects. The BLM is currently processing approximately:

- 128 applications for utility-scale solar projects that involve approximately 77,000 megawatts and 1.2 million acres of public land;
- 95 geothermal energy drilling applications;
- 257 applications for wind testing rights-of-way; and
- 24 applications for wind energy projects.

We have opened Renewable Energy Coordination Offices in California, Nevada, Wyoming and Arizona and established teams in six other states—Colorado, Idaho, Montana, New Mexico, Oregon/Washington and Utah—that are charged with expediting the required reviews of ready-to-go solar, wind, geothermal, and biomass projects and supporting the prompt permitting of appropriate transmission-related projects on our public lands.

We worked with the Federal Energy Regulatory Commission to develop and enter into a Memorandum of Understanding that resolved jurisdictional concerns that had resulted in the delay of renewable energy projects on the OCS. We have also put in place long-awaited offshore renewable energy rules, creating the first-ever framework for offshore renewable energy

development, which we expect to result in the development of significant offshore wind energy potential. We subsequently awarded four exploratory leases for wind energy production on the OCS offshore of New Jersey and Delaware.

Finally, just last month I announced that the Minerals Management Service will establish an Atlantic renewable energy regional office this year – this will be the first federal office specifically supporting renewable energy development on the OCS. I have invited the governors of Atlantic coast states that are considering the development of offshore wind energy projects to meet at Interior Headquarters next month to explore how to support and coordinate the development of this new industry. As the Department explores the potential for renewable energy in offshore areas, wind energy production in the Atlantic offers great promise and this meeting will allow us to exchange ideas and chart a coordinated path forward to advance further, appropriate development of the resource.

These and other accomplishments are moving us toward increased production and use of renewable energy and our goals of reduced dependence on oil and curbing greenhouse gas emissions.

Specifically with regard to solar energy, I have visited solar energy projects in both the East and the West, and met with the employees of innovative clean energy sector companies making necessary components like next-generation thin-film solar photovoltaic modules. We, along with these entrepreneurs, are ensuring that solar development remains at the forefront of the clean, renewable energy frontier.

Over the past year we have worked diligently to prioritize the development of renewable energy on our public lands and our offshore waters and, as a result last June 1, along with Senate Majority Leader Harry Reid, announced the identification of 1,000 square miles, 24 tracts of Bureau of Land Management-administered land, in the West as Solar Energy Study Areas. We are fully evaluating these areas for their suitability – from both an environmental and resource perspective – for the large-scale production of electricity from solar energy.

And, along with DOE, we are preparing a Solar Energy Development Programmatic Environmental Impact Statement, due for public release in late 2010, that provides a landscape-scale plan for siting solar energy projects on our public lands in the Southwest that have been identified as having the best potential for utility-scale solar energy development. The BLM has identified approximately 23 million acres with solar energy potential, including the 24 Solar Energy Study Areas, which are being reviewed as part of this process to evaluate the environmental suitability of solar energy development across the West. The Solar Energy Study Areas alone have the technical potential to generate nearly 100,000 megawatts of solar electricity, enough to power millions of American homes. The public comment period on these solar study areas closed in September 2009, and we are evaluating the comments we received.

We believe that landscape-scale planning and zoning for solar projects on our public lands will provide a more efficient process for permitting and siting of this type of development.

To further make our goals a reality, we have announced 34 "fast track" renewable energy projects. Fast-track projects are those where the companies involved have made sufficient

progress in the environmental review and permitting process that they could potentially be cleared for approval by December 2010, thus making them eligible for economic stimulus funding under the American Recovery and Reinvestment Act of 2009.

Fourteen of the 34 fast-tracked projects are solar energy projects. These include several different types of concentrated solar thermal technologies – like solar engine, parabolic trough, and power tower – and photovoltaic cells, and are located in Arizona, California and Nevada. All are currently undergoing detailed environmental impact reviews, and if ultimately approved, some 5,000-6,000 megawatts of new capacity, in California, Arizona, and Nevada, could be permitted for construction by the end of this year. Moreover, our analysis indicates that tens of thousands of jobs could be created in the development of these projects alone.

In this same vein, California Governor Schwarzenegger and I announced last fall a Memorandum of Understanding between the State and the Department that will expedite the process of siting, reviewing, approving and permitting renewable energy projects on Department-managed lands in California.

Finally, we must recognize that the development of transmission capacity for this new energy production is a crucial element. Developing solar and other renewable energy resources, which are often located in remote areas, will require new transmission capacity to bring this clean energy to the population centers where it is needed. The Department has already identified and designated more than 5,000 miles of transmission corridors on the lands it manages to facilitate the siting and permitting of transmission lines in the right ways and in the right places, and we

are processing more than 30 applications for major transmission corridor rights-of-way on the lands we manage, with 7 applications in Idaho, California and Nevada that could add more than 1,000 miles of new transmission, on the "fast track" to potential permitting this year.

The Obama Administration also continues to cut through bureaucratic barriers. In October 2009 the Administration announced that nine federal agencies, including the Department, had signed a Memorandum of Understanding designed to expedite the siting and permitting of electric transmission projects on federal lands. This agreement commits the participating agencies to close coordination and a number of procedures to improve the federal process under existing authorities, including establishing a single point of contact for all required federal authorizations.

Conclusion

Renewable energy development presents tremendous opportunity, but meeting the potential of that opportunity requires tremendous work. I am proud of the work already underway at the Department of the Interior, and I look forward to continuing this work as it bears fruit. Thank you.

Environment and Public Works Committee Hearing
January 28, 2010
Follow-Up Questions for Written Submission
Questions for Secretary Salazar

Chairman Boxer

1. Your testimony states that "a primary reason" for creating a clean energy industry is that our nation "cannot afford to fall behind in the energy technologies that will shape this century." I believe that our nation must use its technological expertise and American ingenuity to lead the world in clean energy industries, including solar power. Could you describe how people here in America will benefit if we focus on building these industries?

Answer: Renewable energy development is one of President Obama's highest priorities, and the United States has come far in advancing this priority during the past year and a half under the President's leadership. There are tremendous benefits to the American public as we move toward our goal of standing up solar and wind projects and increasing geothermal development and small scale hydroelectric development on public lands and waters. Solar energy is the most widely available source of energy on earth, and developing it and other clean, renewable energy sources would help to diversify our energy supply and move us away from our current overreliance on fossil fuels. Building these industries also means jobs and other direct benefits to the economy. Finally, as we realize our goal of increased renewable energy development, we will also address greenhouse gas emissions and climate change.

2. You have told the Committee that the Department of Interior is working to help develop solar projects that could provide tens of thousands of jobs. Can you please describe the types of jobs that these projects would create?

Answer: The Department, through the Bureau of Land Management, is reviewing 34 "fast track" renewable energy projects in California, Nevada, and Arizona that include 14 solar energy projects with a potential capacity of nearly 6,500 MW. In recent months 9 of these solar projects have been approved. The construction of large-scale projects like these will create tens of thousands of jobs here at home and move us toward energy independence. Moreover, we have stated before that it is important for the raw materials used to manufacture clean energy technologies to be produced here, domestically, when possible and economically feasible. In addition to solar energy projects, we have reviewed 7 wind energy projects with a potential capacity of about 800 MW and 6 geothermal projects with a potential capacity of 285 MW. Three fast-tracked transmission projects traversing over 500 miles of BLM-administered lands have been approved. Another transmission project would traverse 58 miles of BLM-administered lands. These projects will also provide jobs here at home. For example, we

estimate that the Cape Wind project off the coast of Massachusetts will provide hundreds of construction jobs, as well as long term maintenance positions after construction, in addition to being one of the largest greenhouse gas reduction initiatives in the nation.

Senator Sanders

1. I worked on a provision included in the Energy Committee's American Clean Energy Leadership Act (ACELA), S. 1462 sec. 365 that supports development of renewable energy such as solar on brownfield sites. Do you believe there is potential to use brownfield sites to support renewable energy development, providing a win-win by productively redeveloping the land and promoting sustainable energy development at the same time?

Answer: Yes, there is certainly potential for brownfield sites to support renewable energy development in many instances, and we are actively pursuing such opportunities. The BLM funded the Arizona Restoration Design Project with ARRA funds to analyze previously disturbed lands in Arizona that may have potential for siting of renewable energy projects. This project has the potential to be used as a model in other States for reviewing previously disturbed lands. Also, the BLM is collaborating with the EPA on the EPA Repowering America initiative that is reviewing brownfield sites for renewable energy development. As we discussed at the hearing, while our focus at the Department has been on efforts on public lands, as these technologies advance, becoming more efficient and cost-effective, they will foster many more innovative residential and commercial scale uses.

2. As the National Park Service is the steward of our nation's historic properties, what is the National Park Service and the Department of Interior doing to facilitate appropriate development of sustainable energy at historic properties?

Answer: As the Department works to implement the President's vision of a new energy future through prioritized development of renewable energy on public lands and offshore waters, we are also working to reduce our carbon footprint here at home throughout the Department and its bureaus. In the National Park Service, the Facility Maintenance program is a leader in promoting energy efficiency and using renewable energy technologies and recycled products. The NPS has used Recovery Act funds for projects to increase annual energy and water savings through increased building insulation, improved window systems, upgraded water, heating, cooling, and electrical systems, and through the installation of solar arrays at some locations. Through the National Center for Preservation Technology and Training, the NPS equips preservation professionals with progressive technology-based research and training, including presenting training classes and workshops on assessing the energy performance of historic structures through thermal imaging.

Senator Inhofe

1. A 2008 ICF study found that the development of America's domestic oil and natural gas resources that had been kept off-limits by Congress for decades, could generate more than $1.7 trillion in government revenue, create 114,000 to 161,000 new jobs by 2030 and enhance the nation's energy security by significantly boosting domestic production. Do you agree with these findings that increasing domestic production of oil and gas in an environmentally sustainable way on federal lands could increase jobs, decrease our debt, and increase our national security?

Answer: Under President Obama's leadership this Administration has been developing and implementing a broad new energy strategy, one that includes not only development of conventional resources but clean energy sources as well. As the President has said, the intent of this strategy is to move us from an economy that runs on fossil fuels and foreign oil to one based on home grown fuels and clean energy.

2. I was disappointed to learn that in 2009, revenues from oil and gas leases collapsed by more than 90 percent in 2009 and leasing acreage plunged. While I believe you have indicated that oil production did go up in 2009 over 2008, it doesn't appear that this increase was a result of the administration's stance on leasing. This production increase was the result of investments made by companies on acreage it leased under previous administrations. What are your plans to increase acreage offered for production this year?

Answer: The relative lack of interest by industry in leased lands in 2009 was largely a function of the economic times and comparatively low oil and gas prices, not a result of specific Administration policies. The Department has offered new areas for oil and gas development, but has instituted reforms to ensure that we are offering leases in the right places and in the right way.

The Administration is carrying out a balanced, coordinated, proactive, and historic energy strategy. The President is leading the United States toward a clean energy future through implementation of a comprehensive energy plan. We are prioritizing development of renewable energy resources because such development is central to our goal to reduce greenhouse gas emissions, mitigate climate change, and protect the global environment. Renewable energy is also vital to our economic development and energy independence, and development of these resources on our public lands and waters will create jobs and promote innovation while reducing our dependence on fossil fuels. We cannot afford to fall behind in the energy technologies that will shape this century.

3. You recently announced that after a drawn out 9 year permitting saga, a decision on the approval of the Cape Wind project will finally be coming by April. Given the extensive permitting delays of renewable projects around the country such as Cape Wind, should we be expecting similar delays and inability to permit future projects?

Answer: We believe we have made significant progress since the Administration took office in putting in place the building blocks for a robust renewable energy program on the Outer Continental Shelf (OCS). Cape Wind Associates filed an application with the Department for their proposed project in 2005. On April 28, 2010, only 15 months after President Obama took office, Secretary Salazar issued a Record of Decision for the project, describing his decision to issue the Department's first commercial offshore wind lease to CWA. This will be a historic project, the first wind development on the OCS. It will occupy a 25-square-mile section of Nantucket Sound, and the decision to issue the lease involved myriad interests and issues. The testimony presented at this hearing detailed the reforms we have made and accomplishments we have realized as we move the country toward increased production and use of renewable energy and our goals of reduced dependence on oil and curbing greenhouse gas emissions. The most significant of these accomplishments for offshore wind development was the April 2009 publication of an offshore renewable energy regulatory framework. This framework establishes a program to grant leases, easements, and rights-of-way for orderly, safe, and environmentally responsible renewable energy development activities, and provides regulatory certainty for future offshore developers.

4. You testified that the Department of the Interior is fast tracking applications for solar energy development on public lands. How many project applications are being fast tracked? In what states are the project applications that are being fast-tracked? How many of those applications are for projects that use concentrated solar power (CSP) technology? Of those CSP, how many of them will use wet-cooling technology?

Answer: The Bureau of Land Management is currently reviewing 34 "fast track" renewable energy projects in California, Nevada, and Arizona that include 14 solar energy projects with a potential capacity of nearly 6,500 MW of electricity. In recent months 9 of these solar projects have been approved. Through the "fast track" process, the BLM is conducting full environmental analysis and public participation while focusing staff and resources on the most promising renewable energy projects. Ten of these projects use concentrated solar technology, including 3 projects that use some form of wet-cooling technology. In addition to these solar projects, we have reviewed 7 wind energy projects with a potential capacity of about 800 MW and 6 geothermal projects with a potential capacity of 285 MW. Three fast-tracked transmission projects traversing over 500 miles of BLM-administered lands have been approved. Another transmission project would traverse 58 miles of BLM-administered lands.

5. It appears there is a concentration of CSP planned for the southwest, a region of the country with water constraints. This concentration of CSP in the southwest has raised questions about whether, and how, to invest in large-scale deployment of CSP. In your opinion should the federal government continue to incentivize the deployment of CSP, if that CSP will be sited in water constrained locations? Why or why not? Is water use a concern to you and the Department in any of the applications currently being fast tracked?

Answer: As noted in the response to the previous question, 3 of the "fast track" projects that BLM is reviewing employ some form of wet-cooling technology. The impact of these types of projects on water resources is one of the variables that the BLM and the States have been reviewing in the ongoing environmental analyses. Recognizing that all energy projects require the use of some water, the goal as these projects move forward is to balance the interest in conserving and protecting the states' water resources with promoting clean, renewable solar energy.

6. Is the Department of the Interior considering the cumulative impact of installing numerous CSP plants on the water resources of the Southwest? What affirmative steps is the Department taking to ensure that negative cumulative impacts are prevented and/or mitigated?

Answer: As noted in the previous response, the impact of these types of projects on water resources is one of the variables that the BLM and the States have been reviewing in the ongoing environmental analyses. The goal, as these projects move forward, is to balance the interest in conserving and protecting the states' water resources with promoting clean, renewable solar energy.

7. How is water use factored in to the application approval process for renewable energy projects?

Answer: As noted above, the impact of these types of projects on water resources is one of the variables that the BLM and the States have been reviewing in the ongoing environmental analyses. The goal, as these projects move forward, is to balance the interest in conserving and protecting the states' water resources with promoting clean, renewable solar energy.

Senator Vitter

1. Oil and gas production is up in 2010, and your office has attempted to take credit for that in your public response to API President Jack Gerard (particularly in direct statements made by Interior spokeswoman Kendra Barkoff). However, production is up because of investments and efforts that the oil and gas industry has made in leases issued in prior years and under previous administrations. Please explain how leases issued since you have been Secretary of Interior (since 2009) somehow began producing oil and gas in less than a year and managed to increase domestic production? What technologies were used to make this happen?

Answer: As noted in the testimony for this hearing, the Department oversees 20 percent of the Nation's lands and 1.7 billion offshore acres. We have offered new areas for oil and gas development, but we have changed the direction of oil and gas development by instituting reforms to ensure we are offering leases in the right places and in the right way. Based on lessons learned from the Deepwater Horizon oil spill, the Department has raised the bar in the drilling and production stages for equipment, safety, environmental safeguards, and oversight. Onshore, our reforms have restored common sense, order, and certainty to the Bureau of Land Management's leasing process, including bringing public engagement, environmental analysis, and smart planning into the leasing process from the start. We have also opened the new renewable energy frontier – not just for solar power, but also for wind, geothermal, and hydropower – on America's lands and waters that will help power the clean energy economy.

2. How do you see the Commerce Department's "Framework for Effective Coastal and Marine Spatial Planning" impacting domestic production? What areas of the OCS is NOAA planning on zoning out of production? What draft plans have been shared with Interior thus far on Marine Spatial Planning?

Answer: In June 2009, the President established the Interagency Ocean Policy Task Force to develop a national policy for the oceans, our coasts and the Great Lakes. On July 19, 2010, President Obama signed an Executive Order establishing this national policy and adopting the *Final Recommendations of the Interagency Ocean Policy Task Force*. The *Final* Recommendations document, which includes the Framework for Effective Coastal and Marine Spatial Planning, was developed by and will be implemented by all relevant federal agencies including DOI, not just the Department of Commerce. With competing interests in the oceans, our coasts, and the Great Lakes, coastal and marine spatial planning offers a comprehensive, integrated approach to planning and managing uses and activities over the long term. It is not intended to direct any particular outcome for any individual activity. With an emphasis on science-based decision-making and stakeholder and public participation, the framework for coastal and marine spatial planning seeks to improve the coordination of ocean and coastal

management at all levels of government, restore the health of the resources, enhance the ocean and coastal economies and promote sustainable uses and access.

3. Please explain how each of these policies have increased domestic production, created jobs and decreased our dependence on foreign oil:

a. **Extending the comment period for the 2010-2015 planning area and then taking no additional action.**
b. **Not releasing to the public the number of Americans that have commented for or against developing more areas offshore.**
c. **Delaying the process for issuing a second round of oil-shale research leases for development in Colorado.**
d. **In November 2009 taking unilateral action to shorten the lease terms of an upcoming Central Gulf of Mexico lease sale.**
e. **Failing to move forward with studies necessary to proceed for Lease Sale 220.**

Answer: The Administration is carrying out a coordinated, proactive, and historic energy strategy. The President has led the United States toward a clean energy future through implementation of a comprehensive energy plan. A primary reason for this change is that we cannot afford to fall behind in the energy technologies that will shape this century. We spend hundreds of billions of dollars every year on imported oil and this must change. The Department has offered new areas for oil and gas development, but has instituted reforms to ensure that we are offering leases in the right places and in the right way.

We are also developing renewable energy resources, an effort that is central to our goal to reduce greenhouse gas emissions, mitigate climate change, and protect the global environment. Renewable energy is also vital to our economic development and energy independence, and development of these resources on our public lands and waters will create jobs and promote innovation while reducing our dependence on fossil fuels.

4. Please explain how the litany of new tax proposals on oil and gas production in the FY 2011 budget will increase domestic production, make domestic production more competitive and help small producers compete?

Answer: The Administration believes in encouraging sustainable domestic oil and gas production while ensuring a fair return to taxpayers. Recent GAO reports suggest that taxpayers could be receiving a better return from Federal oil and gas resources. The President's budget includes a number of proposals that will help achieve these goals, including royalty reforms and a new fee on nonproducing leases that will encourage companies to either get leases into production or relinquish them so that these resources can be developed by other parties. Collectively, these proposals increase the return on Federal mineral resources.

