

GROWING U.S. TRADE IN GREEN TECHNOLOGY

HEARING

BEFORE THE

SUBCOMMITTEE ON COMMERCE, TRADE,
AND CONSUMER PROTECTION

OF THE

COMMITTEE ON ENERGY AND
COMMERCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

OCTOBER 7, 2009

Serial No. 111-70



Printed for the use of the Committee on Energy and Commerce
energycommerce.house.gov

U.S. GOVERNMENT PRINTING OFFICE

WASHINGTON : 2012

74-103

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

COMMITTEE ON ENERGY AND COMMERCE

HENRY A. WAXMAN, California, *Chairman*

JOHN D. DINGELL, Michigan
Chairman Emeritus

EDWARD J. MARKEY, Massachusetts
RICK BOUCHER, Virginia
FRANK PALLONE, JR., New Jersey
BART GORDON, Tennessee
BOBBY L. RUSH, Illinois
ANNA G. ESHOO, California
BART STUPAK, Michigan
ELIOT L. ENGEL, New York
GENE GREEN, Texas
DIANA DEGETTE, Colorado

Vice Chairman

LOIS CAPPS, California
MICHAEL F. DOYLE, Pennsylvania
JANE HARMAN, California
TOM ALLEN, Maine
JANICE D. SCHAKOWSKY, Illinois
CHARLES A. GONZALEZ, Texas
JAY INSLEE, Washington
TAMMY BALDWIN, Wisconsin
MIKE ROSS, Arkansas
ANTHONY D. WEINER, New York
JIM MATHESON, Utah
G.K. BUTTERFIELD, North Carolina
CHARLIE MELANCON, Louisiana
JOHN BARROW, Georgia
BARON P. HILL, Indiana
DORIS O. MATSUI, California
DONNA M. CHRISTENSEN, Virgin Islands
KATHY CASTOR, Florida
JOHN P. SARBANES, Maryland
CHRISTOPHER S. MURPHY, Connecticut
ZACHARY T. SPACE, Ohio
JERRY McNERNEY, California
BETTY SUTTON, Ohio
BRUCE BRALEY, Iowa
PETER WELCH, Vermont

JOE BARTON, Texas
Ranking Member

RALPH M. HALL, Texas
FRED UPTON, Michigan
CLIFF STEARNS, Florida
NATHAN DEAL, Georgia
ED WHITFIELD, Kentucky
JOHN SHIMKUS, Illinois
JOHN B. SHADEGG, Arizona
ROY BLUNT, Missouri
STEVE BUYER, Indiana
GEORGE RADANOVICH, California
JOSEPH R. PITTS, Pennsylvania
MARY BONO MACK, California
GREG WALDEN, Oregon
LEE TERRY, Nebraska
MIKE ROGERS, Michigan
SUE WILKINS MYRICK, North Carolina
JOHN SULLIVAN, Oklahoma
TIM MURPHY, Pennsylvania
MICHAEL C. BURGESS, Texas
MARSHA BLACKBURN, Tennessee
PHIL GINGREY, Georgia
STEVE SCALISE, Louisiana

SUBCOMMITTEE ON COMMERCE, TRADE, AND CONSUMER PROTECTION

BOBBY L. RUSH, Illinois
Chairman

JAN SCHAKOWSKY, Illinois
Vice Chair

JOHN SARBANES, Maryland

BETTY SUTTON, Ohio

FRANK PALLONE, New Jersey

BART GORDON, Tennessee

BART STUPAK, Michigan

GENE GREEN, Texas

CHARLES A. GONZALEZ, Texas

ANTHONY D. WEINER, New York

JIM MATHESON, Utah

G.K. BUTTERFIELD, North Carolina

JOHN BARROW, Georgia

DORIS O. MATSUI, California

KATHY CASTOR, Florida

ZACHARY T. SPACE, Ohio

BRUCE BRALEY, Iowa

DIANA DeGETTE, Colorado

JOHN D. DINGELL, Michigan (ex officio)