5. Please provide the total number and difference in bonus bid revenue from the years 2008 and 2009. How does the fall in revenue impact Interior's budget?

Answer: Bonus bid revenue collected and retained by the United States is deposited in the miscellaneous receipts account in the U.S. Treasury and is not a part of the Department's budget. Federal [onshore] oil production increased 14 percent in fiscal year 2009, with onshore oil and gas rents and bonuses totaling $455 million, compared to $247 million in FY 2008. Offshore on the OCS, $1.3 billion was collected in FY 2009, compared to $9.6 billion in FY 2008. The record OCS bonuses received in FY 2008 came from several large lease sales that were held at a time when oil and gas prices had spiked to very high levels. FY 2009 bonus bid receipts represented a return to more typical collection levels.

6. Please provide the total number and difference between OCS lease sale revenues between 2008 and 2009. How does this fall in revenue impact Interior's budget and how will the fall in revenue impact state revenue sharing under GOMESA?

Answer: As noted in the response to the previous question, $1.3 billion was collected in FY 2009 and $9.6 billion in 2008 from OCS rents and bonuses. Under the provisions of the Gulf of Mexico Energy Security Act (GOMESA), only "qualified" OCS revenues (including bonus bids, rentals and production royalty) are shared among the four recipient Gulf States and their coastal political subdivisions. The first payments under GOMESA began in FY 2009 (from revenues collected in FY 2008). In FY 2009, $25 million in OCS revenues were shared with the Gulf States under the terms of GOMESA. In FY 2010, $2.7 million in OCS revenues were shared with the Gulf States under GOMESA from revenues collected in FY 2009. The difference is a result of bonus bids from a lease sale held in 2008 in which significant leased acreage subject to the GOMESA revenue sharing terms was included. No similar sales were held in 2009.

7. Can you explain exactly how you see your reforms increasing certainty for the oil and gas industry in regards to process and reducing conflicts? What percent of lease sales on public lands are currently being challenged by NGOs?

Answer: The Department's reforms will result in better public participation and environmental documentation, reducing the number of protests filed and resolving potential protest issues prior to lease sales. The lack of effort to carefully guide this process during the last Administration led to a situation where about 50 percent of leases ended up in litigation.

8. On January 26, 2010 your Interior Department put out a press release stating "Secretary Salazar Announces Additional Steps to Assist Central Valley Project Water Users", In this release your office claimed that 350,000 to 400,000 acre-feet of water will be made available for West Side farmers by March 1, the beginning of the contract water year. Your office further claimed that "This assured water supply is being provided due to

two significant actions taken by the Bureau of Reclamation." Please answer the following questions in regards to these statements:

a. **Please explain how this water allocation you claimed credit for did not already "legally" belong to growers?**
b. **Explain how your office came to the conclusion that this water was not saved from last year's grower allocations, and is not deliverable under existing Warren Act contract entitlements?**
c. **Was it inappropriate for Interior to give the false impression an additional 350,000 to 400,000 acre-feet would be available on March 1?**

Answer: In response to question (a), the Department's January 26 news release announced the rescheduled delivery of water from the 2009 water year to the 2010 water year. The announcement did not address the legal ownership of the water. The rescheduling and eventual delivery of the water, however, was made possible through the use of Federal infrastructure, specifically storage space available in the joint Federal/state owned San Luis Reservoir, the Federal C.W. "Bill" Jones pumping plant, the Federal Delta-Mendota Canal, and appurtenant conveyance components of the San Luis Unit of the Federal Central Valley Project. In response to question (b), and as stated above, the water was indeed rescheduled from the 2009 water year pursuant to Warren Act contracts, as referenced in paragraph four of the news release. The term "entitlement" does not apply to Warren Act arrangements. In response to question (c), the Department does not believe the news release contained misleading information or false information.

9. Did either you or Deputy Secretary David Hayes have a conversation prior to the January 26 press release in which you indicated to John Boren that this would be "additional" water, and not water already saved from the prior year's allocations?

Answer: As noted in the response to the previous question, the Department's decision, announced on January 26, was that the water was rescheduled from the 2009 water year pursuant to Warren Act contracts.

Senator SANDERS. Thank you, Mr. Secretary, and thank you for your very exciting work that you are doing.

Let me begin. The last time you were before this committee I believe you mentioned that you thought that solar thermal itself, concentrated solar, could provide something like 29 percent of the electrical needs of households throughout this country. Is that something that you—can you say a word about the potential of solar thermal in the Southwest and its capability both in producing electricity and creating jobs?

Mr. SALAZAR. Mr. Chairman, we do believe that the solar potential, if we can realize the full solar potential, can provide that kind of energy for the entire energy demand of the Nation. How much of that will come from concentrated solar versus other kinds of technologies is something that the industry can speak to. The fact is the projects that we are permitting on public lands now use both technologies, they use the concentrate solar technology as well as the photovoltaic technology, and there is great technology progress that is being made with respect to capturing the sun.

Senator SANDERS. I hope everybody understands what the Secretary is saying. What he is saying that over a period of time we can produce 30 percent of the electricity that homes in America need from solar. What an extraordinary development that will be.

Mr. Secretary, talk for a moment, in your judgment, about the future of solar. We have seen that in recent years the cost of photovoltaic panels, for example, have gone down very substantially. Do you see a time in the near future when the creation of solar energy will be competitive with the more conventional technologies?

Mr. SALAZAR. Mr. Chairman, as I have visited the National Renewable Energy Lab in Colorado probably now a half-dozen times, I have watched how the technology is evolving there, as well as having visited a number of solar manufacturing places around the country, I think that there is great interest, and there is great capacity that is emerging to build solar products and to build them here in America. I think the fact that we have, just within our public land portfolio—this is not dealing with private lands in America—128 applications for major solar facilities by itself should send a strong and clear message that there is great interest in developing these solar energy facilities.

And I would add, Mr. Chairman, that it is not pie-in-the-sky stuff. As I have traveled, as I know you have, Mr. Chairman, to different places in California, I can go to a place where I can show you a solar energy facility that is already generating several hundred megawatts of power. So we have the technology. What we need to do is have the policies in place over the long term so that we don't have the mistakes of the past repeated, which are fits and starts with respect to our energy policy.

Senator SANDERS. In that light, we are, with Senator Lautenberg and others, going to be introducing legislation which would call for incentives and tax credits for 10 million rooftops in this country to be able to have solar. What do you think about that?

Mr. SALAZAR. I think there is a potential for solar at all levels. There is a potential for solar with respect to residential applications; potential for solar with respect to small commercial scale applications, as well as large utility scale applications. The ones that

we are talking about on these public lands are some of the larger facilities which would generate up to 350 megawatts of power. That is a very huge utility facility.

But you also, as Senator Lautenberg spoke about what they have done in New Jersey, including at the stadium, the facilities in New Jersey, where you have solar energy already connected there, you can see how solar energy has a national application; it is not an application that is just suited just for the Southwest.

Senator SANDERS. No, that is exactly right. Not only is it not just for the Southwest, it is going to work in New England as well. We have a large National Guard base in the Burlington, Vermont, area. They are going to be installing a whole lot of solar to try to make that base as energy independent as possible. We are seeing solar going up in schools and businesses all over the State of Vermont. Senator Lautenberg mentioned New Jersey as being one of the leaders. So I think people have to understand this is not just in the sun States; this is applicable, more or less, in every region of our country.

Can you give us a projection, Mr. Secretary, in terms of what you see the potential of job creation in solar? Where do you see jobs going as we expand solar technology?

Mr. SALAZAR. I think the potential is immense, and I think it is not at all an understatement for us to talk about hundreds and thousands of jobs and, in fact, millions of jobs if we can move forward with a clean energy economy, which the President is so committed to making happen. And we are making that happen, and I think the demonstration for us lies in these applications that are we processing.

Yes, while we have more than 100 applications, there are about 15 of those that we are fast tracking, and those ones that we are fast tracking are projections through the Bureau of Land Management is that they will create over 40,000 jobs, and they will be permitted, our hope is, our fervent hope is that we will have those projects permitted by December of this year.

Senator SANDERS. OK, thank you.

Senator Lautenberg.

Senator LAUTENBERG. Thanks for your testimony. I can't help but think about some music that says that the environment is in the best of hands, and we thank you for presenting that kind of an attitude and the kind of suggestions that you have been making all along since you left the fold, so to speak. It is good to see you.

New Jersey now requires that, as I mentioned, 22.5 percent of its electricity must come from renewable sources by 2021. Since putting this requirement in place the number of solar installations in our State has grown from simply 6 to more than 4,000. Is that a national renewable standard that could develop across the country in that period of time?

Mr. SALAZAR. Senator Lautenberg, having been a supporter of a national renewable portfolio standard and as the President and the Administration have been supporters of moving forward with a national RES, that is one mechanism in which we have seen, at the State levels, significant progress being made with respect to a renewable energy portfolio. It is interesting to note that perhaps the place that has advanced the farthest is Texas, where one of the—

I think it was the first renewable energy portfolio standard that was passed for that particular State.

In my own home State of Colorado, Senator Lautenberg, our renewable energy portfolio, which was created by Citizens Initiative in the first place, was actually doubled because the utility companies 2 years out came back in and said that they could produce significantly more renewable energy than what had been planned in the Citizens Initiative.

So there is great potential in the way that you have done in New Jersey to do that across the country.

Senator LAUTENBERG. Your home State of Colorado leads the way in Government research into clean energy with its National Renewable Energy Lab. Has there been any effect on the local economy as a result of that in terms of job creation there and in terms of reductions in the use of fossil fuels?

Mr. SALAZAR. The answer is that the economic injection into Colorado is very evident and very obvious from the clean energy economy. In the last year, I have been to places like Pueblo, Colorado, and know about places in Brighton and others where just one wind energy company alone has built facilities for the manufacturing of wind turbines that will create thousands of jobs just from wind energy. And I have watched what has happened in what I call the forgotten America, the rural parts of the State of Colorado, where you have seen a new economy that has been created because of the new renewable energy installations that are going into these rural areas where they need an injection of additional economic wherewithal.

Senator LAUTENBERG. We hear a lot about the cost of passing a global warming bill, but the report by the former chief economist at The World Bank found that inaction on global warming could cost 10 times as much as transitioning to a clean energy economy. How could the unchecked global warming hurt the economy, and what dislocation might occur with job losses in the country if we don't pass a global warming bill?

Mr. SALAZAR. Senator Lautenberg, from the point of view of the Department of Interior, I see the impacts of climate change and the warming of the climate firsthand in the places that I have responsibility to manage on behalf of the American people. I see it in places such as the Apostle Islands in Lake Superior, where the temperatures there have already increased by 5 degrees from where they were 30 years ago. I see it in places such as the Glacier National Park, where our scientists have told us that the glaciers at Glacier National Park will be gone by the year 2020.

And for those who worry about water, which is a particular issue of great importance in the West, when you look at the Colorado River Basin that essentially is the underpinning of the great economies of California and Nevada and Arizona and Wyoming and New Mexico, Colorado, the seven States, Utah, the scientists are projecting a 20 percent decline in the water availability from the Colorado River Basin.

The consequence of that economically to each of those economies in those seven States would be huge. It would be huge in large part because of the complexity of how water is allocated along that river system, which I would be happy to discuss with you in further de-

tail. But just the impacts with respect to water supply would be huge, in the billions of dollars that would be affected to the economies just in the Southwest alone.

Senator LAUTENBERG. Thanks very much, Mr. Secretary.

Thanks, Mr. Chairman.

Senator SANDERS. Thank you, Senator.

Senator Alexander, do you have some questions?

Senator ALEXANDER. Thank you. I am sorry I missed the testimony; I was in a budget hearing.

I wanted to explore the question of subsidies and see if I could get, Mr. Secretary, from you or the other panelists some guidance about kind of subsidies for solar power and clean energy Congress—what kind of principles we ought to use when we fashion these subsidies, thinking specifically about solar technology.

My bias would be that for emerging technologies, that the subsidies should be technology neutral and temporary. But that has not been the case over the last several years. For example, a production tax credit was created in the early 1990s, which is often touted as a renewable energy tax credit, but basically it went for wind turbines. They were the only ones that really benefited from it, and it is a very generous subsidy. If you take the President's goal of making 20 percent of our electricity from wind, one calculation I did was figuring that it would cost the taxpayers about $170 billion over 10 years to subsidize that.

Solar energy got left out of those early years of the protection tax credit. I remember when I first came to the Senate, it was trying to get into the game and I was the sponsor of an early investment tax credit for solar energy. And then we are considering other policies such as renewable electricity standards which basically amount to a subsidy by narrowly defining certain types of energy and not other types of energy. For example, would geothermal be in or out, or will new hydroelectric power be in or out? So, in effect by requiring certain types of energy to be bought that is a subsidy for that energy. And then there are certain subsidies that utilities give called feed-in tariffs to subsidize other energy.

So as we think, particularly given the President's call last night and our own calls for having a limited amount of extra money over the next 5 or 10 years and wanting to see our country have more clean energy, how do we make—what principles should we follow in making these choices?

Mr. Secretary, I will start with you because you used to be here. We have an X amount of dollars we can put, say, into research and development to try to lower the cost of solar power, so it can be more competitive; or we can subsidize homeowners; or we can subsidize manufacturers. Which should we do, and how long should we do it? And especially what about the idea of having subsidies that are technology neutral so that we don't end up encouraging one form of carbon free electricity production, but leaving out another? What advice would you have for us about that?

Mr. SALAZAR. Thank you very much, Senator Alexander, and thank you for your leadership on these issues as well as your leadership in terms of making sure that we are protecting the landscapes of America as we move forward with renewable energy de-

velopment. We very much have enjoyed our work with you on that front.

Let me respond in several ways. First, I think that we ought to avoid the mistakes of the past, and the mistakes of the past have been that we have not had a legislative or regulatory framework with respect to renewable energy in place long enough to be able to get to a result. You saw the great growth, for example, that occurred with renewable energy, including solar energy, in the late 1970s. Then it was abandoned.

Now Germany and other countries, Spain, have essentially taken the lead in terms of moving forward because we haven't been there with a policy that has been in place long enough to be able to allow these new energy forms to get to the maturation point where they can stand on their own. So my first and most important piece of advice is that we need to have a long-term policy in place.

Senator ALEXANDER. While you are doing that, I forgot to mention in Germany there is some call to reduce or end some of the solar subsidies because they are in effect encouraging a high price, and Germans are buying Chinese solar panels, and it is not helping the German manufacturers. So if you could think about that in terms of your answer as well.

Mr. SALAZAR. I recognize that the trade issues and the costs of doing business are something that have to be addressed, but I also—and you will hear it from some of the companies who will testify—the technology that we are developing here is now allowing companies to be able to produce solar panels much cheaper today than they were 5 or 10 years ago, and we need to continue to support those companies as they search for ways of being able to produce solar panels in a way that is much more cost effective here.

The long-term set of incentives really are two options, or maybe three. One would be for us to move forward with a cap with respect to carbon emissions because a cap on carbon emissions at the end of the day will start driving the energy supply needs of this country to these less carbon emitting energy supplies. So that is one way of developing the long-term energy policy.

The second, which we have had many debates here in the U.S. Senate in the past, is whether we can move forward with a national renewable energy standard. Many of the States have done that; I think it is now over half of the States have done that, and they have been effective, whether it is Texas or Colorado or New York, they have moved forward with very significant renewable energy standards. The fourth point I would make in response to some of your comments and questions, with respect to neutrality on the different kinds of energy supplies, I think that is a very good point to make, because I do believe that there are some aspects of renewable energy that have been treated differently and have been placed at a disparity vis-à-vis others.

We, for example, believe that there is significant potential with respect to small hydro, and that would be harnessing the power that we already are seeing produced except not in the form of electrical generation, through pipelines that run under the streets of cities and through small dams that are already out there and simply don't have an electrical generator.

So I do think that there has to be—I think that when we look at the portfolio of renewable energies, I think the conversation and the consensus that I see here in Washington is, yes, everybody agrees on solar. Everybody agrees on wind in the right places with limitations to protect the landscapes. People will agree and may be a little more contentious with respect to some of the biofuels, but there are some other energies that are out there, including hydro, that I think that we need to be more neutral with respect to looking at those potential sources.

Senator ALEXANDER. Thank you, Mr. Chairman.

Senator SANDERS. Senator Barrasso is here; I am going to call on him in a second.

My hope is that because of the votes that are going to take place we can get to the second panel fairly soon.

Senator Barrasso.

Senator BARRASSO. Thank you very much, Mr. Chairman. And with your permission, Mr. Chairman, I would just like to introduce my statement for the record, so to not go through all of that.

Mr. Secretary, great to see you again. Enjoyed seeing you always. Welcome back to the Senate. I was encouraged by the President's comments last night about nuclear energy, about oil and gas, about different issues, and specifically with clean coal, which is so important in Wyoming. You have spoken about creating green jobs as a way to rescue our economy, and I support green jobs. We have wind turbines going up around our State, transmission lines continue to be an issue, but I have always believed that equally important to those green jobs are the red, white, and blue jobs that continue to power this country and will continue to do that for the next century.

Our Wyoming Department of Employment reports that employment in our oil and gas industry increased slightly in November, but we have lost thousands of jobs over the previous 14 months. Many families in the West, as you know, rely on oil and gas development for good paying jobs. I think you have characterized some of these families as kings of the world, and I have concerns about that. My constituents that work in the oil and gas industry are hard working men and women; many of them are small business owners or their employees. So I would encourage you to work together to find some common sense solutions that foster job growth and promote our energy security in not just the green jobs, but in the red, white, and blue jobs.

I have concerns that the Administration's oil and gas leasing reforms are only going to make it more difficult to get these jobs back on track. Governor Freudenthal, I know, was here recently to visit with you. He and I are of the opposite parties, but we both agree that the new requirements on oil and gas are burdensome, and he said in a letter to you that it puts a stranglehold on an already cumbersome process.

So the specifics of your proposed reforms, to me, remain unseen, but it creates greater uncertainty for development in Wyoming. When do you plan to make the specifics of these reforms available to the public? And I don't know if you have that ready on that yet, Mr. Secretary.

Mr. SALAZAR. Senator Barrasso, let me just say, first, that I very much appreciate the men and women who work in the oil fields, because they are real people whose families very much rely on oil and gas development. Indeed, I think when you look at the numbers, if you want to be objective about our efforts on oil and gas, we had a 14 percent increase in oil and gas from our public lands, both onshore and offshore, in 2009 over what they were in 2008. So I think the rhetoric that you frankly see not from the men and women in the oil fields, but I would say from the executives of some of the companies, I think is misplaced.

But having said that, I think the important thing is that we are trying to move forward with energy development, both onshore and offshore, in the right places, and wanting to make sure that the landscapes, such as some of the very beautiful ones you have in Wyoming, are in fact protected. There is an instruction memorandum that has gone out with respect to the oil and gas reforms on the ground, and I am going to have Director Abbey speak to those instruction memorandum, if I can, for just a couple of minutes to bring you up to date on what the process is.

Senator BARRASSO. Thank you.

Director Abbey.