CLIFF STEARNS, Florida

Ranking Member

RALPH M. HALL, Texas

ED WHITFIELD, Kentucky

GEORGE RADANOVICH, California

JOSEPH R. PITTS, Pennsylvania

MARY BONO MACK, California

LEE TERRY, Nebraska

MIKE ROGERS, Michigan

SUE WILKINS MYRICK, North Carolina

MICHAEL C. BURGESS, Texas

CONTENTS

	Page
Hon. Bobby L. Rush, a Representative in Congress from the State of Illinois, opening statement	1
Hon. Cliff Stearns, a Representative in Congress from the State of Florida, opening statement	2
Hon. John Barrow, a Representative in Congress from the State of Georgia, opening statement	4
Hon. Steve Scalise, a Representative in Congress from the State of Louisiana, opening statement	5
Hon. John D. Dingell, a Representative in Congress from the State of Michi- gan, prepared statement	74
Hon. G.K. Butterfield, a Representative in Congress from the State of North Carolina, prepared statement	75
Hon. Doris O. Matsui, a Representative in Congress from the State of Cali- fornia, prepared statement	78

WITNESSES

Mary Saunders, Deputy Assistant Secretary for Manufacturing Services, International Trade Administration	7
Prepared statement	10
Answers to submitted questions	80
Tim Richards, Managing Director of International Energy Policy, General Electric Company	18
Prepared statement	20
Answers to submitted questions	95
Lisa Jacobson, President, The Business Council for Sustainable Energy	31
Prepared statement	34
Answers to submitted questions	111
Andrea Larson, Associate Professor, Darden Graduate School of Business Administration, University of Virginia	38
Prepared statement	41
Answers to submitted questions	123
Steven F. Hayward, F.K. Weyerhaeuser Fellow in Law and Economics, Amer- ican Enterprise Institute	52
Prepared statement	55

GROWING U.S. TRADE IN GREEN TECHNOLOGY

WEDNESDAY, OCTOBER 7, 2009

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON COMMERCE, TRADE,
AND CONSUMER PROTECTION,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 10:07 a.m., in Room 2322, Rayburn House Office Building, Hon. Bobby L. Rush [chairman of the subcommittee] presiding.

Present: Representatives Rush, Barrow, Stearns, Sullivan, Murphy, Gingrey, Scalise, and Barton [ex officio].

Staff Present: Michelle Ash, Chief Counsel; Angelle Kwemo, Counsel; Will Cusey, Special Assistant; Theresa Cederoth, Intern; Aaron Ampour, Fellow; Brian McCullough, Minority Senior Professional Staff Member; Will Carty, Minority Professional Staff Member; Sam Costello, Minority Legislative Analyst; and Shannon Weinberg, Minority Counsel

OPENING STATEMENT OF HON. BOBBY L. RUSH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. RUSH. The Subcommittee on Commerce, Trade and Consumer Protection will come to order for the purpose of a hearing on "Growing U.S. Trade in Green Technology." The Chairman will recognize himself for 5 minutes for the purposes of an opening statement.

I want to thank the members of the subcommittee for participation in this important discussion.

The world is currently engaged in an important economic and political shift. As President Obama said, and I quote, "In the 21st century, we know that the future of our economy and national security is inextricably linked to one challenge: energy."

All the developing and industrialized nations are taking more steps to address their energy needs and environmental challenges. In this race, some are increasing their production capacity, others are acting to protect their domestic markets, and some whose domestic markets are already maturing are opening up new markets for their industry.

According to the New American Foundation, the U.S. moved from a positive trade balance of \$14.4 billion in green technology in 1997 to a deficit of \$8.9 billion in 2008, and that included renewable energy products. These swings amount to almost a \$21-billion swing in a little over 20 years.

If our green technology exports continue to plummet, then the U.S. will miss out on a once-in-a-lifetime opportunity to become a global leader in the green energy sector. According to the U.S. Department of Energy, the increase in exports in green technology could reach \$40 billion per year and could create more than 750,000 jobs by 2020.

It is estimated that the green technology industry in the U.S. employs 9.1 million U.S. workers. However, only 6 American companies are among the top 30 leading companies in the world in the green energy sector.

As we embark on this new adventure—which I would like to call the “Green Crusade”—the future of the U.S. Economy will not only depend on environment domestic policy, but will also be driven by the global marketplace.

Now we are presented with the following question: How will we reverse our trade balance and compete in this global market? How will we serve green jobs by increasing green technology exports?

I strongly encourage my colleagues to stand by their commitment to significantly increase our exports, help deploy clean technologies to developing countries, and to assist them in addressing climate change, spurring economic growth, including job opportunities for all American workers.

What would make us a global leader in today’s economic environment is to become an export-led economy. Moving to a green economy is an opportunity; we must not and we will not miss.

I am deeply honored to welcome our witnesses to today’s hearing. Considering that you all represent different sectors, together I hope that we can look specifically at how to best enhance America’s competitiveness in the burgeoning international market for green technology and therefore create more domestic job opportunities for our citizens.

This hearing is a great opportunity to highlight the importance of a strong domestic policy to facilitate U.S. penetration into the green economy’s international market. Also, it is equally important that we include a strong, long-term export promotion policy to turn our current domestic economy into a global leader that will once again be the envy of the world.

Thank you, and I yield back the balance of my time.

Mr. RUSH. It is now my honor to introduce the Ranking Member of the subcommittee, Mr. Stearns.

OPENING STATEMENT OF HON. CLIFF STEARNS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF FLORIDA

Mr. STEARNS. Thank you, Mr. Chairman. I’m the Ranking Member for today in substitution thereof. So I’m pleased to be here. And obviously this is a very important hearing, so I want to welcome all the witnesses. Thank you for your time.

It’s important, I believe, to have a conversation about the opportunities that trade holds for American jobs and American ingenuity, particularly in the emerging green technology sector.

We must view trade as an opportunity and not a threat if we want to see our exports grow. Free trade has many benefits to the global economy, driving economic growth, reducing poverty, and raising the standard of living for everyone.

Domestically and internationally, trade accounts for approximately one-third of our gross domestic product, and we depend on dynamic open markets to sustain our well-being and, of course, our way of life. Today's hearing will focus on ways to expand our trade exports in "green technology."

As we discovered at a previous hearing on the marketing of green products, defining green, of course, can be difficult, if not impossible. Regardless of how we define it, improving the opportunities and avenues to increase our exports and goods and services is obviously a worthy goal, particularly as we look to new businesses and new business models to pick up the slack in economic activity that is affecting many of our industries today during the current economic downturn.

The easiest step Congress can take to enact the free trade agreement we have already negotiated is to simply enact the free trade agreement we have already negotiated, but which has not been acted upon. There is no simpler way to open new markets for these great innovations and increase our exports than to enact a free trade agreement.

Last year, for example, we ran a \$21-billion surplus in manufacturing with our free trade agreement partner countries. On top of that, we ran a surplus in all our services trade of approximately \$144 billion. If we lower the barriers to our exports, it is clear there are willing buyers in the global economy. We must lower those barriers. And the benefits of this are not theoretical. High tariffs on our green energy exports that are currently prohibited in countries like Colombia would instantly disappear with the enactment of the Colombia Free Trade Agreement.

Green technology encompasses a broad array of activities ranging from those designed to minimize the impact on the environment to those that seek to improve efficiencies in production, but many discussions about green technology will naturally focus on the energy industry.

While we vigorously debate whether to institute a national tax to limit our consumption of fossil fuels, we cannot expect many of the world's developing nations to simply voluntarily change their energy policy if it requires them to sacrifice their growth. Similarly, American companies and taxpayers should not have to shoulder the burden of a policy that, of course, limits our economic growth.

So, today, let's focus this discussion on how to expand economies by expanding trade and cooperation. We don't need an international agreement like the Kyoto agreement on energy and the environment to benefit our trade exports in green technology. We have seen that earlier in my opening statement here with the 17 countries we have a free trade agreement with.

We have pioneered technology and services over decades, including those that provide efficiency gains in pollution reduction. The progress of our energy sector has produced and will continue to produce new developments that improve energy delivery, such as the SMART grid technology. These improvements can be transferred to developing nations through trade. Selling our innovations to the world will provide developing nations the technology to improve their energy efficiency, promote conservation, and limit adverse effects on our global environment.

To achieve these goals, we must make a marketplace receptive to our services, and we must incentivize the private sector to innovate. Therefore, our trade policy must insist that our partners protect intellectual property rights. A healthy and innovative market cannot succeed without the appropriate rewards that follow true innovation and invention.