Mr. ABBEY. Good morning, Mr. Chairman, Senator Barrasso. We have forwarded our draft memorandum to our field offices for their comments. We have received the field's comments this week. We are going through analysis of those comments. We do believe that there may be some minor modifications to what we have proposed in the draft. We do not believe that there will be any significant modifications required. Again, the intent of our new guidance to our field offices is to provide greater assurance to everyone that the parcels that are offered for lease are likely to be leased and ultimately developed.

So, again, in response to your specific question, I would imagine that we would have our final policy ready to be disseminated within the next probably 2 weeks to 3 weeks.

Senator BARRASSO. I don't know if you have had a chance to read Governor Freudenthal's letter; it is 5 pages, it is very detailed, and I think it is right on point on the issues that are affecting the jobs in our community and our ability to continue to aim toward energy security in our Nation and in Wyoming, which continues to be a place where there are huge energy resources, both renewable and nonrenewable. So I would appreciate that and would appreciate it if you could take a second look at that letter.

Mr. Chairman, you had mentioned the issue of time. I see my time has expired. I have a number of additional questions, and with your permission I would like to submit those in writing for later response.

Senator SANDERS. Of course. Without objection. Thank you, Senator.

[The prepared statement of Senator Barrasso was not received at time of print.]

Senator SANDERS. Senator Udall, did you want to briefly ask some?

Senator UDALL. I know, Mr. Chairman, you would want to get to the second panel, and I do also, because both eSolar and First

Solar are very active in New Mexico, and I want to have the opportunity to question them.

But just a brief question to Secretary Salazar. Secretary Salazar, you have done a marvelous job, I think, at targeted with Federal land where you are going to do renewable energy development, and your testimony includes some useful information about the number of applications and the scale of renewable energy projects that the Department of Interior is working on. When do we expect to see these projects reach the construction stage, and how many do we think we will see move forward over the next several years, and what is going to be the impact on jobs? As we all know the President last night spoke about clean energy jobs, and you are right in the forefront of that, so if you could give me a little bit of an idea that would be great.

Mr. SALAZAR. Thank you very much, Senator Udall, and thank you for your leadership on these issues and other natural resources issues in New Mexico. We look forward to working with you on all of them.

With respect to your question, there are over 100 applications that we have for major commercial scale solar utility projects on our public lands. We are moving forward on a fast track basis, in part because we want to meet the December 1st deadline under the American Recovery Act for these projects. There are 13 of those projects that we have identified and we estimate that those 13 projects, permitted hopefully by December the 1st or before, will generate about 4,567 megawatts and will create over 40,000 jobs.

Senator UDALL. Thank you very much.

And I would yield back at this point, Mr. Chairman.

Senator SANDERS. The Chair of the full EPW Committee is here, Senator Boxer, who has been a long-time champion of sustainable energy, and she wants to make a brief statement.

OPENING STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator BOXER. Yes, Mr. Chairman. I am so sorry; I was off the Hill.

And I so appreciate your coming earlier so we could hear from you, Mr. Secretary. I have looked over your statement, and I listened to the President last night, and I just think it is so clear that to launch this economy and to lead the world we are going to have to be the leader here on alternative energy, clean energy. As the Chinese leader once told me, he said, the world is going green, and he said we hope you sit on your hands because we are ready to go. And the President is not going to sit on his hands, and I don't think we are going to sit on ours either.

I wanted to put my statement in the record, Mr. Chairman, if I might, and just simply say that clean energy and energy efficiency jobs continue to be one of the bright spots in the California economy.

On December 9th, the Los Angeles Times reported an analysis released by Collaborative Economics for the Next 10 Organization that found green jobs increased by 5 percent while total jobs declined by 1 percent in California from January 2007 to 2008, and we are waiting for the latest numbers. But we know that green

jobs grew at three times the rate of the overall California economy between 1995 and 2008, so it is absolutely key. It is obvious you can't outsource the installation of a solar roof or utility scale solar facility located here in the U.S., and those jobs are right here.

So thank you very much, and we look forward in this committee to working with you as we move forward.

Thank you, Mr. Chairman.

[The prepared statement of Senator Boxer was not received at time of print.]

Senator SANDERS. Thank you, Senator Boxer.

Mr. Secretary, thank you very much. And, Mr. Abbey, thank you as well.

Now we welcome our new panel, second panel.

OK, we welcome very much our second panel. The expectation is still that votes will take place at about 10:40, so we are going to move as quickly as we can.

We welcome Robert Rogan, who is the Senior Vice President at America's eSolar; Rob Gillette is the CEO at First Solar; Andrew P. Morriss, who is a Professor of Law and Business at the University of Illinois College of Law; and Jeff Wolfe, who is the CEO at groSolar.

Let's begin with Mr. Rogan. And we thank you very much for being with us.

STATEMENT OF ROBERT ROGAN, SENIOR VICE PRESIDENT, AMERICAS, ESOLAR

Mr. ROGAN. Madam Chairwoman Boxer and Chairman Sanders, distinguished members of the Environment Public Works Committee and the Green Jobs Subcommittee, I am proud to appear before you today to address the important role a robust and growing solar energy industry can play in driving our economy. My name is Robert Rogan. I am the Senior Vice President of American Markets at eSolar.

eSolar was founded in 2007 with the goal of creating a solar technology that could compete with fossil fuels. eSolar's technology was developed in California, and today we have almost 130 employees in the greater Los Angeles area. We opened our first commercial scale fully operating power plant this past summer in Lancaster, California. It is a 5-megawatt sun tower facility, and it employs over 21 people on a full-time basis.

eSolar technology is a different variety of solar technology than conventional photovoltaics. There is room for both technologies in the market; both have certain applications in which they do better. eSolar's particular technology uses tens of thousands of tiny mirrors to concentrate sunlight at the top of a tower, much like a magnifying glass. We use this concentrated heat to boil water, produce high pressure steam, and then drive a conventional steam turbine as you would find in any traditional power plant.

As a result of this design, the eSolar technology produces jobs in similar ways that the traditional power plant industry does today. To build one of our power plants, you need welders, you need turbine technicians, and you need power plant engineers that the fossil industry has been using. In fact, we actually have more pipe in

our facilities than an average coal plant; thus, we actually need more welders at our facilities.

Because our technology is primarily made of steel and glass and requires no special exotic materials, we have the ability to scale up our business very rapidly. In the last 12 months, we have announced 3,500 megawatts of commercial contracts globally. These are for projects in the United States, China, and India. This is approximately the same amount of megawatts as three large nuclear facilities. Five hundred megawatts of these contracts are for projects in the United States.

Our first project, in New Mexico with our partner NRG Energy is scheduled to break ground later this year. NRG has applied for a Department of Energy loan guarantee to support the project, and if the loan process is completed, the project can break ground in 2010 and could be the first solar thermal facility built in the United States using Department of Energy funds.

As I mentioned, eSolar launched its first commercial facility in California earlier this year. The project created more than 300 jobs over a year construction process and now permanently employs 21 people. Many of the plant employees were formerly fossil-fired plant employees and have been working long careers at coal or natural gas facilities before coming to the eSolar facility.

Our 92 megawatt facility in New Mexico with NRG Energy will generate nearly $23 million in direct economic benefits to the local community and State during the development, construction, and operation process. During construction over the period of a year, over 400 full-time positions will be created and 20 full-time permanent positions will be created at the facility over its 30-year lifetime.

According to the Solar Energy Industry Association, today there are over 10,000 megawatts of solar facilities in the Southwest United States under contract, PPAs, with utilities who are waiting to buy the power. These projects have the potential to generate literally tens of thousands of jobs; they are good paying jobs in engineering, construction, operations, and maintenance of power plants.

It is also important to understand that for every project that eSolar puts into the ground, there are ripple effects in job markets across the country. For our New Mexico project we will need to deliver almost 1,500 containers of materials to the site. This will provide a boost to the shipping and trucking industries across multiple States in the Southwest. Each of our projects flexes the supply chain and creates jobs as a result.

As one example, the mirrors for our New Mexico project are manufactured in Naugatuck, Connecticut, and our vendor there estimates that he will need to hire 10 additional staff at his factory just to support our order for the New Mexico project. When counting the materials and processes needed to face their glass factory, there are 10 additional jobs that this vendor will need to support in Pennsylvania, New York, Michigan, and Texas.

The towers for our California facility were manufactured in North Dakota, and the boilers were made in the Midwest. This is how solar energy can benefit the Nation, not just the Southwest United States.

Like many young and growing energy industries we need stable Federal policy to support and ensure the success of the solar industry in the future. In particular, I would like to draw attention to two programs that are beneficial, the extension of the Treasury Grant Program and the DOE Loan Program. I am running out of time, but I would be happy to talk more about that during questioning.

[The prepared statement of Mr. Rogan follows:]

Testimony of

Robert Rogan

Senior Vice President

eSolar

Before the

US Senate Committee on

Environment and Public Works and

the US Senate Subcommittee on Green Jobs

January 25, 2010

Madam Chairwoman Boxer and distinguished members of the Environmental Public Works Committee and the Green Jobs Subcommittee,

I am proud to appear before you today to address the important role a robust and growing solar energy industry can play in driving our economy and providing quality green jobs for a growing number of Americans. My name is Robert Rogan. I am the senior vice president of American markets at eSolar, a Pasadena-based concentrating solar thermal (CSP) company.

I. Introduction

As way of introduction, allow me to provide some brief background on eSolar. Our company was founded in 2007 with the ambitious goal of creating a technology to provide clean, affordable renewable energy for less than the cost of fossil fuels. eSolar's technology was developed in California, and today we have almost 130 employees in the Los Angeles Area. Despite the fact that we are less than three years old, eSolar opened its first commercial scale, fully functioning power plant, the Sierra SunTower facility, in Lancaster, CA in the summer of 2009. Sierra SunTower is the only operating solar thermal power tower facility in the United States today. Twenty-one people are employed full time by the Sierra facility.

Our technology of choice for generating clean energy is concentrating solar power (CSP). This is quite different from the photovoltaic (PV) technologies used by my colleagues from First Solar and groSolar. In simple terms, CSP harvests the heat of the sun to boil water, create steam, and turn traditional turbines. CSP is generally used solely in utility-scale applications. Generally, there is room for both PV and CSP in the market since each has its own ideal applications in terms of size and geography.

There are numerous ways to concentrate the sun's energy. eSolar uses tens of thousands of small mirrors to focus the sun's light on towers on which heat receivers are mounted. eSolar's engineers developed state of the art software and advanced algorithms to achieve the highest level of mirror accuracy in the industry. We use standardized hardware components that reduce costs and increase scalability. Our technology distinguishes itself from other CSP companies by being extremely modular and flexible in application. Our plants can be deployed in increments of 46 megawatts, which is the smallest commercially viable CSP plant available today. Because our solar thermal technology is primarily made of steel and glass, and requires no special materials, eSolar has the ability to scale up deployments rapidly, and delivery many GW of power plants over the next few years.

In the last 12 months, eSolar has announced a 3,500 MW global pipeline of orders for our equipment, with projects sited in the United States, China, and India. This is the equivalent of approximately three large nuclear facilities, and positions eSolar as one of the market leaders in solar thermal energy.

Approximately 500 MW of these contracts are for projects located within the U.S. We are currently developing our first U.S. project in southern New Mexico with our partner, NRG Energy Inc., which has applied for a DOE loan guarantee. The project is being built on private land and has progressed very far through the permitting process. If the DOE loan guarantee process is completed, the project can break ground in 2010, and thus could become the first solar thermal facility to be built using funds from the DOE loan guarantee program.

In my testimony today, I plan to address several key points:

1. First, I would like to highlight the success our projects have had in creating jobs and driving local economic development in California and New Mexico.

2. Second, I will address the important role the solar energy industry will play in the United States' economic recovery and the large contribution the industry will make in terms of job creation.

3. Finally, I will discuss the role of the federal policy in expanding the solar energy industry, outlining the necessary steps that need to be taken in order for solar energy companies such as eSolar to deliver on their promise of clean energy and good jobs for years to come.

II. eSolar Projects Provide Good American Jobs

As mentioned above, last summer eSolar launched its first commercial-scale solar facility, a 5-megawatt power plant in Lancaster, California in the heart of the Antelope Valley region. The project created more than 300 jobs at the peak of construction. It now permanently employs 21 people. eSolar received accolades from Gov. Schwarzenegger and the Lancaster Mayor and for our innovative solar technology and for our ability rapidly develop a new industry in a town yearning for economic opportunity.

eSolar's technology builds on concepts first pioneered at Sandia National Laboratories in the late 1970s. We are able to produce more power on less land, and by building our plants in modular pieces, we can site our plants on previously disturbed land or brownfields, mitigating environmental concerns.

Our plants are built from US and international components They assemble quickly, can be located close to points of consumption, can tap into existing lower voltage

transmission lines, and stand to make a major contribution to the United States' electric generating capacity.

The permitting process is already underway on our next facility, a 92-megawatt plant proposed for the southeastern corner of New Mexico, and the economic impact of this project promises to be even greater than our first project. NRG Energy is developing the project on more than 440 acres in Dona Ana County, and will sell the power produced under a 20-year power purchase agreement already approved by the New Mexico Public Regulation Commission to El Paso Electric.

When the project was announced, Gov. Bill Richardson hailed the project for bringing a new renewable energy technology to New Mexico and for helping El Paso Electric to meet the state's recently enacted renewable portfolio standard.

The facility will produce the most electricity when temperatures rise and demand is at its peak, delivering 193 million kilowatt hours per year to the grid, enough to power about 74,000 homes at peak production. It will reduce annual greenhouse gas emissions by about 153,000 tons as compared to a fossil-fueled plant, according to the EPA.

In addition to these environmental benefits, the facility will have a tremendous benefit on the local economy. It will generate nearly $23 million in economic benefits from development, construction and operation to the local community and the state, and will create hundreds of jobs throughout the construction process and more than 20 full-time, permanent positions.

Projects such as Sierra SunTower and New Mexico SunTower are essential to the recovery of the American economy, and are critical to establishing the United States as the global stand-alone renewable energy leader.

III. The U.S. Solar Industry Has an Enormous Potential for Job Creation

According to the Solar Energy Industries Association (SEIA), today there are more than 431 MW of CSP power generation facilities in operation in the US. However, 354 MW of that capacity was deployed between 1984 and 1990.
There are currently over 10 GW (10,084 MW) of projects under development. These projects have the potential to generate literally tens of thousands of jobs. These are good paying jobs in engineering, construction, operations, and maintenance of the power plants.

It is important to understand that for every project that eSolar puts into the ground; there are ripple effects across job markets across the United States. In California, we currently have almost 130 corporate employees, and last year we paid over $1 Million dollars in payroll taxes. For our New Mexico project, almost 1,500 shipping containers worth of parts and materials will be delivered to the site, aiding the recovery of the trucking and shipping industries across multiple states in the Southwest

Because eSolar relies on a large variety of both domestic and foreign vendors for its technology, our projects also produce high quality jobs in the supply chain. As one example, the mirrors for the New Mexico project are manufactured in Naugatuck, CT, and our vendor will need to hire 10 more people at the plant to support our order. When counting the materials and processes needed to feed their glass factory, the vendor estimates they needs to hire another 10 people in the states of Pennsylvania, New York, Michigan, and Texas.

Solar energy development benefits the nation, not just the Southwest U.S. In total, the Solar Energy Industries Association projects the American solar industry in general will generate 882,000 related jobs by 2020. These jobs include research and development, engineering, construction, operations, installations, and many others.

IV. Policy Recommendations – Promoting a Clean Energy Economy

Like many young and growing industries, the American solar energy industry requires sensible federal policy and support to ensure its success and stability in the future.

In particular, I would like to draw your attention to a number of specific policy initiatives whose extension or introduction would be of great benefit to the industry, ensuring its growth and continued potential to provide needed green jobs for tens of thousands of Americans.

1. Extension of the Investment Tax Rebates – The introduction of the Investment Tax Rebate in 2008 proved to be a fantastic boon for the American solar industry. This policy should be extended to at least 2016 to provide much needed support to solar developers and financiers that do not have adequate tax appetite to take full advantage of the Investment Tax Credit. The recent financial crisis has dramatically reduced the availability of project investors with the required tax appetite to build solar projects and, without extending the Investment Tax Rebate, many solar projects will fail at the financing stage.

2. DOE Loan Guarantees – eSolar is incredibly grateful to Congress, the Obama administration and the hard-working people at the Department of Energy for providing this access to low-cost capital for a variety of projects. We ask you to encourage the administration to expedite its selection process so our industry may begin developing more projects and creating more jobs right away. Additionally, I strongly encourage the Senate to adopt the House's position on H.R. 2847, which will allow for multiple DOE loan applications for a single technology. Currently, our development partner NRG can only access DOE loans for our New Mexico project, but cannot use DOE loan guarantees

for either of our two California projects. This restriction stymies the progress of thousands of MW of renewable energy projects across the country. HR 2847 also importantly restores the $2 billion in funding for the program that was previously removed to pay for the "cash for clunkers" program.

The creation of a Clean Energy Deployment Administration (CEDA) is the next important step in the evolution of the loan guarantee program. Whether part of a comprehensive climate bill, an energy bill, or a jobs bill, CEDA would give DOE additional tools and flexibility to spur deployment of important technologies such as eSolar's.

3. National RPS – eSolar joins SEIA in supporting a national Renewable Portfolio Standard that is designed to encourage the growth of all forms of renewable energy, including all solar applications (utility-scale, distributed and solar hot water).

4. Streamlined Environmental Permitting – Almost every solar project developer, especially CSP providers, have encountered significant obstacles in the environmental permitting process for both private and federal public lands. We ask for your support in streaming the environmental permitting processes to ensure these solar facilities are built on reasonable timelines. Without streamlined permitting, the realization of the green job benefits of renewable energy is severely hampered.

5. Transmission Network Plan – Due to the nature of the solar resource itself, solar projects are most economically feasible when constructed in sunny locations, often far from population centers. These sites often do not have existing transmission. A coherent national transmission network plan including expedited permitting for new transmission lines that carry renewable energy would assist greatly in getting these projects developed and online.

V. Conclusion

The United States has been the leader in every major industrial and market innovation over the last 200 years. In order to continue our position of leadership in the global economy, we must also be leaders in the global clean energy revolution. eSolar is but one of hundreds of companies vying to help our nation lead the world into a new age of clean energy and economic prosperity. I wish to thank the committee once again for inviting us to present our unique perspective as a representative of the concentrating solar power community.

Figure 1: Sierra SunTower Solar Generating Station in Lancaster, California

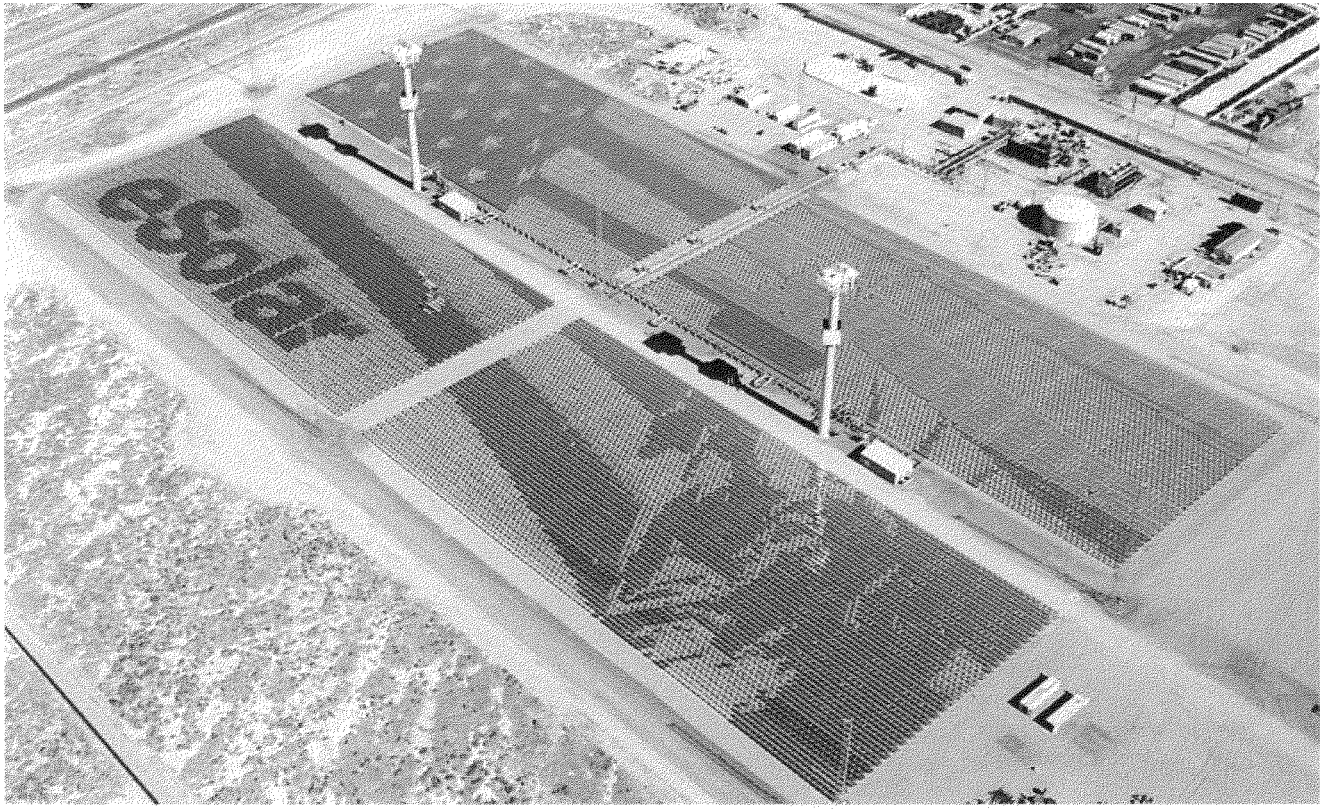

Figure 2: Solar thermal salute at Sierra SunTower, July 2009

April 20, 2010

Re: Environment & Public Works Committee Hearing Follow-Up Questions

Senator Barbara Boxer

Q 1: I believe that my state of California is blessed with innovative people and businesses who work hard to develop cutting edge technologies that can solve problems and create profits.
Could you please describe the solar power plant in California that eSolar was able to build within three years of starting its business?

A 1: Sierra SunTower is a 5 MW, full-scale power plant, and is the first example of a commercial CSP tower in the United States. The project supplies electricity to Southern California Edison (SCE) and will power up to 4,000 homes. The project created over 250 construction jobs and 21 permanent jobs. Sierra SunTower provides a new local tax base, as well as direct and indirect economic benefits during development, construction and operation.

Q 2: Mr. Rogan, in addition to building a solar power plant in California, eSolar is moving to build solar power plants in New Mexico, too, right?

A 2: eSolar is pursuing opportunities to build power plants in several states in the Southwest.

Q 3: Could you please describe how many homes could be powered by the energy from this New Mexico project?

A 3: [no answer]

Senator Bernard Sanders

Q 1: I worked on a provision included in the Energy committee's American Clean Energy Leadership Act (ACELA), S. 1462 sec. 365 that supports development of renewable energy such as solar on brownfield sites. Do you believe there is potential to use brownfield sites to support renewable energy development, producing a win-win by productively redeveloping the land and promoting sustainable energy development at the same time?

A 1: Yes, we do agree that the amount of renewable energy development required to have a significant impact on both U.S. jobs and carbon production will necessitate projects on both greenfield and brownfield sites. As for any energy site, challenges around associated transmission and the limited number of suitable sites may be a barrier, but brownfield sites can be promising for solar development

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Senator SANDERS. Thank you very much.

I apologize to the panel. I have to be on the floor, and I am going to hand the Chair over to Senator Boxer.

Senator BOXER [presiding]. Thank you.

I guess, Mr. Morriss, we will call on you. We welcome you. You are an H. Ross & Helen Workman Professor of Law and Business at the University of Illinois College of Law, a Senior Fellow, IER. Is that all correct?

Mr. MORRISS. Yes, ma'am.

Senator BOXER. Well, we welcome you, sir.

STATEMENT OF ANDREW P. MORRISS, H. ROSS & HELEN WORKMAN PROFESSOR OF LAW AND BUSINESS, UNIVERSITY OF ILLINOIS COLLEGE OF LAW; SENIOR FELLOW, IER

Mr. MORRISS. Thank you, Madam Chairman and members of the committee. Thank you for the opportunity to testify before your committee as you consider these important questions about the role of public investment in alternative energy sources.

An aggressive push for public investment in alternative energy programs is underway in the United States and in some other countries. The appeal of these proposals is easy to understand because they promise both increased employment and other economic benefits and improvements in environmental quality. As a lawyer and an economist who studies regulatory programs, I cannot speak to the technical details of converting sunlight to electricity, but I can make suggestions on issues you should consider as you exercise oversight in determining when and where to invest public money in such programs.

In my written testimony I suggest five questions about investments in alternative energy programs, the answers to which I believe will help you distinguish among potential programs seeking support. These questions are drawn from my research together with my coauthors, William Bogart, Andrew Dorchak, and Roger Meiners. I believe asking these questions would enable Congress to exercise better oversight over public investment strategies for alternative energy. As my time is limited, I will focus on two in my remarks.

First is the question of comparing proposals based on net job numbers. If our goal is to help the economy recover through energy investments it is crucial that these investments produce a net gain in employment. When alternative energy investment in solar technology is successful it will likely increase employment in the solar energy industry, but it will also likely produce a decline in employment in the energy industries that solar energy displaces.

To evaluate proposals in terms of job creation both Congress and the executive branch must focus on the net employment effect, not just on the jobs created. Unfortunately, relatively little of the literature supporting public investment in alternative energy addresses this point.

In addition, the impacts of shifting energy technologies are likely to be significantly different in different regions. I believe Congress could use its oversight powers, staff resources, and the Government Accountability Office to improve the policy debate by creating a de-

mand for standards that could be applied to evaluating proposals in this and other respects.

For example, as I discuss at length in my written testimony, there are important questions about the appropriate methodology for calculating employment projections and circumstances where significant technological change and shifts in relative prices are occurring.

The second is the question of how the technologies that receive public investment are being chosen. The green energy literature calls for massive shifts in power generation technologies. The danger is that we will construct a sustainable energy sector that relies on public subsidies to exist rather than based on success in the marketplace. We must avoid choosing technologies that will fail to develop into viable industries, which is a difficult task. Based on prior predictions of viability by proponents there are reasons to worry about this with respect to solar energy in particular, as I outline in my written testimony.

Fortunately, an alternative model for spurring private sector innovation and investment in alternative energy technologies like solar is for Congress to provide prizes modeled on the Ansari X Prize for space flight. My former colleague at Case Western Reserve University Law School, Professor Jonathan Adler, has argued that a prize approach would resolve many of the difficulties Congress faces in choosing which technology to back. While cautioning that prizes are not a panacea, Adler argues that prized induce innovation in the same way the patent system does while imposing costs only when they produce results.

Similarly, Thomas Kalil of the University of California at Berkeley, and a former Clinton administration official, explained in his 2006 Brookings paper that prizes offer a means to "help blend the best of public purpose and the creativity, energy, and passion of private sector entrepreneurial teams" without committing the Government to choose particular recipients or strategies. Prizes, he said, "allow the Government to establish a goal without being prescriptive as to how that goal should be met or who is in the best position to meet it." Since, by definition, we do not know what will be the successful technology that delivers a new energy source, prizes offer the advantage of not precluding any promising directions for innovation.

Our energy future is a subject of vital importance to our Nation. Congress should have the best information available to analyze potential strategies for meeting the challenges that lie ahead. Even with the best information possible, however, our energy future contains many unknowns.

In 1870, coal heated people's homes, natural gas provided light and street lights, electricity had little practical application, and gasoline was a waste product of kerosene refining. The great energy policy debates of that era concerned whether the world would run short of coal. No one in 1870 would have predicted that coal would become an almost entirely industrial fuel in plentiful supply, that natural gas would be used primarily to generate electricity and provide residential heat, that electricity would be in widespread use in homes and industry, or that gasoline would become an expensive commodity. We know as little about our energy future

as our predecessors did about theirs, and so we must put a premium on strategies that can adapt to new information, new circumstances, and new ideas.

In making its energy policy choices, Congress ought to exercise due diligence in reviewing both the methods and the predictions offered in support of particular technologies and strategies. I hope the material I provided today will assist you in making those choices.

Thank you for giving me the opportunity to testify. I would be happy to answer any questions.

[The prepared statement of Mr. Morriss follows:]

Testimony on Solar Energy Technology and Clean Energy Jobs

Andrew P. Morriss

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Institute for Energy Research

Testimony before the Subcommittee on Green Jobs and the New Economy of the Senate Committee on Environment and Public Works

January 28, 2010

Performing Due Diligence on Green Energy Investments

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Madam Chairman and members of the Committee, thank you for the opportunity to testify before your Committee as you consider the important question of the role of public investment in alternative energy sources, such as solar power, and the impact of that investment on our economy.

An aggressive push for public investment in alternative energy programs is underway in the United States and in some other countries. The appeal of proposals for such programs is easy to understand. They promise both increased employment and other economic benefits and improvements in environmental quality. As a lawyer and economist who studies regulatory programs, I cannot speak to the technical details of converting sunlight to electricity but I can make suggestions on issues you should consider as you exercise oversight in determining when

and where to invest public money in such programs. I suggest five questions about investments in alternative energy programs, the answers to which I believe will help you distinguish among potential programs seeking support. These questions are drawn from my research, together with my coauthors William Bogart of York College, Andrew Dorchak of Case Western Reserve University, and Roger Meiners of the University of Texas at Arlington.[1]

Question 1: What is the *net* increase in jobs and energy produced by an investment?

Much of the green jobs literature generally, and the alternative energy literature in particular, reports estimates of gross employment impacts of public investments in new technologies and mandates in the alternative energy sector.[2] However, the relevant number from a public policy point of view is not the gross number of jobs but the net. Shifting energy production away from existing forms of energy will destroy jobs in those areas, just as investing in new forms of energy production will create jobs in the new areas. Only by assessing the net job creation can you effectively weigh the employment merits of a proposed investment.

When the impact on current employment is considered, some of the new green jobs will turn out to be substitutes for existing jobs. For example, one of the goals in promoting an

[1] *Green Jobs Myths* (with William T. Bogart, Andrew Dorchak, & Roger E. Meiners), 16 MISSOURI ENVIRONMENTAL LAW & POLICY REVIEW 326-473 (2009); *Green Jobs: Boom or Bust?,* PERC REPORTS (Summer 2009) (with William T. Bogart, Andrew Dorchak, & Roger E. Meiners) (reprinted in RANGE (Winter 2010)); *Advocating Autarky: A Flaw in Green Jobs Policy Proposals as They Pertain to Renewable Energy* (with William T. Bogart, Andrew Dorchak, and Roger E. Meiners), 5 TEXAS JOURNAL OF OIL, GAS, & ENERGY LAW 155-164 (2010); THE MYTH OF GREEN JOBS (with William T. Bogart, Andrew Dorchak, & Roger E. Meiners) (Cato Institute, forthcoming 2010) (tentative title).

[2] United States Conference of Mayors, U.S. METRO ECONOMIES: CURRENT AND POTENTIAL GREEN JOBS IN THE U.S. ECONOMY, 2008; American Solar Energy Society, RENEWABLE ENERGY AND ENERGY EFFICIENCY: ECONOMIC DRIVERS FOR THE 21ST CENTURY, 2007; Center for American Progress, GREEN RECOVERY: A PROGRAM TO CREATE GOOD JOBS AND START BUILDING A LOW-CARBON ECONOMY, 2008; United Nations Environment Program, GREEN JOBS: TOWARDS DECENT WORK IN A SUSTAINABLE, LOW-CARBON WORLD, 2008.

increase in solar-powered electric generation is to reduce our reliance on coal-fired electricity generation, since a key benefit of solar-power is to reduce emissions by reducing reliance on coal. Such a shift will certainly increase employment in producing, maintaining, and operating solar power plants but it will also reduce employment in coal mining and processing, coal transportation, and operation of coal-fired power plants. Whether the net impact on employment overall is positive or negative will depend on the relative labor intensity of energy production in the respective sectors at the margin of added or subtracted production. There is no question, however, that the net employment impact of the shift from coal to solar power is smaller than gross impact of the investment in solar power. Moreover, the shift is likely to produce quite different regional impacts in different parts of the United States, shifting jobs away from regions with extensive coal reserves and power generation facilities and toward regions with more sun.

There is evidence to suggest this is a significant concern with respect to investments in green jobs. Spanish researcher Gabriela Calzada examined employment impacts of such investments in Spain and found a loss of 2.2 jobs for each new job gained.[3] Care is therefore necessary to ensure that efforts to promote new technologies do not reduce overall employment.

Question 2: What is the impact of the investment on labor productivity?

In general, the labor intensity of energy production – the labor required per unit of energy produced – is much higher in solar and other renewable energy sources than in conventional energy production. That is, any given amount of energy produced generally requires more labor if the energy is produced from solar or wind than if it is produced by a coal or natural gas fired

[3] Gabriel Calzada Álvarez, *Study on the effects on employment of public aid to renewable energy sources* (2009) available at http://www.juandemariana.org/pdf/090327-employment-public-aid-renewable.pdf.

power plants. Many advocates for public investment in renewable energy point to this higher labor requirement as a *benefit* because it will tend to increase employment. For example, if we were able to switch much of our electricity production to solar away from the current mix of technologies, more people would be employed in electricity production than are so employed today.

This is not a benefit, but a cost. Ignoring productivity confuses ends (goods and services valued by consumers) with means (labor). If one form of energy requires more labor to produce than another, it is less efficient with respect to labor. (Of course, the efficiency with respect to capital must also be considered.) If the cost of energy increases as a result of this less efficient production, then the net benefits of energy production available to the citizens of the United States decrease. An analogy would be if we used less machinery and more shovels in building roads. More people would be employed building the roads due to the labor-intensive method of production, but the net cost to the taxpayers would be higher per mile of road built. Moreover, because energy is part of the cost of production of virtually all goods and services, many goods will become more costly and American producers will become less competitive in world markets. There is evidence that this is a significant concern, with current estimates showing solar energy to be considerably more expensive per unit than conventional alternatives because of standby power generation needs.[4] We should not therefore favor technologies because they are inefficient users of labor or capital.

Moreover, increasing the labor efficiency of new technologies like solar energy is critical to making these technologies commercially viable without subsidies. For example, one

[4] Gilbert E. Metcalf, Federal Tax Policy Towards Energy, Report 142, MIT Joint Program on the Science and Policy of Global Change (2007) available at http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt142.pdf at p. 21-22.

promising development in solar photovoltaic technology was the recent separate announcements by two companies, Dow Solar and United Solar Ovonic, of products integrating solar cells into roofing shingles, a development which promises to cut installation costs significantly by allowing installation by regular roofers rather than specialized installers. Because these products increase labor efficiency, they would be ranked as less desirable under many green investment schemes that feature high-levels of labor use. If we want solar energy to succeed in the market place without requiring permanent subsidies, we must ensure that we reward improvements in efficiency of labor use rather than subsidize the inefficient use of labor.

We must also take care to minimize what economists refer to as the "dead weight losses" that are an inevitable consequence of increased public expenditures. Many green energy proposals assume that spending public money is a costless means of promoting additional economic activity. Such public expenditures must be paid for with an equivalent increase in tax revenue, now or in the future. All taxes induce some degree of tax avoidance behavior among those able to do so. As a result, the cost of a tax generally exceeds the revenue yielded by the tax. That is the "deadweight loss." Because avoidance actions are a wasteful but unavoidable part of any tax policy, they must be considered in evaluating the net benefits of any program that relies on increased public expenditure. Since deadweight losses are generally excluded in the calculations done by proponents, including it will likely reduce the net benefit of proposed expenditures below proponents' estimates.

It is particularly problematic that these issues are simply ignored in the literature promoting such programs. Fortunately, Congress has available to it the resources of the Government Accountability Office, Congressional Budget Office, and committee staff. An important step forward in Congressional oversight of alternative energy programs would be to

commission an analysis of the appropriate assumptions which should be used in evaluating proposals and then require benchmarking of future studies against the results of that analysis.

Question 3: What are the assumptions underlying predictions of costs and benefits?

Many advocates for green energy expenditures claim that their programs will have a large impact because of the added jobs and other benefits created as those hired into green jobs spend their paychecks, creating additional economic activity in the businesses where those paychecks are spent. These estimates are derived from a technique known as economic multiplier analysis.

Multipliers are based on the idea that increases in activity by one firm will lead to increases in activity by other firms. For example, the contractor for a new football stadium buys concrete, the concrete subcontractor buys new tires for its trucks, all the firms' workers go out to dinner, and so forth. Unfortunately, multipliers are difficult to observe directly and so must be estimated by indirect means. This is usually done with a modeling technique known as input-output analysis.

While the details of constructing an input-output analysis are both technical and tedious, the key problems with relying on such models to estimate the impact of alternate energy spending are relatively straightforward. To conduct an input-output analysis requires construction of a matrix of relationships between different economic activities. More road construction means more demand for cement, more demand for cement means more demand for diesel fuel to run cement trucks and more work for cement plant workers, more demand for diesel means higher sales of fuel and more work for cement plant workers means they will spend more in retail establishments, and so forth. These relationships can be estimated statistically

using industry-level data. Properly used, input-output analysis can provide useful estimates of the impact of a project like construction of a highway.

This is not so with respect to projects intended to change the relationships on which the analysis rests, however. Input-output analysis relies on two key assumptions, neither of which can be made for alternative energy spending. The first assumption is called constant coefficients production, which means that the ratios of outputs to inputs in various industries are *constant* regardless of the scale of production or the time period. This eliminates the possibility that inputs may be substituted for each other, either because of technical progress or because of changes in factor prices. For example, a typical assumption would be that if a dollar of energy was required to produce $10 of steel at the time the input-output table was created, then this relation will continue to hold. In reality, if the price of energy increases, the relation is likely to change as higher energy prices induce steel producers to change production techniques to reduce the energy used per unit of steel. Since alternative energy proponents concede that green energy costs more per unit than conventional fuels,[5] the ratio of energy costs to production is *not* constant and this assumption is violated.