Whether it is the Hollywood studio movies or the latest advance in energy efficiency, protection for our innovators' intellectual property facilitate bringing successful products to the market.

And finally, Mr. Chairman, as we look at ways to reduce barriers to trade and green technology, we also must be mindful of the mistakes other countries have made in their efforts to develop green industries. Taxpayer-funded subsidies don't necessarily work. History has shown the fundamental law of economics, government intrusion, and regulation to restore its market. If the marketplace cannot support it, why should taxpayers?

Evidence is mounting that government innovation and support for particular industries in our country is distorting the marketplace at great cost to the taxpayers, without parallel benefits. We know from our own experience that the housing market was heavily subsidized through incentives, tax credits, and easy financing. The resulting boom and bust should be a note of extreme caution to all of us that we not distort this market through heavy-handed intervention and regulation. Congress cannot be in the business of choosing winners and losers in a particular industry; rather, we should endeavor to ensure every company simply has equal opportunity to succeed or to fail.

I thank the witnesses again. And thank you, Mr. Chairman. I yield back.

Mr. RUSH. The Chair thanks the Ranking Member.

Now the Chair recognizes the gentleman from Georgia, Mr. Barrow, for 5 minutes for the purpose of an opening statement.

OPENING STATEMENT OF HON. JOHN BARROW, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF GEORGIA

Mr. BARROW. I thank the Chairman. I hope I won't take that much time. In fact, I think I'm the guy that the witnesses have been waiting for, because once I'm through, then you all get to talk. I think I am going to be the last person—wait a minute, we got a late joiner.

I want to first apologize for those who aren't here and point out that they also participate who can't be personally present. We have a caucus going on right now that was not previously scheduled, so a great many of the members here are absent because they feel pulled in more than one direction. I apologize for that. But I just want to add to the concerns that have been raised. I want to tell you one of the concerns that I have about this whole area.

We've become aware over time of a number of barriers to free and fair trade in the area of green technology. We have got tariff barriers in which some countries are putting up tariffs on green technologies from our country but that don't apply to their manufacturers. We have got quality certification safety standards that are not really just about quality control and safety, but they are written in such a way to make sure that only the home producers'

products will qualify. So we have got stuff masquerading as quality control, but it's really trade protection.

We have got local content requirements that can do the same thing. We have got development programs that look good on the outside, but they are essentially the home government of the producer basically lending to the developing countries on the condition that they buy from their folks and their folks only.

So we have got a lot of things that look kind of neutral on the outside, but they are all about erecting barriers so that we don't have access to their markets on the same terms that they have access to ours. And what I want to make sure is that whatever we do in this area, that we don't have a one-way street in green technology the way we have in so many other areas.

There are two things we have got to work with, we have got to work with laws and we have got to work with money. What I don't like is the idea that other countries can use laws to keep us out. And we respond to this by not addressing that problem. We end up turning to the taxpayer to try and figure out how to jump-start our economy when we're playing on an unlevel playing field. And I want to make sure that we're not having to resort to the taxpayers to do for us what the laws ought to do for us.

So the question I have for all of you—whether I am here to hear it or not, I hope you will address it for the record and for the benefit of the members who can't be here—is what are institutions that are supposed to promote free and fair trade, institutions like the WTO, doing to protect us from this, because the sense we get in so many other areas of international trade is we are being played for chumps in this country, that the free trade agreements we got are one-way streets. Other folks are quick to pull the trigger and haul us in front of the WTO at the drop of a hat, but if we try and get access to their markets, we have got a case of the slows when it comes to enforcing our rights to access to other people's markets when they are not under any disability at all.

So think about that. Help us understand what is it about the institutions we have got right now that are either working well or not working well in order to make sure that, as far as the legal framework, our primary responsibility as legislators is to make sure that the laws are protecting free and fair trade. And if they're not doing that or can't do that, I want to know the reason why.

So thank you all for this opportunity to visit. Mr. Chairman, thank you for your leadership in bringing this issue before us. I look forward to the testimony and statements of our witnesses.

Mr. RUSH. The Chair thanks the gentleman.

The Chair now recognizes the gentleman from Louisiana, Mr. Scalise, for 5 minutes.

OPENING STATEMENT OF HON. STEVE SCALISE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF LOUISIANA

Mr. SCALISE. Thank you, Mr. Chairman. And we will see if anybody else comes in the room in the next few minutes to continue the opening statements, but I do thank the Chairman for calling this hearing and for our panelists.

As we all know, our Nation is facing one of the worst economic downturns since the Carter administration. Our unemployment rate is approaching 10 percent, and current estimates predict that it will continue to rise.

Given the economic circumstances we are facing, it is important that this subcommittee examine ways to enhance American competitiveness and create jobs, green or any other color. It is also important that we focus on creating jobs, given the current energy policies being pushed by this administration.

If enacted, the proposed cap-and-trade energy tax would be the most dramatic overhaul of America's energy economy in our lifetime, and it would ship millions of American jobs overseas. But the administration has continued to stay—it is focusing on policies that will create or save jobs. It is good to hear that there is an understanding that we need to create or save jobs, but if we have this cap-and-trade energy tax, I think most of us recognize that we would actually be taking a further downturn in our economic situation.

Even countries that have enacted climate change policies have seen negative effects on existing employment. Spain's renewable subsidies, for example, created over 50,000 jobs, but led to the destruction of 113,000 existing jobs in other economic sectors, a loss of 9 permanent jobs for every 1 permanent job created. In addition, 9 out of 10 of the green jobs created in Spain are now gone. That doesn't sound like creating or saving jobs to me.

Mr. Chairman, we must improve American competitiveness and enact smart economic policies, not policies that will hurt American companies and shift millions of jobs to countries like China and India. Our international trade industry is one sector that will be crucial to restoring our economy and creating jobs.

Unfortunately, there are currently barriers to trade that are hurting our exporters, one of those being the protection of intellectual property rights. There are some that believe that we should not enforce intellectual property rights and protect patents in the renewable energy industry because the technologies, they feel, should be free to everyone, and that that would allow more renewable energy products to be created. Unfortunately, that is a false assumption.

Without the proper patent protection and proper enforcement of intellectual property, companies will not take the necessary risks to develop those new technologies. They will have no incentive to do so, and therefore, we will see less innovation and a loss of jobs due to decreased sales.

I look forward to hearing from our witnesses on our current efforts to remove these trade barriers and to promote export activity. Hopefully, we are not wasting our time promoting products and technologies that will not be exported due to barriers that we are not seeking to remove.

Trade is a vital issue to my district, and it is a crucial part of restoring our economic prosperity. I hope that we leave today's hearing with a better understanding of what's being done to promote international trade, while ensuring that we protect American jobs and spur innovation and competitiveness.

I thank you and I yield back.

Mr. RUSH. The Chair thanks the gentleman.

Now it is my distinct honor and pleasure to welcome all of our witnesses to this hearing.

It is the normal practice of this subcommittee that we swear in the witnesses. So before I introduce you, I will swear you all in. Would you please rise and raise your right hand.

[Witnesses sworn.]

Mr. RUSH. Thank you, and please take your seat.

Let the record reflect that the witnesses have all answered in the affirmative.

Now, let me introduce the witnesses on this panel. And again, we appreciate you taking time out from your busy schedule to be with us. And I also would like to apologize for the scarcity of membership. There is a mandatory caucus meeting for some that is occurring, so that is the reason why we don't have a lot of members here. But they will be able to review the record.

Beginning on my left, Ms. Marie Saunders, she is the Deputy Assistant Secretary for Manufacturing Services at the International Trade Administration.

Next to Ms. Saunders is Mr. Tim Richards, who is the Managing Director of International Energy Policy for General Electric Company.

Next to Mr. Richards is Lisa Jacobson. Ms. Jacobson is the president of the Business Council for Sustainable Energy.

And seated next to Ms. Jacobson is Ms. Andrea Larson, who is an Associate Professor at the Darden Graduate School of Business Administration here at the University of Virginia.

And last but not least, is Mr. Steve Hayward. He is the F.K. Weyerhaeuser Fellow in Law and Economics at the American Enterprise Institute.