The second key assumption necessary to conduct an input-output analysis is that the relationship between prices of the various factors of production is constant. This is particularly important because, for modeling convenience, the relation between inputs and outputs is calculated using dollar values rather than physical quantities. Doing so is appropriate only if the physical quantities and the monetary values have a constant ratio, in other words if there are

[5] For example, CENTER FOR AMERICAN PROGRESS, GREEN RECOVERY: A PROGRAM TO CREATE GOOD JOBS AND START BUILDING A LOW-CARBON ECONOMY, (2008), *available at* http://www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf, notes that $1 million spent on solar energy will currently produce considerably less energy than $1 million spent on oil. (p. 6).

fixed prices over time. That is unlikely to be the case for alternative energy programs since a key justification for public support for green technology is that oil and coal will become more expensive, either for technological reasons or because of a tax based on carbon dioxide emissions. Because of the pervasive role of energy, such changes would alter factor prices throughout the economy, making an input-output analysis an inappropriate method for evaluating the impact of the program.

The proper method for evaluating such proposals is to make public the data, assumptions and models used to generate the estimates of costs and benefits. Doing so would expose problems in all three areas, by harnessing the expertise in modeling, in technology, and in data analysis that exists throughout the United States. Gaining the benefit of critiques from the wider population would mean that decisions are made based on the strongest analysis. Making data, models, and studies widely available in advance would ensure that Congress would benefit from exposing such proposals to what software expert Eric Raymond termed the "bazaar" approach in his landmark study of open software standards, *The Cathedral and the Bazaar*,[6] and what University of Tennessee law professor Glenn Harlan Reynolds termed "an army of Davids" in his book by that name.[7]

Question 4: Does a proposed expenditure create jobs that add value?

One consistent problem in the larger green jobs literature and in the narrower alternative energy literature is that they count all jobs as benefits rather recognizing that some are costs. The purpose of any business, regardless of how green, is not to *use* resources but to *produce* a good or service, desired by consumers, that can be sold for more than the cost of production. For a

[6] ERIC S. RAYMOND, THE CATHEDRAL AND THE BAZAAR (2001).
[7] GLENN HARLAN REYNOLDS, AN ARMY OF DAVIDS (2006).

given level of output, businesses that use more resources are less efficient – have higher costs – than those using fewer resources. Many jobs created in response to government mandates or to take advantage of government programs are not benefits of the program but rather costs. These costs may be worth incurring as the price of the benefits a program produces, but they must be counted as costs not benefits in assessing the program's net value.

For example, the Conference of Mayors' green jobs report includes the hiring of more lawyers and administrators of regulations as *benefits* of green jobs spending.[8] While as a law professor, I am always pleased to see more job opportunities for my students, as an economist I know that all such expenditures cannot qualify as a benefit rather than a cost to society. Such claims are analogous to claiming that the need to hire more police as a result of a new criminal law is a benefit. By making labor the end, rather than treating labor as the means to production of environmentally friendly goods and services, the literature makes a fundamental error in economic logic. Promoting inefficient use of labor will steer resources towards technologies, firms, and industries that will be unable to compete in the marketplace without ongoing subsidies. Dooming the environmentally friendly sector to an unending regime of subsidies is fiscally irresponsible and harmful to any efforts to build a competitive and environmentally friendly economy.

Question 5: How are technologies that receive public investment being chosen?

The green energy literature calls for massive shifts in power generation technologies. The literature is selectively optimistic about favored approaches (wind, solar, biomass) and pessimistic about disfavored ones (coal, nuclear). The danger is that we will construct a

[8] Conference of Mayors, *supra,* at 16.

"sustainable" energy sector that relies on public subsidies to exist rather than based on success in the marketplace. Even groups favoring public investment in alternative energy have found a significant reliance on public subsidies. For example, during a prior debate over renewable energy tax credits, a study done for the American Wind Energy Association and the Solar Energy Research and Education Foundation estimated that if the investment tax credit for solar/photovoltaic projects and the production tax credit for wind energy was not renewed, then those industries would lose 77 percent of their jobs.[9] It is important that Congress avoid creating subsidy-dependent industries. That this is a potential danger can be seen from the shift of renewable energy projects to the United States from abroad by companies seeking those benefits. For example, American subsidies for renewable energy projects were so attractive in 2008 that BP dropped plans to build wind farms and other renewable projects in Britain, shifting its renewable programs to the United States where government incentives for clean energy projects provided what a company spokesman called "a convenient tax shelter for oil and gas revenues."[10] We must avoid choosing technologies that will fail to develop into viable industries, a difficult task. Based on prior predictions of viability by proponents, there are reasons to worry about this with respect to solar energy in particular. For example, in 1986 Amory Lovins of the Rocky Mountain Institute said that commercial viability of wind and solar technology was only 1 to 3 years away; in 1983, Booz, Allen & Hamilton reported in a study done for the Solar Energy Industries Association, American Wind Energy Association, and Renewable Energy Institute that "The private sector can be expected to develop improved solar and wind technologies which will

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[9] Navigant Consulting, *Economic Impacts of the Tax Credit Expiration*. Prepared for the American Wind Energy Association and the Solar Energy Research and Education Foundation, 13 February 2008, Navigant Consulting, Bedford, MA.

[10] Terry Macalister, *Blow to Brown as BP scraps British renewable plan to focus on US*, THE GUARDIAN (7 November 2008).

begin to become competitive and self-supporting on a national level by the end of the decade [i.e. by 1990] if assisted by tax credits and augmented by federally sponsored R&D."[11] This earlier optimism suggests we train a skeptical eye on optimistic predictions today.

An alternative model for spurring private sector innovation and investment in alternative energy technologies like solar power is for Congress to provide prizes, modeled on the Ansari X Prize for spaceflight. My former colleague at Case Western Reserve University Law School, Prof. Jonathan Adler, has argued that a prize approach would resolve many of the difficulties Congress faces in choosing which technology to back. While cautioning that prizes are not a panacea, Adler argues that prizes induce innovation in the same way that the patent system does, while imposing costs only when they produce results.[12] Similarly, as Thomas Kalil of the University of California at Berkeley, and a former official of the Clinton administration, explained, prizes offer a means to "help to blend the best of public purpose and the creativity, energy, and passion of private sector entrepreneurial teams"[13] without committing the government to choosing a particular recipient or strategy. Prizes "allow the government to establish a goal without being prescriptive as to how that goal should be met or who is the best position to meet it."[14] Since, by definition, we do not know what will be the successful technology that delivers a new energy source, prizes offer the advantage of not precluding any promising directions for innovation.

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[11] These, and additional, examples are collected at IER, *Will Renewables Become Cost Competitive Anytime Soon?,* http://www.instituteforenergyresearch.org/2009/04/01/will-renewables-become-cost-competitive-anytime-soon-the-siren-song-of-wind-and-solar-energy/.
[12] Jonathan H. Adler, *Eyes on a Climate Prize: Rewarding Energy Innovation to Achieve Climate Stabilization*, available at http://www.law.upenn.edu/cf/institutes/plee/workshops.html.
[13] Thomas Kalil, *Prizes for Technological Innovation*, Hamilton Discussion Paper 2006-08, The Brookings Institution (December 2006), at 5.
[14] Kalil, *supra,* at 6.

Conclusion

Our energy future is a subject of vital importance to our nation. Congress should have the best information available to analyze potential strategies for meeting the challenges that lie ahead. Even with the best information possible, our energy future contains many unknowns. In 1870, coal heated people's homes, natural gas provided light, electricity had little practical application, and gasoline was a waste product of kerosene refining. The great energy policy debates of that era concerned whether the world would run short of coal. No one in 1870 would have predicted that coal would become almost entirely an industrial fuel in plentiful supply, that natural gas would be used primarily to generate electricity and provide residential heat, that electricity would be in widespread use in homes and industry, or that gasoline would become an expensive commodity. We know as little about our energy future as our predecessors did about theirs and so we must put a premium on strategies that can adapt to new information, new circumstances, and new ideas.

In making its energy policy choices, Congress ought to exercise due diligence in reviewing both the methods and the predictions offered in support of particular technologies and strategies. I hope the material I provided today will assist you in making those choices.

Thank you for giving me the opportunity to testify today. I would be happy to answer any questions.

Response by Prof. Andrew Morriss to Sen. Inhofe's questions:

Question 1: "In your written statement you mention that some jobs are costs and shouldn't be counted as a benefit. What kind of jobs do you mean? Why aren't all jobs created by a federal program a gain for the economy?"

Answer: All jobs produce an employee with income. But not all jobs produce something of value. For example, if you gave me $100 million and I hired people to dig holes in my fields and refill them, those jobs would produce employees with salaries but would not generate any wealth. There would also be a cost of diverting the $100 million away from productive investment that could have created productive jobs.
A lawyer's job created to monitor compliance with federal regulations would be an example of a job that was a cost rather than a benefit. This job would not produce something of value desired by consumers and so is a cost. Similarly, jobs for consultants to help people apply for federal subsidies are not productive but merely move resources around. It may be necessary to have such jobs, but they divert resources from productive employment creating value and so are properly considered a cost to the economy rather than a benefit.

2. Can you briefly explain in layman's terms what the problems are with the studies that use "input output analysis" to estimate job creation from alternative energy programs?

Answer: Input-output analysis depends on calculations of the relationships between production of different goods. For example, the amount of steel in a car is estimated, then if more cars are produced, the additional amount of steel needed is calculated. The problem is that the analysis assumes that relative prices will not change and that the physical relationship between goods will not change. Since green jobs estimates are based on making significant changes in both (increasing energy prices by switching from cheaper to more expensive forms of power generation, changing the composition of goods to make them less energy intensive), these assumptions are violated and the results fall into the "garbage in, garbage out" model. Input-output models are fine for estimating the impact of a new factory moving to an area; they are inadequate to cope with large scale technological change. Since the latter is what is sought by green jobs programs, they are inappropriate by definition.

Senator BOXER. Thank you very much, Mr. Morriss. You got a lot into that 5 minutes. Thank you very much.

Now we are going to call on Rob Gillette, CEO, First Solar.

Welcome.

STATEMENT OF ROB GILLETTE, CEO, FIRST SOLAR

Mr. GILLETTE. Thank you. It is a pleasure to be with you today to talk about the opportunities that exist for clean energy and solar energy specifically. My name is Rob Gillette. I am the CEO of First Solar. First Solar is the largest manufacturer of photovoltaic solar modules in the world, so as a business we have grown a lot over the last several years.

Between 2005 and 2009 we started with 20 megawatt of production and now have 1.1 gigawatt of production worldwide as a business. That is an increase of over 50 times in just 4 years. So a lot of growth for us. 1.1 gigawatt is enough electricity to power about 160,000 homes, if you kind of do that math back; reduce 30 million tons of CO_2 over a 25-year life of our module. So good contributions in general.

We employ over 4500 people, over 1500 of them in the United States, and we manufacture and build product. In our business, we have invested about $1 billion in total in capital technology, and we install power and generate power in the range of between 12 cents and 15 cents per kilowatt.

The critical component of our success is the technology we call thin film, and it was developed here in the United States. Our successes in growth really have been driven by overseas growth and specifically sold much of our product outside of the United States. This has enabled us to grow and reduce our total cost and drive scale in our business and drive competitiveness in solar electricity.

It is no surprise that although we expanded our plant in Ohio last year most of our plants are outside of the United States, as we build products, build our facilities where the demand is. We are still a net exporter from the United States in our facility in Perrysburg, Ohio.

Germany remains an excellent example of increased renewable energy use and creation of green energy jobs. Renewable energy consumption in Germany increased from 4 percent of their total demand to 15 percent as a result of renewable energy feed-in tariff that created growing and transparent and predictable renewable markets.

The German market reports that there is roughly 280,000 jobs in the renewable energy sector that have been created over the last several years and driven by the feed-in tariff which was adopted, and 53 billion tons of CO_2 emissions have been avoided because of it. So adoption of similar support programs across most European countries exists, and the consideration of such programs is also in place in both China and India.

So our resources in the United States are abundant. We have a lot of sun. We have a lot of opportunity to grow our business, as the Secretary described earlier. About less than 1 percent of our energy today is provided by solar power, so we have a lot of opportunity to provide.

We have some suggestions, I think, that will help us grow the business, and I would like to cover a few of them. They are similar to my colleagues' on the panel, but the first is extend the expiring Treasury Grant Program. As you know, one of the solar energy's most significant constraints is to gain and have efficient access to capital, so our ability to fund and develop these sites is important.

In 2009, the American Recovery and Reinvestment Act included a grant in lieu of the investment tax credit for solar generation. However, the grant program will expire at the end of this year just as it is critically needed to bring these projects to market.

So from a business standpoint and overall, we would like to see that extended to the end of 2012 and allow us to get these programs executed and in place. Senator Feinstein in California has introduced legislation to extend and expand the grant program there and also help with that, so that is a definite plus.

Second, to extend and streamline the Department of Energy Loan Guarantee Program. Approximately 85 percent of the power price received from large scale solar power plants goes to repay the capital invested to build the project. Even though we are the leading solar power plant developer in the United States with over 1.5 gigawatts of projects in development, First Solar has only one project that can meet the deadline for this project.

Due to the 2011 sunset date, permitting redundancy, and complexity of the program, we anticipate having to seek private sector funds and loans to drive the rest of the projects in our portfolio. So this will end up costing more for the utilities and others to buy the electricity generated from solar power, so we think it is critical that we align that with the overall policy and extend it to 2016 and at least 2 years going forward.

Federal and State solar initiatives from a business standpoint are also going to help us as a business to grow and to help to drive the adoption and ease of execution in land use as was mentioned earlier.

Thank you for the opportunity to present, and I am open to questions.

[The prepared statement of Mr. Gillette follows:]

STATEMENT OF

ROBERT GILLETTE

CHIEF EXECUTIVE OFFICER

FIRST SOLAR

BEFORE THE

U.S. SENATE

COMMITTEE OF ENVIRONMENT AND PUBLIC WORKS

AND

SUBCOMMITTEE ON GREEN JOBS AND THE NEW ECONOMY

JANUARY 28, 2010

JOINT HEARING:

SOLAR ENERGY TECHNOLOGY AND CLEAN ENERGY JOBS

Chairman Boxer, Ranking Member Inhofe and members of the committee, thank you for the opportunity to discuss the potential to improve our environment and create jobs by expanding the use of clean, affordable solar energy.

First Solar Background

I am Rob Gillette, CEO of First Solar. First Solar is the world's largest photovoltaic (PV) solar module manufacturer. Our firm is North America's largest PV solar power plant developer, and the low cost PV manufacturer. Our mission to enable clean, affordable solar electricity is supported by a sustainable business strategy that leverages advanced technology and economies of scale to lower costs.

First Solar welcomes the opportunity to address the topic of today's hearing -- Solar Energy Technology and Clean Energy Jobs. Our advanced technology thin film modules are the cornerstone for the rapid manufacturing scale-up, progress toward grid parity, and job creation that we have experienced. However, stable, long-term government policies accelerated our journey. Today, First Solar is a Fortune 500 company with expected 2009 revenues totaling approximately $2 billion.

Between 2005 and 2009, we scaled our annual solar module production from 20 megawatts to over 1,100 megawatts -- an increase of more than 50 times. During the same period, we increased employment to more than 4,500 people and invested over $1 billion in equipment and research. The ability to scale the business enabled a 70 percent cost reduction in our modules. For high irradiance solar projects, the installed cost is on a pathway toward grid parity with a US installed cost between $0.12 and $0.15 per kilowatt-hour, including federal incentives.

Our associates take great pride in their work and the knowledge that on an annual basis, First Solar's manufacturing capacity can generate enough electricity to power 160,000 houses and simultaneously avoids emissions of 30 million tons of CO2 over the 25-year life of the modules.

Plans to increase our global solar module manufacturing capacity from 1,100 megawatts to 1,800 megawatts were announced earlier this year.

Market Growth Enables Jobs and Cost Reduction

The critical component of First Solar's success has been our game-changing thin-film technology, developed in the United States. Today, our growing Ohio operations directly employ over 1,000 associates and remain a nucleus for research and technology innovation. In a state with over 10 percent unemployment, our operations continue to expand and offer high-tech jobs. Our cutting edge research has attracted dozens of PhDs who live and work in the greater Toledo area. Equally important is that our Perrysburg facility employs many former auto workers who possess manufacturing skills that are both specialized and transferable to solar manufacturing.

The cornerstone of our technology adoption and cost reduction success is due to growing and reliable solar markets overseas. In 2009, over 90% of our global production was sold outside of the United States. These markets have provided us the opportunity to scale and reduce costs, thus enabling an accelerated cycle of improvement that benefits the environment, local economies and the cost competitiveness of solar electricity.

It should come as no surprise that, although we expanded our Ohio plant last year, most of our plants are built outside of the United States. As a growing number of countries combine carbon emission reduction goals with renewable energy policy, the proximity to markets and low cost manufacturing will drive investments and manufacturing overseas unless policies here help drive market growth; it is that simple.

Germany remains an excellent example of how forward looking policy increased renewable energy use and created green jobs. Renewable energy consumption in Germany increased from 4% to 15% as a result of a renewable energy feed-in tariff that created growing, transparent, and predictable renewable markets. The German government reports that over 280,000 renewable energy jobs have been created since the feed-in-tariff was adopted and 53 billion tons of CO2

emissions have been avoided. This success has driven the adoption of similar support programs across most European countries and ongoing consideration of such programs in China and India.

US solar resources are many times larger than those in Germany or other solar markets of significance. However, despite the enormous potential for solar leadership, the United States accounts for less than one percent of global sales. Without a growing and predictable domestic market, the United States risks losing the global race for solar technology and associated green jobs and could be relegated to an importer of products developed and manufactured in other countries.

US Policy Initiatives

The good news is that it is early in the industry's development path, and the outcome can still be influenced. In order for the United States to establish a leadership role, First Solar recommends four actions to extend programs that are beginning to make a difference in today's marketplace and to position the US for mid and longer-term growth.

1. **Extend Expiring Treasury Grant Program**

One of the solar industry's most significant constraints is efficient access to capital. The 2009 American Recovery and Reinvestment Act included a grant in lieu of the investment tax credit for solar generation, which could have a very positive impact on the US solar market and related US job creation.

The Section 1603 Treasury Grant Program provides direct payments to energy producers in place of tax credits. This was done to help compensate for the dwindling tax equity market and to provide a cash incentive at a time when the solar industry as a whole was not profitable.

A defining feature of the Treasury Grant Program is that it vastly expands the pool of investors who are attracted to the stable, long-term return on investment that a utility-scale solar power

plant generates. The Grant Program also benefits the debt-side of solar financing by lowering the cost of debt at a time when financing continues to be tight.

First Solar joins others in our industry, small and large, to extend our thanks to Congress for establishing this program. However, the grant program will expire at the end of this year, just as it is critically needed to bring projects on line and attract investors for new development projects. It is vital that the grant program be extended though December 31, 2012 in the upcoming Jobs Bill. First Solar is also supportive of Senator Feinstein's legislation, the Renewable Energy Incentive Act, to extend and expand the Section 1603 grant program.

2. Extend and Streamline the Department of Energy Loan Guarantee Program

Approximately 85 percent of the power price received from a large-scale solar power plant goes to repay the capital invested to build the project. Even though we are the leading solar power plant developer in the US, with over 1,500 megawatts of projects in development, First Solar has only one project that can meet the deadline for this program. Due to the 2011 sunset date, permitting redundancy, and complexity of the program, we anticipate having to seek private sector loans for the other projects in our portfolio. The fact is, more expensive financing results in higher-cost solar electricity.

The Department of Energy loan guarantee program can play a key role in supporting industry growth by reducing financing costs and fostering the development of robust private capital markets to finance large solar projects.

It is critical that:

- the program's lifespan be extended to 2016, making it coterminous with the investment tax credit, and synchronized to the long development timelines of the projects it is intended to support, and

- environmental permitting requirements and timelines are harmonized between state and federal oversight agencies.

3. Federal/State solar incentives

As I mentioned earlier, the solar industry's development and cost reductions to date have resulted primarily from feed-in-tariff programs in countries such as Germany. I encourage you to consider the creation of joint Federal/State incentive program that would promote the development of solar markets in geographies that have strong solar resources. The outcome would be the installation of multiple gigawatts of solar energy, the creation of hundreds of thousands of jobs, solar electricity costs near grid parity, and a significant reduction in CO2 emissions.

4. Address Issues of Land Use and Grid Transmission for Solar Inclusion

I want to thank Secretary Salazar for his work in improving the regulatory processes to deploy solar on federal lands with greater speed, certainty and transparency without compromising the stewardship of our nation's precious resources. Based on First Solar's experience, we believe the MOU between the Department of the Interior and the State of California has fostered a sense of collaboration and commitment around advancing large-scale projects.

As renewable energy grows, transmission becomes a serious constraint that must be addressed. The rules governing transmission siting and interconnection were designed decades ago and urgently need updating to accommodate the inclusion of renewable generation.

Conclusion

First Solar believes that a strong US solar industry is critical to our energy security and economic recovery. In fact, we know that solar energy creates more jobs per megawatt of energy than any other form of energy: renewable or fossil. The federal government should provide transitional

incentives of sufficient duration and impact to ensure that those jobs are created in the United States.

We encourage Congress to act now to extend vital programs scheduled to expire and to remain committed to longer-term programs necessary to attract the global capital and investment required to sustain a growing renewable energy sector.

We look forward to working with Congress in crafting solutions to create jobs and reestablish America's leadership in solar manufacturing and deployment.

Senator BOXER. Thank you so much.

We will now hear from Mr. Jeff Wolfe, CEO of groSolar.

Welcome, sir.

STATEMENT OF JEFF WOLFE, CEO, GROSOLAR

Mr. WOLFE. Thank you, Madam Chairman, for holding the hearing and for all of your leadership on energy issues. I am Jeff Wolfe, co-founder and Chief Executive Officer of groSolar. I am also the elected Chair of the Photovoltaic Division of the Solar Energy Industries Association, a founding Board Member of several renewable energy associations, and a registered professional engineer with a mechanical engineering degree from Cornell University.

groSolar is one of the Nation's largest residential solar installation companies. We are also the largest 100 percent U.S. owned distributor of solar electric systems and also an installer of large commercial solar systems. We were founded in 1998 in Vermont and now directly operate in 12 States and the District of Columbia and provide distribution services to most other States.

I came here today to speak about solar energy. Solar energy is one of those unusual technologies that can solve a bunch of problems at once. Since I started groSolar with my wife 11 years ago the technology has been able to provide American-made energy, decrease our dependence on foreign oil, increase our national security, reduce pollution, and fight climate change. And while it is doing all those things it is also creating jobs—good jobs. Each megawatt of solar photovoltaic systems deployed annually in the U.S. creates 25 jobs, and most of these jobs are impossible to send offshore, since they are on the ground and on the roof installing and selling these systems, and it is simply hard to install a solar system on a roof in this country unless you are in this country.

While many of our solar panel manufacturers are exporting overseas the U.S. is still a net exporter of solar panels, creating more jobs here. As an example, while groSolar is smaller in terms of businesses in the United States groSolar's overall territory includes direct jobs in over a third of the States represented by members of this committee. When added with indirect jobs, groSolar has created jobs in California, Delaware, New Jersey, Maryland, Vermont, Minnesota, Rhode Island, New Mexico, Oregon, New York, Pennsylvania, Ohio, Idaho, Missouri, and Tennessee. Looking beyond groSolar, every State represented here has multiple solar energy companies in it. Solar is one of the renewable energy sources that can provide jobs and economic benefit to every State in the Union.

It is a difficult time for small business in America. It is difficult to get credit, financing for projects, and working capital. But with the incentives put in place under the American Reinvestment and Recovery Act and other recent legislation we are not only retaining existing jobs, we and other solar companies are helping to create new jobs. The ARRA funding for State energy programs has injected new life into many States and created solar programs where little existed before. The funding for public works projects has also created good business opportunities. And most importantly the Federal Grant in lieu of the solar investment tax credit has been fundamental in moving solar projects forward in 2009 and now in 2010. While we create jobs we are also securing our longer term

future. Stable energy prices are an important element of economic stability and solar provides long-term stable electric prices.

But we need to do more. The 10 Million Solar Roofs bill to be introduced by Chairman Sanders would help homeowners and small businesses stabilize their energy costs by defraying enough of the cost of a solar electric or solar hot water system to allow the homeowner or business to fund the rest with cash flow similar to their electric bill, resulting in potential reductions in their energy costs.

To wrap up and urge the Senate to do some more things to help create more jobs quickly, first and foremost, we need to have the investment tax credit grant extended, as my colleagues have said, for another 2 years, to help stabilize the industry and stabilize the project flow that we all need, the long-term project flow. And this grant extension is at no added cost to the Government in this time of budget troubles.

Second, we request the tax credit for any solar installed on a residence be expanded to 50 percent of the cost of the eligible solar energy system. Homeowners are most in need of assistance to stabilize their monthly bills. This provides an economic benefit to a very broad range of working Americans, which continues to assist the homeowner for more than 25 years, stabilizing and reducing their energy bills, helping the homeowners to continue to make their mortgage payments.

Third and last is to open up the ability to finance small projects as part of the proposed Green Energy Bank. Giving large banks the ability to lend has not created within them the desire to lend. Thus, we ask that the Government step in and set up a lending organization. Strikingly, the existing programs that the Export/Import Bank is able to provide for U.S. solar companies selling products overseas if made available for projects in the U.S. would do a lot to spur domestic manufacturing and domestic job creation. These loan programs would be provided by domestic banks in normal times, but these are not normal times. Thus, some method to drive lending to small business is critical.

In summary, solar technology is ready now. I thank you for your time and attention to the matter.

[The prepared statement of Mr. Wolfe follows:]

Full Committee and Subcommittee on Green Jobs and the New Economy Joint Hearing: Solar Energy Technology and Clean Energy Jobs

Jeff Wolfe, CEO, groSolar

Testimony to the US Senate, Environment and Public Works Committee

I am Jeff Wolfe, co-founder and Chief Executive Officer of groSolar. I am also the elected Chair of the Photovoltaic Division of the Solar Energy Industries Association, founding Board Member of several renewable energy associations, and a Registered Professional Engineer with a Mechanical Engineering degree from Cornell University.

groSolar is one of the nation's largest residential solar installation companies, the largest 100% US owned distributor of solar electric systems, and an installer of large commercial solar electric systems. We were founded in 1998, in Vermont, and now directly operate in 12 states and the District of Columbia, and provide distribution services to most of the other states.

I came here today to speak about solar energy. Solar energy is one of those unusual technologies that can solve a bunch of problems at once. Since I started groSolar 11 years ago with my wife, the technology has been able to provide American-made energy, decrease our dependence on foreign oil, increase our national security, reduce pollution, and fight climate change. And while it is doing all those things, it is also creating jobs, good jobs. Each Megawatt of solar photovoltaic systems deployed annually in the US creates 25 jobs. And most of those jobs are impossible to send offshore, since they are on the ground and on the roof, installing and selling the systems. And it's simply hard to install solar panels in this country unless you are in this country.

As an example, while groSolar is small in terms of businesses in the US, groSolar's overall territory includes Direct Jobs in over a third of the states represented by members of this Committee. When added with Indirect jobs, groSolar has created jobs in California, Delaware, New jersey, Maryland, Vermont, Minnesota, Rhode Island, New Mexico, Oregon, New York, Pennsylvania, Ohio, Idaho, Missouri, and Tennessee. Looking beyond groSolar, every state represented here has multiple solar energy companies in it. Solar is one renewable energy source that can provide jobs and economic benefit to every state in the Union.

It is a difficult time for small business in America. It is difficult to get credit and financing for projects and working capital. But with the incentives put in place under the American Reinvestment and Recovery Act and other recent legislation, we are not only retaining existing jobs, we and other solar companies are helping to create new jobs. The ARRA funding for state Energy Programs has injected new life into many states, and created solar programs where little existed before. The funding for public works projects also has created good business opportunities. And most importantly, the Federal Grant in lieu of the solar Investment Tax Credit has been fundamental in moving solar projects forward in 2009 and now in 2010. And while we create jobs, we are also securing our longer term future. Stable energy prices are an important element of economic stability, and solar provides long term stable prices.

Full Committee and Subcommittee on Green Jobs and the New Economy Joint Hearing: Solar Energy Technology and Clean Energy Jobs

Jeff Wolfe, CEO, groSolar

Testimony to the US Senate, Environment and Public Works Committee

But we need to do more. The 10 Million Solar Roofs bill, recently introduced by Chairman Sanders, would help homeowners and small businesses stabilize their energy costs by defraying enough of the cost of a solar electric or solar hot water system to allow the business to fund the rest with cash flow similar to their electric bill, resulting in potential reductions in their energy costs. This type of program has been proven in CA with their Million Solar Roof program. Rolling it out nationwide will create jobs in every congressional district, create secure, reliable and clean distributed energy, and move us forward with the smart grid.

One of the successes of the California Million Solar Roofs program has been a reduction in the cost of solar. The installed cost is falling dramatically (over 35% in 2009 alone), and unlike fossil and nuclear technologies which have received large incentives for decades, solar actually foresees a time, in this decade, when we will require no subsidies from the federal government. The national 10 Million Solar Roof bill will allow scale to occur in solar in many locations. This will drive down the costs of installation, while at the same time stimulating demand, which drives up innovation, which again drives down prices.

It is a difficult time in the US economy. Homeowners and small businesses feel a particular hurt, as many of us 'did nothing wrong', but appear to be bearing the brunt of the burden for paying for the problems caused by large banks. There are several items which could assist this class of Americans while also creating immediate jobs.

- First and foremost is to extend the Federal grant option of the solar Investment Tax Credit. This program has been tremendously helpful in allowing small businesses to buy solar energy systems, at a time when getting bank financing for those projects would have been impossible. Since it appears that the banks still do not have sufficient tax capacity to meet the needs, extending this grant in lieu of tax credit for 2 years, through 2012, will continue to create solar jobs, **at no added cost to the government.**
- Second, we request that the tax credit for any solar installed on a residence be expanded to 50% of the cost of the eligible solar energy system. Homeowners are most in need of assistance to stabilize their monthly bills. This provides an economic benefit to a very broad range of working Americans, which continues to assist the homeowner for more than 25 years, stabilizing and reducing their energy bills helping the homeowner continue to make their mortgage payments.
- Third, and last, is to open up the ability to finance smaller projects as part of the proposed Green Energy Bank. Giving large banks the ability to lend has not created within them the desire to lend. Thus, we ask that the government step in and set up a lending organization. Strikingly, the existing programs that the Export / Import Bank is able to undertake for US

Full Committee and Subcommittee on Green Jobs and the New Economy Joint Hearing: Solar Energy Technology and Clean Energy Jobs

Jeff Wolfe, CEO, groSolar

Testimony to the US Senate, Environment and Public Works Committee

> solar companies selling product overseas, if made available for projects in the US, would do a lot to spur domestic manufacturing and job creation than any other program. These loan programs would be provided by domestic banks in normal times, but these are not normal times. Thus, some method to drive lending to the small business level is critical.

In summary, solar technology is ready now. It works in every state in our great country, and provides reliable, clean, and secure US made energy. More solar implementation will quickly create more US jobs. Implementation of a National 10 Million Solar Roofs bill, the no-cost tax changes I have discussed, and a solid ability for small businesses to borrow money would create jobs Americans need, and it would create many of them in 2010.

Thank you for your time and attention.

Environmental Public Works Committee Hearing
January 28, 2010
Answers to Follow-Up Questions for Written Submission

Question from Senator Barbara Boxer:

1. You have testified that the cost of installing solar energy on roofs can fall dramatically with the right types of policies.

Can you describe how big of a reduction we can see, and the types of policies that help achieve such cost reductions?

Answer from Mr. Wolfe:

The installed cost of solar has fallen between 35% and 45% in the last 18 months. This is due to a large drop in PV module costs (spurred largely by a large drop in refined Silicon costs). We anticipate another 20%+ drop within the next 18 months. This will bring residential solar system installed costs to the range of $4.25/watt, and commercial solar system installed costs to the range of $3.75/watt.

Like any industry, solar needs a stable policy environment and stable government regulation. Like all other energy industries, solar needs incentives in order to compete with all other energy sources which also have significant (and sometimes well hidden) subsidies and incentives. By creating a level playing field of incentives, this allows the solar industry to grow, and scale has a significant impact on cost. Specific additional areas of policy that can assist in reducing the cost of solar are:

- Uniform national net metering laws, based on the Interstate Renewable Energy Council (IREC) model legislation.

- Uniform national interconnection standards, based on the Interstate Renewable Energy Council (IREC) model legislation.

- Increase the ITC for residential solar deployments under both 48 and 25D to 50% through 2012. This will bring the tax benefit for residential to the same level as large commercial (which has MACRS depreciation benefit unavailable to homeowners). Residential solar deployment happens faster than larger scale, and creates more jobs faster as well. The residential sector doubled in 2009 after the $2000 cap on the ITC for homeowners was removed.

- Adopt labor rules to provide for a labor classification for a "Solar Technician." Currently no labor classification exists for the specialty work

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performed, and the work is often lumped under "Electrician," resulting in increased costs and regulatory hurdles.

- Extend the Treasury grant program through 2012 (see attached). The grant program was enacted to compensate for the dwindling tax equity market. Those markets have not recovered as expected, and the grant program has become critical in commercial solar sales.

- Provide a national rebate / incentive program for distributed solar, similar to Senator Sanders' 10 Million Solar Roofs bill. The patchworks of individual state programs require significant paperwork, change frequently, and are often out of funds. These state programs create an unstable environment for industry investment. A federal program could unify and streamline the process, and provide a higher level of business certainty, allowing additional investment to flow into solar companies, therefore accelerating solar deployment and accelerating cost decreases.

Question from Senator Barbara Boxer:

2. Can you please describe the types of jobs and geographic diversity of such jobs that groSolar relies on to conduct its business?

Answer from Mr. Wolfe:

groSolar directly employs people in 12 states (VT, MA, CT, NY, NJ, PA, MD, NC, GA, TX, MT, CA). We support a large number of contractors (who purchase equipment from us, and who we assist with their business development) in almost every state.

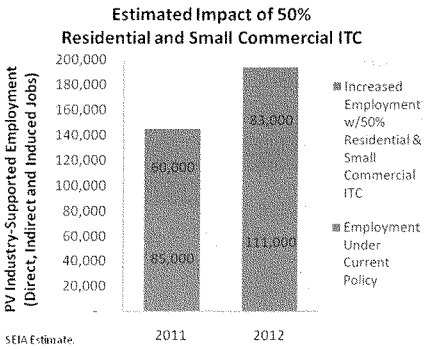
Personnel we employ have the following types of positions:
- Residential installation crew
- Electricians (Apprentice, Journeyman, Master)
- Residential installation project manager
- Regional project manager
- Inside sales (telephone sales)
- Outside sales (in-home sales)
- Sales management
- Incentive and utility paperwork specialist
- Procurement
- Warehouse management
- Warehouseman
- Distribution sales
- Sales support
- Order fulfillment
- Information technology
- Operations management
- Finance / accounting

- Human resources
- Regulatory compliance specialist
- Marketing
- Graphic design
- Website design
- Engineering
- Drafting
- Trainers
- General administration

Personnel we indirectly employ include:
- Public relations
- Marketing
- Trucking/shipping
- Roofers
- Lawyers
- Collection agencies
- Travel agents
- IT services
- Bankers

SEIA Solar Energy Industries Association

Analysis of 50-Percent Residential and Small Commercial ITC



Summary

SEIA estimates that expanding the federal investment tax credit (ITC) to 50 percent in 2011 and 2012 for residential and commercial systems less than 20 kilowatts (kW) could support up to 80,000 additional jobs (direct, indirect and induced) in 2012 compared to current policy. It could also result in the deployment of an additional 1,000 megawatts (MW) of solar electric capacity and $6 to $7 billion in additional investment.[1]

Analysis

This analysis focuses on photovoltaic (PV) systems but this policy change would also impact the demand for and employment in solar water heating (SWH) and small concentrating solar power projects (CSP). Though the scale of the impact in SWH and CSP is not calculated here, providing these small systems with a 50-percent credit would likely have a large and positive impact on employment in those industries.

Installations of residential PV systems doubled from 2008 to 2009 from 78 to 156 MW. This achievement was made possible in part by the expansion of the Federal residential ITC. That expansion sufficiently improved small PV project economics to make it an attractive investment in previously marginal areas.

Increasing the ITC to 50 percent for residential and commercial systems less than 20 kW would have a similar impact on project economics. Considering only Federal incentives, this change would make solar less expensive than traditional electricity in cities across the country. (See the chart on the following page.)

Of the cities represented in the chart below, the "30-percent ITC" line shows only one city at parity with the grid, while the "50-percent ITC" line shows 8 cities where solar is cost-competitive with grid electricity. (See footnote for explanation on

[1] Assuming average installed costs between $6 and $7 per watt.

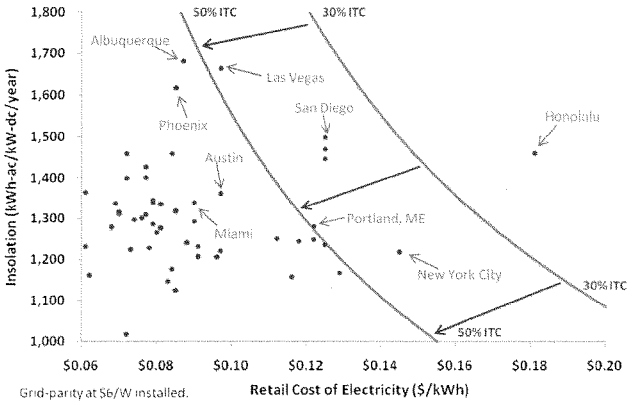
how to read this chart.)[2] This calculation does not include state and local incentives, which will push solar electricity below grid price in even more cities.

Small commercial systems are physically and logistically similar to residential systems, and including them would likely impact the small commercial market in a similar manner.

SEIA estimates that expanding the ITC to 50 percent for small systems would increase demand for small PV systems by roughly 400 MW in 2011 and 600 MW in 2012. This estimate is based on expected doubling in the baseline demand for residential systems in those two years and a shift from a conservative to an aggressive forecast for commercial systems.

Small systems, both residential and small commercial, are more labor intensive to install. As such, they will employ more people per dollar than larger systems. Given the estimated impact on demand for these systems, this policy change could help support over 80,000 additional jobs (direct, indirect and induced).[3]

Cities at Grid-Parity with either the 30% or 50% Federal ITC



[2] The lines on this chart represent the "levelized cost" cost of PV electricity at different levels of solar radiation and with different incentive levels. The dots represent US cities. Any city to the right of a given line has achieved grid-parity at that cost under the incentive structure. These charts represent only the impact of federal incentives. Additional state incentives would push additional cities past the point of grid parity.

Assumptions: 100% debt financed at 5% APR for 20 years. 25-year system life. Tilt at latitude. No property taxes on system.

[3] Direct jobs are people employed in the solar industry. Indirect jobs represent supply chain employment. Induced jobs are attributable to the broader impacts of the industry's economic activity.

SEIA Solar Energy Industries Association®

10 Million Solar Roofs & 10 Million Gallons of Solar Hot Water Act

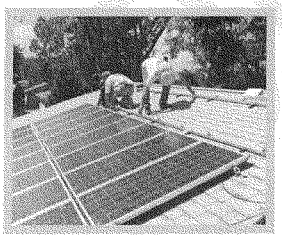
Introduced by Senator Bernie Sanders (I-VT)

Background

The '10 Million Solar Roofs & 10 Million Gallons of Solar Hot Water Act' would address rising energy costs, global warming and America's dependence on foreign energy sources and create tens of thousands of new green-collar jobs and billions of dollars in new investment. The legislation would spur the installation of photovoltaic (PV) and solar water heating technology across the country by providing direct rebates to consumers. Analysis by SEIA shows that there is sufficient roof space in the United States to provide 20% of total electricity demand using PV panels.

Key Provisions

- Provides direct rebates of at least $3 per watt of installed PV capacity and $1 per watt thermal-equivalent of solar water heating capacity.
- Eligible recipient include homeowners, businesses, non-profit entities and state or local governments. The properties on which the solar systems are installed must be located within the United States and must meet energy efficiency criteria designated by the Secretary of Energy. The solar systems must also be no larger than 4 megawatts.
- The total rebate may not exceed 50% of the total installed system cost after factoring in other rebates, tax credits and incentives.



Workers install a solar system on a zero-energy home. The system has both photovoltaics and solar thermal collectors and will provide enough electricity and hot water to meet all the occupants' needs. (Photo—Pete Beverly)

Why a National Solar Roofs Program?

- Solar is an economic engine, creating manufacturing and installations jobs across the country, spurring investment and saving consumers money on their utility bills. Every megawatt of solar deployed in the US creates 25 job/years of employment. The solar industry as a whole is responsible for over 60,000 jobs in the United States.
- Solar helps provide energy security by generating clean power and reducing the impact of natural disasters and other disruptions to the grid. Producing domestic solar energy also reduces our dependence on foreign sources of energy.
- Solar systems generate the most energy during periods of peak electricity use, and often reduce the need for expensive generation from gas-fired power plants.
- Solar produces clean, renewable thermal and electrical energy with zero emissions and will be a key technology in reducing greenhouse gas emissions to combat global warming.

Learn more about the economic benefits of solar from SEIA's web site at www.SEIA.org.

SEIA Solar Energy Industries Association®

Net Metering & Interconnection Standards

Pathways to Distributed Generation

Overview

Net metering and interconnection standards provide the foundation for the on-site generation of electricity in homes or businesses. Electricity generated at or near its point of use is referred to as *distributed generation* (DG). It is particularly relevant for photovoltaic (PV) solar power, which comprises a majority of DG electricity. DG can complement *base-load generation*, which refers to the traditional generation of electricity by large-scale utility power plants. The viability of DG systems is dependent upon access to the electric grid (interconnection rules) and fair utility billing terms (net metering).

Net metering allows for the electricity grid to act as virtual storage by requiring that utilities bill customers only for the *net* electricity used during each billing period. For example, if a customer has a PV system on their home, they may generate more electricity than they use during daylight hours. In that case, if their home is net metered their electricity meter will run backwards. At night – when they are using electricity – their meter runs forward as normal. *Interconnection standards* are the technical and legal procedures for a customer with a DG system to physically connect to the grid.

National net metering and interconnection standards would protect the right of consumers and companies to generate electricity at their homes and places of business. A uniform national standard would also lower the cost of net-metered systems by helping achieve economies of scale through a simplified process and rules

Why Distributed Solar?

DG solar systems offer a number of benefits to consumers, both individually and in the aggregate.

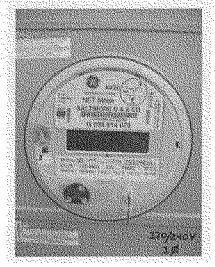
- PV solar systems generate the most electricity during the middle of the day, when demand and the cost of electricity are highest. With net metering, individual PV systems can offset expensive peak electricity purchases, resulting in lower electricity bills for all consumers.
- Each megawatt (MW) of PV solar power will prevent 25,000 tons of air pollution over its useful life and reduce harmful particulate emissions from fossil-fuel generation.[1]
- Solar is an emerging jobs engine. PV solar creates more jobs per MW than any other energy source. Each MW manufactured and installed in the US will directly employ 24 people.[2]
- As DG solar reaches higher market penetrations, it can make the electricity grid more reliable and secure. It can smooth out the electricity demand curve and reduce the need for expensive new base-load power plants to meet peak loads.

About the Solar Energy Industries Association

Established in 1974, SEIA is the national trade association of the solar energy industry. As the voice of the industry, SEIA works to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry and educating the public on the benefits of solar energy.

For a footnoted version of this factsheet and more information, please visit www.seia.org.

SEIA Solar Energy Industries Association®



A General Electric net meter, installed by Baltimore Gas & Electric in Maryland. This digital meter runs in both directions to accommodate electricity generated at the customer's home. A 4 kilowatt PV system on a home in this area would offset around 4,911 kilowatt hours of electricity each calendar year, saving the homeowner over $380 on their utility bill. For the average Maryland home, this represents over a 37 percent reduction in yearly electricity use. (Source – SEIA, NREL, PV Watts, EIA)

National Net Metering

Net metering recognizes the right of utility customers to generate their own electricity; often more cleanly and efficiently than the utility that serves them. Some utilities resist implementing net metering policies, believing that they represent lost revenue opportunities. In fact, net metering policies and deployment of DG solar resources create a smoother demand curve for electricity and allow utilities to better manage their peak electricity loads. Varying state and utility policies on net metering make it difficult for companies to develop best administrative practices to properly account for customer-sited generation.[3] Best practices for net metering include:[4]

- Allowing all customer classes (residential, commercial & industrial) and all renewable technologies to net meter.
- Protecting the right of customers to size their solar systems to adequately meet their electricity demands, and removing arbitrary limits on aggregate deployment across states or utilities.
- Specifying that customer-sited generators retain all renewable energy credits (RECs) generated to satisfy voluntary or legally-binding renewable energy targets.
- Allowing unlimited "rollover" of any generation in excess of a customer's monthly usage.

National Interconnection Standards

An *interconnection standard* encompasses both the technical standards and legal procedures which allow customer-sited generation facilities to connect to the electricity grid. Many utilities have cumbersome, lengthy and expensive interconnection procedures which can be a barrier to DG solar installations. Some utilities require significant fees, permits and redundant safety measures that are inappropriate and unfeasible for small-scale generators. Adopting a standard interconnection policy nationwide will allow for a streamlined approval process for small generators, and provide a uniform technical standard for interconnection equipment. Best practices for interconnection include:[5]

- Allowing all sizes of generators to interconnect with transparent, detailed and public processes, including expedited "plug-and-play" rules for residential customers.
- Setting reasonable, consistent fees that are proportional to the size of the customer's system.
- Prohibiting utilities from requiring redundant equipment – such as external disconnect switches – and extraneous property insurance.
- Appling existing third-party technical standards for physical equipment such as IEEE 1547 and UL 1741.

SEIA Solar Energy Industries Association®

Citations

[1] Solar Energy Industries Association.
[2] Ibid.
[3] A survey of utility company practices by the Solar Electric Power Association (SEPA) revealed that utilities are more likely to encounter difficulties administrating net metering policies than upgrading their metering infrastructure. The report – *Residential Photovoltaic Metering and Interconnection Study* is available at www.sepa.org.
[4] Best net metering policy practices derived from the Interstate Renewable Energy Council's model rules, available at http://www.irecusa.org/fileadmin/user_upload/ConnectDocs/IREC_NM_model_Dec06.pdf.
[5] Best interconnection policy practices derived from the Interstate Renewable Energy Council's model rules, available at http://www.irecusa.org/fileadmin/user_upload/ConnectDocs/IREC_IC_model_Nov06.pdf.

Extend the Treasury Grants Program (TGP)

- Congress needs to extend the TGP "commence construction deadline" to December 31, 2012 (2-yr extension):
    - Tax equity financing is still VERY scarce.
    - Our economy is still recovering.
    - Every dollar invested in the TGP projects goes directly to stimulate Renewable Energy (RE) investment, because it avoids what have become expensive tax equity transactions.
    - As a practical matter the TGP will only operate for about 13 months. Treasury will release the first grants around mid-November of this year. Congress intended the program to operate for 24 months.

Background:

- The American Recovery and Reinvestment Act of 2009 ("Recovery Act") created a TGP for commercial solar property. Companies can access the TGP in lieu of the 30% investment tax credit IF they commence construction on projects by December 31, 2010. This date operates as the "sunset" date for the entire TGP.
- The TGP was created to compensate for the dwindling tax equity market. The absence of tax equity financing continues today and will persist through 2012.
- Lending was fluid when banks had large balance sheets and could make use of a 30% renewable energy (RE) investment tax credit. Banks would invest in projects in exchange for the developing company's tax credit and a related tax write-off called accelerated depreciation, but as losses have mounted, the five remaining big investment banks have cut back on their tax- equity financing.
- Due to the continuing financial crises a big gap still persists between what developers need and what money is available.
- The RE tax credit market last year was worth about $6.5 – $9 billion, according to Meridian Investments Inc., a brokerage that puts together tax credit financing deals for RE projects. This year the market has declined to less than $3 billion and the remaining companies in the tax equity market have demanded higher yields on RE tax equity transactions - from 8% - to as much as 14%.

For Large Projects:

- Many RE projects rely on DOE loan guarantees for financing. The loan guarantee process and associated National Environmental Policy Act (NEPA) reviews from the time of application to the issuance of a term sheet can take up to 18 months, by which time the "commence construction deadline" to take advantage of the TGP will have passed. Applications for DOE's temporary loan guarantee program solicitation for innovative RE technology and high-efficiency transmission projects were submitted in the middle of September. A solicitation for commercial technology under this program was issued in early October.
    - Larger projects will effectively be PRECLUDED from the TGP due to extended review timelines. Without an extension of the TGP these projects will not go forward.

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Senator BOXER. Thank you very much.

We will go in order of arrival, so we will start with Senator Udall.

Senator UDALL. Thank you very much, Madam Chair.

I very much appreciate the testimony of the entire panel here, in particular, Mr. Gillette and Mr. Rogan, talking about the solar projects that you are working on, and I realize the great impact that that is having in New Mexico and across the West. The solar power industry, I think, has tremendous potential in New Mexico and many, many other western States. In fact, just yesterday a Spanish company announced plans for a 300-megawatt plant in Eastern New Mexico, in Guadalupe County. So we are seeing what you all are testifying about here today.

One of the things that I wanted to ask you about, and it goes directly to Federal policy and the policies that we put in place to further develop solar energy. We are kicking around in various committees a renewable electricity standard. The Senate and the House have passed bills that set a standard by 2020 of 12 percent. The President has actually called for a renewable electricity standard of 25 percent by 2025, and I have introduced that piece of legislation here in the Senate.

What would be the impact on your hiring if Congress enacted a national renewable energy standard at one of these levels? Any of you that want to jump in on that.

Mr. ROGAN. I can start. I think that the impact would be tremendous. As I stated, we have 3,500 megawatts of global contracts right now. Only 500 megawatts of that is in the United States. So because our technology is an installation and construction intensive process the majority of the jobs flow with where the projects are built and ultimately operated, and right now a national RPS would help get more projects developed in the United States more quickly.

As a quick addition to that, I think that it is also important to continue the existing policies that are in place, allowing for the time for these projects to develop, as has been mentioned, the Treasury Grant Program, which Senators Feinstein and Merkley have introduced legislation on, as well as some of the stanzas on the DOE Loan Guarantees that are in place now but need to continue to be in place to support the market.

Senator UDALL. Mr. Gillette or any of the others, would you like to——

Mr. GILLETTE. I would just second what my colleague just said. Also, the emphasis on the financing aspects of the situation, because if we can put together a good financing business transaction, a lot of people are willing to invest in it, that drives growth. In terms of jobs and our cost-down, we have managed to reduce our cost by half in the last 3 to 4 years, so as a business what drives that is scale, and what drives our scale is increasing opportunities installation. So it would help to drive a lot of job growth.

Senator UDALL. Now, one of the other things that we have been considering specifically in this committee is limiting greenhouse gas pollution. Would it be positive for job creation to put that policy also in place?

Please, Mr. Gillette.

Mr. WOLFE. It is our firm belief that fighting climate change, limiting greenhouse gas emissions actually creates one of the biggest economic opportunities that the U.S. has ever seen. In terms of spurring innovation, spurring research and development jobs, spurring engineering and high level project jobs, it is one of the biggest opportunities I think we have ever seen and, as Chairman Boxer mentioned, other countries are hoping we sit on our hands. I hope we don't because it will in fact drive our economy.

Senator UDALL. Mr. Gillette or Mr. Rogan.

Mr. ROGAN. Generally speaking, I would agree. Every megawatt of eSolar power plants that are built is a lesser amount of coal or natural gas power plants that would have to be built, and as I said, in our particular case, because we use much of the same equipment that a coal or natural gas-fired facility would have to buy and have to install, much of the same infrastructure of those industries is used in the construction of our facilities. So, in general, yes, it would spur a widespread development of renewable energy.

Senator UDALL. Thank you. I thank the panel. Apologize for having to go, but I think that you have driven home the point that if we put some good sound policies in place, like an RES and limiting greenhouse gas pollution, we can really drive the industry forward and create a lot of clean energy jobs here in America.

Thank you, Madam Chair.

Senator BOXER. Thank you so much.

Senator Alexander.

Senator ALEXANDER. Thanks, Madam Chairman. Thanks to the panel.

Mr. Rogan, you said that your 3500 megawatts of solar power was equal to three nuclear plants. It would be more like one nuclear plant, wouldn't it, because nuclear plants operate 90 percent of the time and solar is 35 or 40 percent?

Mr. ROGAN. That is true, on a capacity factor basis.

Senator ALEXANDER. In fact, in terms of actual electricity.

Mr. ROGAN. Energy produced, yes, sir.

Senator ALEXANDER. Mr. Morriss, if I were king, I would pick nuclear power as a winner for the future, but of course I don't know the future, as you have suggested. Our energy needs have changed over a long time, and I am trying to keep all of this in perspective. We have in Tennessee two big new photovoltaic plants to make—I mean two big new polysilicon plants, and they each use 120 megawatts of power, massive amounts of electricity. If they had to rely on solar or any other form of renewable energy for that electricity, they wouldn't be in Tennessee, they would be somewhere else, because they need lots of low cost electric power.

So as we look ahead to a time when perhaps solar power can be cheap enough to be a supplement to base load power or even provide some base load power, I would like to ask you what lessons we can learn from two things, one thing you cite and one other fact. One is you cite that a Spanish researcher showed that in fact green jobs might kill more net jobs than they create because if you add jobs for solar plants you might lose jobs for coal plants, for example, and that is one thing we ought to at least have in mind.

A second is the effect of subsidies on emerging technologies. In Germany, according to a chief energy economist of a research insti-

tute there, consumers are paying 5 billion Euros additionally per year to subsidize renewable energy. They basically pay consumers double the price of electricity if they will put solar panels on their houses and sell it back to the grid, as I understand it.

Well, the effect of that is that the Germans are buying Chinese panels, so there are big subsidies going to Chinese solar manufacturers by German people, and that also, would it not, mean that the German manufacturers, because of the high prices, aren't encouraged to lower their cost? And would it not also mean that the cost of electricity is high, and as a result of that, big plants like the polysilicon plants or aluminum plants or automobile plants or other plants with high electricity costs might choose to locate in some other country because their electricity costs are low?

So what are the lessons from other countries about subsidies to solar? How long should they last? What should they be? What are the most effective? And what about the concern about net jobs, as we try to keep a clear idea about all this talk about green jobs and whether in fact there is a cost to all these green jobs that might outweigh the benefit if we are just measuring it in terms of jobs?

Mr. MORRISS. Yes, sir. On the net jobs point, I think it is absolutely crucial that if you are focused on employment you actually have to look at both jobs created and jobs lost, and if we are talking about creating new energy industries, we will definitely be losing jobs in old energy industries. Now, some of those people may well go to work making the same kind of equipment, but we need to do those calculations, and those haven't been done, and that is a place that I think Congress can really have an impact on the debate by getting that information out there.

With respect to subsidies, the danger is that we create an industry that is dependent on subsidies. So Congress, again, has to be very careful in how it structures programs to make sure that the programs it does will not simply, as you pointed out in Germany, create an incentive to buy a piece of equipment——

Senator ALEXANDER. Well, how long should subsidies last?

Mr. MORRISS. Well, I am an economist, so they shouldn't last very long at all, in my professional opinion. But I think what you really want to do is you want to make sure that the subsidies are not designed to lock us in to a technology that turns out to be inferior 10 years down the road when we have done more development. Secretary Chu said last year that solar has to get five times better before it is cost competitive. So if we have to get the technology five times better, then I think the effort Congress puts in should be in funding development of improvements in the technology, not in installing inefficient technology today.

Senator ALEXANDER. Thank you, Madam Chairman.

Senator BOXER. Thank you very much.

You know, I really sometimes wonder about things. If you are a fan of nuclear energy, which most of the members here are, and I think all members believe it is going to be very important in our fight against carbon pollution, and it has a bright future if there is a price on carbon. So if you are a fan of nuclear energy, I would be careful about making the case that solar displaces other forms of energy because you say the same thing about nuclear. If there

is a lot more nuclear energy, there is going to be less coal. So let's not get into that.

The important thing is what is best for the people here. And if you ask about subsidies and how long subsidies ought to last, I don't know when Price Anderson passed, but it has been—1957. It is still in place. It is a huge subsidy. So I just think, if I might finish——

Senator ALEXANDER. [Remarks off microphone.]

Senator BOXER. If I might finish. No, we are going to go on the regular order here. So here is the point——

Senator ALEXANDER. But you are commenting on my questions.

Senator BOXER. Senator, everybody has a chance. and we will have a second round for you.

I want to make this point, that if you pick one area that you think is best—now, I may think it is clean energy; somebody else might say, well, clean energy is nuclear, and that is what I think is best. You are taking a side here on what is best. So, for me, as I look at where we are right now, and I see an economy that is struggling, and I look at the world, and I see China getting ready to clean our clocks on this, as we have been warned, essentially, by them, and frankly, if you read Thomas Friedman's book, Hot, Flat and Crowded, that is their whole intent.

When you talk, Mr. Morriss, about displacing other workers, I think that is a fair point, but remember we are going to export these technologies. Am I right?

Mr. Wolfe, are you exporting any of the things that you do?

Mr. WOLFE. We are exporting some of our ideas and installations. We are not a manufacturer.

Senator BOXER. Right.

Mr. WOLFE. We are helping to grow manufacturing here.

Senator BOXER. But you are working with other countries.

How about you, Mr. Gillette?

Mr. GILLETTE. We do. We export, from a panel standpoint, approximately half the production of our Perrysburg facility.

Senator BOXER. OK. So you are exporting—and I think it is interesting, last night, when the President said he wants to double our exports, everyone stood up and cheered. So I think we have to step back here and realize that the world is going green, and either America will lead this, or we will not lead this. I just feel we ought to approach this from the standpoint of what is best for the people of this country and the jobs for this country. And I know that there are certain factors that don't get into play here. I mentioned Price Anderson Act. That is one. The fact that there are coal ash spills. The cost of that is enormous.

Now, I know that there are costs of solar and wind, and I know there is no question about that, and geothermal, but that is fair. But we can't just say, because it is old energy, that there is nothing else in our future. That is not the American way. We always make progress.

I want to ask in terms of this New Mexico plant that you are building, Mr. Rogan, how many homes will you be able to power when that is done?

Mr. ROGAN. When the sun is shining, it will power—sorry to be caught flatfooted on the math. It will be about 92,000 homes when

the sun is shining. When the sun is not shining, we can't power anything, obviously. But on the top of——

Senator BOXER. In New Mexico, the sun shines how much of the time?

Mr. ROGAN. Quite a bit.

Senator BOXER. That is what I thought.

Mr. ROGAN. The capacity factors for that plant are expected to be some of the better in the Nation. California, Nevada, Arizona, and New Mexico typically are the best places to cite solar facilities. But as I mentioned, just by virtue of the fact that they are being built in the United States, there are widespread job impacts across the Nation.

Senator BOXER. Mr. Gillette, I believe the United States has the technological expertise and drive to lead the world in the development of clean energy industries, and that is to me what is so exciting about this.

Mr. GILLETTE. It is exciting.

Senator BOXER. Yes. Because you are not only producing clean energy, which helps our families and makes them healthier, the other issue is all of our importation of foreign oil and the fact that I am sure, Mr. Morriss, you would agree—I shouldn't say that—I hope you would agree that if we have a way to get past this $1 billion a day foreign oil importation habit, that would be good for our society, would it not, for our country?

Mr. MORRISS. I think it would be great if we could have domestically produced cheap energy. That would be great.

Senator BOXER. I agree with you so much.

What is First Solar's experience in using U.S. workers to produce products that can compete against renewable energy systems made in other countries?

Mr. GILLETTE. Very successful. Most all of our technology development for all of our facilities globally is done in Perrysburg, Ohio, and as I mentioned during testimony we have reduced the cost from $1.50 to $1.60 a watt to 80 cents a watt in the last 3 years, so all of that driven through our technology developments and capabilities here in the United States.

Senator BOXER. OK.

Senator Merkley.

Senator MERKLEY. Thank you very much, Madam Chair.

Thank you all for your testimony.

Mr. Rogan, I want to ask you a few questions about the industry that you are in. One is you are involved in tower technology. Are you also involved in trough technology? Has the technologies evolved, are they roughly competitive, or is the industry going to go one direction or the other?

Mr. ROGAN. Well, I think right now we are seeing a mix of both tower and trough solar thermal technology depending upon which market you are participating in. Currently, in the Southwest United States there is a healthy mix of both tower and trough projects under development. Ultimately, when projects close financing and actually break ground, I think in a few years hopefully there will be a lot of eSolar tower plants sprinkled across the Southwest. But our company is based solely on tower technology,

that is the approach we took to lowering the cost of the overall system.

Senator MERKLEY. And are the mirrors you are using, they look to me to be flat mirrors, or do they have a concave aspect to them?

Mr. ROGAN. No, they are actually small flat mirrors. They are about the size of your average—well, I shouldn't say average, a fairly large flat screen TV, about 1 square meter.

Senator MERKLEY. And they are driven by a central computer program, or do they have some kind of—each mirror has its own tracking device?

Mr. ROGAN. They are driven by a centralized computer system, and the software that we use to have the mirrors track and focus the sunlight is part of our core technology.

Senator MERKLEY. One of the things in the concentrated solar power discussion is the storage of solar energy, in part to address the rhythm of the power production. Is that something that you all are involved in? Are you using any type of heat storage to continue generating until the sun goes down, if you will?

Mr. ROGAN. Our current systems that we have under contract do not have storage capabilities, they just directly generate steam. However, we have applied for a Department of Energy research program to perform analysis on storage technologies. Additionally, we have several senior staff at eSolar who ran the solar thermal program at Sandia National Laboratories for the past several decades, all of whom are very familiar with storage technology and have encouraged us to continue looking in that direction. As a long-term solution, it is very important to have storage.

Senator MERKLEY. And what are you using for your cooling strategy?

Mr. ROGAN. Right now, our plans are water cooled. There is always a tradeoff between having to use water to cool plants and the performance of the plants. So this is always—it is an economic and environmental tradeoff. All of our current facilities in California are cited on private property that is formerly agricultural land, so the net impact on the water use of that property is actually going down as a result of us building a power plant there. In the future, as the technology efficiency improves I think that moving toward lower water impact technology is possible.

Senator MERKLEY. There are some, are there not, that are going to solely—especially where water is a limited commodity, as it often happens to be in places where the sun shines a lot—are going to a dry strategy?

Mr. ROGAN. It is possible to do so, yes, and that is again a difference between solar, thermal, and photovoltaic and why there is usually a mix of these technologies in certain areas.

Senator MERKLEY. But there are concentrated solar plants that are using dry technology cooling as well, is my understanding.

Mr. ROGAN. Yes, some of them are, yes.

Senator MERKLEY. OK.

Mr. ROGAN. They are proposed——

Senator MERKLEY. Which would increase the footprint of the locations that they could be placed in, if you will, if water is not a limiting factor.

Mr. ROGAN. Yes. By using air to cool the plants, you lower the efficiency of the power plant output at the exact time of day that you want it most, which is when it is hottest outside. So the footprint of the plant expands and the cost of the electricity generated by the plant goes up——

Senator MERKLEY. What kind of percentage factor there in terms of loss?

Mr. ROGAN. It depends on which market you are in, but in the United States you would typically see a 10 percent reduction in efficiency of the plant and up to a 10 percent capital cost increase in the plant. Those combined effects can make the electricity several cents more expensive.

Senator MERKLEY. Thank you.

Mr. Wolfe, are you familiar with Bernie Sanders' 10 Million Solar Roofs bill modeled on the California bill? If you are, could you comment a bit on the impact that that might have?

Mr. WOLFE. I am familiar with it; it is a tremendous bill. What it does is it helps to incentivize distributed generation, smaller scale solar across the entire country, which is an important element. We think that we need the very large scale solar farms in the Desert Southwest as well as the smaller scale solar on my rooftop, your rooftop, and warehouse and large flat roofs around the country. Incentivizing it helps to stabilize our transmission grid, which needs more help; helps to implement the smart grid; and distributes the jobs and the employment and the economic effect of solar nationwide.

Senator MERKLEY. I believe it is structured around a per watt capacity rebate.

Am I out of time?

Senator BOXER. Yes.

Senator MERKLEY. OK.

Senator BOXER. But I'm very impressed with your line of questioning.

Senator MERKLEY. I will look forward to following up the conversation. Thank you very much.

Senator BOXER. OK.

Senator Klobuchar.

The votes started about a minute ago, but we have time.

Senator KLOBUCHAR. OK. Well, perhaps I should follow up on that line of questioning with the small solar, Mr. Wolfe. Do you want to go into a little more detail about just the advantages of that? Obviously, we want both, and I get concerned as well in my State. We have a lot of people interested in small wind and small solar. They argue you don't have to have transmission lines and that they can—or at least as long ones, and they can do things right in the home bases. Do you want to talk a little bit about that? And is it really—when does it become cost-effective if you put a solar panel in when you get—what is the average of getting your money out of it?

Mr. WOLFE. It very much depends upon your State. It depends upon the electric grids we are competing against, it depends upon the sunshine in the State and the installation costs, which all vary. In some States it makes sense, given simply the Federal tax credit today, with the prices we are seeing on residential solar, which is

a change from last year, prices have decreased by over 35 percent in the last year for residential solar.

The 10 Million Solar Roofs bill is structured very similar to how the Million Solar Roofs in California was structured in that it is a per watt rebate for small systems, which declines over time. So as we have more and more solar, the price is expected to decline, which will reduce the incentives, which is unlike pretty much any other energy source, any traditional energy source in the U.S. which have had stable and long-term high incentives for many, many decades. So the 10 Million Solar Roofs program allows individual homeowners, small business owners to take advantage of solar, help to create economic benefit in many diverse areas, while also creating economic benefit by stabilizing power costs.

Senator KLOBUCHAR. Have you heard about this issue about the testing of the solar panels and how there was limited places that they could be tested, including one in Canada? I had some manufacturers in our State that were very concerned about how long it took to get some new products approved.

Mr. WOLFE. The U.S. requires certification by a NRTL, national research and test lab, and there are limited numbers of those labs that can test solar panels to the U.S. standards, which are unique and different than any other worldwide standard, and that time period has increased dramatically over the last 4 or 5 years and is a significant hurdle in bringing new products to market quickly.

Senator KLOBUCHAR. Ideas on how you can fix that?

Mr. WOLFE. Additional testing laboratories would be greatly appreciated; potentially looking at the whole testing and certification regime for solar equipment, which has tended to be far more burdensome and excessive than almost any other electrical device found in a home or a business.

Senator KLOBUCHAR. I chair the Commerce Subcommittee on Export Promotion. What would be some of the things that would be helpful in terms of getting our—we have been importing so many products, whether it is wind or solar, from other places—getting our manufacturing going and then have us start exporting, especially in light of the weak dollar in some of the growing economic markets across the world?

Mr. WOLFE. Well, I will let my colleagues speak more to that, but I just want to note first that we are a net export, the U.S. is a net exporter still of solar photovoltaic panels. We want to encourage more and more manufacturing, but we are already a net exporter of those products.

Senator KLOBUCHAR. OK. I didn't know that.

Mr. GILLETTE. For solar and our business, we talked about it earlier, has continued to grow the opportunities for installations in the United States and we are still exporting half of our capacity here out of our Ohio facility. So anything that we develop in new opportunities here with some support of the Government and Congress will help us grow scale and grow jobs and ship product as well.

Senator KLOBUCHAR. I think I will give my remaining——

Mr. WOLFE. I would like to add, if I could, that if you look at the countries that are exporting the most panels worldwide, they are the ones that typically have the best domestic markets. And then I would also add that even to China we are exporting equipment

that makes solar panels from the U.S. to China, so we have a net benefit even of Chinese production, oddly enough.

Senator KLOBUCHAR. Very good. I am going to give my remaining time to Senator Whitehouse here, since we have a vote going on. Thank you.

Senator BOXER. Thank you so much.

Senator Whitehouse.

Senator WHITEHOUSE. Yes. I understand that the vote was just called a few moments ago, so I only have one quick question for whichever would like to answer it, more than one, if you wish. I would like you to put Government support for solar industry in the context of the development of that industry in international competition and the role of technological leadership in securing future economic opportunity and advantage.

In a nutshell, get behind, fall behind versus get ahead, stay ahead. Is that an accurate principle, and is it something that we should be—in your experience, is that something that we should be justifying investment in this early stage technology for competitive reasons against foreign competition?

Mr. ROGAN. Well, I think currently it could be argued that the United States is still the technology leader in most aspects of the solar industry. However, because countries such as Spain and Germany put in place large development incentives, they have seen explosive growth and a volume drive that is currently unparalleled. Recently, China and India have both taken steps in this direction. As a result, there is going to be a huge bloom of solar development in those nations.

Senator WHITEHOUSE. Just to interrupt, it is in that growth and volume drive where the economic advantage and the jobs are really located. We have seen a considerable number of technologies in which American ingenuity invented the technology, but foreign countries took advantage of the development phase and actually put it into significant production, and the jobs associated with that technological invention manifested themselves to an unfortunate degree overseas rather than at home.

Mr. ROGAN. And the corresponding carbon benefits of installing the technology. So that volume drive is what reduces pricing, and it is not just the pricing of the underlying technology, it is the cost of constructing and operating the plants as well. So more developments in the United States will drive those costs down here and bring down the costs of solar development inside U.S. borders.

Senator WHITEHOUSE. It is fair to conclude that investment in this emerging technology provides cumulative benefits as we enhance our competitive position not only for the invention of the technology but for its volume and deployment.

Mr. ROGAN. Absolutely.

Mr. GILLETTE. Senator Whitehouse, I would add that the investment is not only just the plants and the capacity, it is also the technology development. So we continue to focus on driving the efficiency of our panels up, sort of conversion of energy in to energy out, and we also continue to focus on the drive and yield out of our facilities, which drives the cost down.

But not only that; it comes down to the complete installation of the solar power plant. So we also focus on what is called BOS, or

the rest of the components that go into the installation of the facility, whether it is the racking system or the inverters that go into it or the number of coupling boxes that are there, and improve the cycle time and the cost as well. So the total cost of the installed system is the combination of the panel and the rest of the costs.

Senator WHITEHOUSE. So what you are saying is that in the economic race to remain dominant in this emerging and fast growing international market, there are actually two races we need to win. One is the technological race, to always be a step ahead with the technology, and the second is the implementation and deployment race so that the volume and the jobs and the productivization—if that is a word—of the technology takes place under our leadership.

Mr. GILLETTE. Yes, the innovation side, whether it is the installation or the panel itself, and how well it operates and what the yield of the asset is in the end is driven by the irradiation or the amount of sunlight, but also the cost to install it and operate it.

Senator WHITEHOUSE. Well, I appreciate very much the panel's interest, and I think I am getting anxious about getting over to the vote, so I am going to end my questioning.

Senator BOXER. I know. I understand.

I just want to thank the panel. I am sorry—he really did have some time, but he and I usually debate this issue of whether or not Price Anderson is a subsidy, but that is fine; we just don't agree on it.

But I just want to say to all of you thank you very much for your clear testimony. I continue to believe that we are on the right track if we move to clean energy on every single level, from the health of our families to the competitiveness of our Nation, and a lot of you are right there doing it, and I am very proud of your entrepreneurial spirit. Thank you very much, all of you, for being here today, including Mr. Morriss, who was very polite and very clear in his views. Thank you, and we stand adjourned.

[Whereupon, at 10:55 a.m., the committee was adjourned.]

[An additional statement submitted for the record follows:]

STATEMENT OF HON. BENJAMIN L. CARDIN,
U.S. SENATOR FROM THE STATE OF MARYLAND

Thank you, Chairmen Sanders and Boxer, for holding this hearing today on the job growth potential of the solar industry and jobs in the clean energy sector.

I firmly believe that the development, manufacture and wide scale deployment of innovative renewable energy technologies will be critical to long-term job growth in the U.S. and the recovery of the nation's economy.

Maryland clearly sees the potential for renewable energy development in our State, and the State legislature and Governor O'Malley have taken several notable steps to bring clean energy and the jobs that come with them to Maryland. This includes:

- A robust 20 percent by 2020 renewable energy standard, which includes a 2 percent solar electric standard by 2022.
- Maryland's RES requires that renewable sources be located within the State to count toward the RES.
- Enactment of tax incentives and grants program for solar energy development and geothermal heating.
- And Maryland's commitment to reduce CO_2 levels by 10 percent of 2006 levels by 2009 under the Regional Greenhouse Gas Initiative.

I am happy to see that my State along with many others across the country recognizes the need to change how we get our power. The individual and disparate actions of individual States in encouraging action at the Federal level to reduce our dependence on foreign and dirty energy sources and create business incentives for clean tech companies is essential to creating a national and globally competitive

market for clean energy technologies to base themselves and create jobs in the United States.

A study conducted by the Political Economy Research Institute and the Center for American Progress estimates that investing just a little over 1 percent[1] of the annual U.S. gross domestic product into clean energy technologies nationwide would generate 26,000 new jobs for Maryland and hundreds of thousands of jobs nationwide.

Maryland's recent history with Clean Energy Jobs growth is reflective of how disparities in State policies that call for positive energy reforms like a robust renewable energy standard and reductions in carbon emissions lack the reinforcement of strong Federal policies call for the same positive reforms.

In 2007 BP Solar completed a $25 million expansion of its manufacturing facilities in Frederick, Maryland, and was preparing to embark on a second facilities expansion. This was excellent news for the State and the employees of this state-of-the-art facility which employs nearly 2,000 people.

However, a year after breaking ground on the second expansion of their Frederick headquarters, BP Solar reevaluated the expansion plans and put off the expansion and ultimately shed 140 jobs from this plant.

I want to bring those jobs back to Frederick, and I want to see similar job opportunities for communities around the country, but it's going to take a national commitment to clean energy to get us there.

Solar energy in particular provides tremendous small business opportunity. As Jeff Wolfe from groSolar, which operates throughout Maryland employing solar installation technicians and supply managers, can surely testify, small scale use of solar provides tremendous opportunities for entrepreneurs and consumers.

In Maryland there are more than 50 small businesses registered as members of the Solar Energy Industries Association. These are local solar retailers, installers, engineering firms and energy consultants working in my State to bring clean energy solutions to the people of Maryland.

Additionally the power generation company NRG Energy is retooling its Vienna, Maryland, power plant to utilize biomass and solar energy, and plans are underway to bring offshore wind throughout the mid-Atlantic States.

Despite the lack of an international greenhouse gas emissions agreement, it is clear that our global competitors are not waiting for an international agreement to ramp up production of clean energy technologies.

There are many other countries around the world competing for these industries to do business on their soil, and they are implementing policy frameworks that make it much easier for clean energy companies to do business abroad than to do business here in America.

These are not foreign governments with lax environment or labor standards; rather countries like Spain, France, Japan and Germany have merely established robust renewable energy standards creating lucrative markets for companies to do business. It is unfortunate that we import so much of our finite energy resources from abroad as it is, and it is unconscionable that we would do the same with renewable energy sources in the future.

Given America's historical ingenuity and manufacturing capacity we can become the world's leading supplier of essential renewable energy technologies. Revamping the American economy for the 21st century will put us in charge of our own energy supplies. The Clean Energy and Green Jobs legislation we pass will put us on a path to energy independence, and that's a path to improved national security, increased GDP and increased job growth.

I thank Chairmen Sanders and Boxer for holding this hearing.

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[1] Or $150 billion.