TESTIMONY OF MARY SAUNDERS, DEPUTY ASSISTANT SECRETARY FOR MANUFACTURING SERVICES, INTERNATIONAL TRADE ADMINISTRATION; TIM RICHARDS, MANAGING DIRECTOR OF INTERNATIONAL ENERGY POLICY, GENERAL ELECTRIC COMPANY; LISA JACOBSON, PRESIDENT, THE BUSINESS COUNCIL FOR SUSTAINABLE ENERGY; ANDREA LARSON, ASSOCIATE PROFESSOR, DARDEN GRADUATE SCHOOL OF BUSINESS ADMINISTRATION, UNIVERSITY OF VIRGINIA; AND STEVEN F. HAYWARD, F.K. WEYERHAEUSER FELLOW IN LAW AND ECONOMICS, AMERICAN ENTERPRISE INSTITUTE

Mr. RUSH. I want to thank you again. And we want to recognize now Ms. Saunders for 5 minutes of opening statement.

TESTIMONY OF MARY SAUNDERS

Ms. SAUNDERS. Chairman Rush, Ranking Member Stearns, and members of the subcommittee, thank you very much for the opportunity to testify before you today on the Growing U.S. Trade in Green Technology.

As you are aware, this is an innovative and growing sector that has wide-ranging impact both domestically and internationally. Secretary Locke is leading the Commerce Department in a series of initiatives to further open up markets and provide tangible re-

sults to workers and businesses alike. The International Trade Administration within the Department of Commerce is the lead export promotion agency in the Federal Government, and ITA is working to expand green technology opportunities.

Early development and commercialization of green technologies are critical to the competitiveness of U.S. firms. First, these technologies result in greater energy efficiency. Second, as the demand for green technologies grows, so do export opportunities for U.S. companies. As Chairman Rush noted, the Department of Energy estimates there could be up to \$40 billion a year in increased exports of green technologies, generating up to 750,000 green jobs by 2020. However, our ability to realize this potential depends on achieving U.S. leadership in the field.

General Electric CEO Jeff Immelt and venture capitalist John Doerr noted in an August Washington Post op-ed titled, "Falling Behind on Green Tech" that Amazon, eBay, Google, Microsoft, and Yahoo were the leading Internet technology companies, and they are all American companies. And yet out of the top 30 alternative energy companies in the world, only six are American.

One of Commerce Secretary Locke's priorities is to enable new businesses to enter the market and to increase the number of U.S. Businesses that produce green products and services, with particular emphasis on manufacturing. ITA administers a series of programs that are designed to support these goals and priorities to enhance the competitiveness of U.S. industries and firms. And these include—I'll just name a few—a new green tech Web site that aggregates all of our promotion programs in a single place, providing easy access for industry; and energy efficiency initiatives to assist U.S. manufacturers to improve the energy efficiency of their operations as well as to deploy energy efficient technologies; and industry events on low-carbon energy sources and fuels to improve the domestic and international competitiveness of U.S. clean energy companies.

With the world hungry for climate change solutions, the United States must act as an incubator for innovative technologies. ITA is actively promoting U.S. Technology solutions to address government-mandated requirements that address the effects of climate change.

We have an aggressive green technology promotion program with over 90 trade events planned worldwide for this year and next. As examples, clean technology and alternative energy are the central themes of several ITA export promotion initiatives; a green building event in Europe; and a solar technology and energy efficiency mission to India.

In November, we are organizing a five-city green build road show to Pittsburgh, Denver, San Francisco, San Jose, and Phoenix to help U.S. companies take advantage of the \$975 billion annual construction market in Europe. We have also ramped up our efforts to promote the commercialization and the export of green technologies through increased outreach to industry on best practices and priority markets, technical assistance, capacity-building events, helping develop trade policies that favor cleaner technologies, and addressing those market barriers in other countries.

ITA's sustainable manufacturing initiative encourages U.S. companies to use sustainable practices that can make them more competitive in the global marketplace, and therefore potentially better export candidates. You can't export what you don't manufacture.

And finally, we also have an initiative known as SMART—Sustainable Manufacturing American Regional Tours—that shows small manufacturers how to find success through sustainable manufacturing that improves the bottom line.

President Obama has called for new policies to advance a cleaner environment, a stronger response to the challenge of climate change, and more sustainable natural resources and energy supplies. To reach this goal requires effort by both industry and government. Commerce will continue to prioritize strengthening U.S. competitiveness in this sector and enhancing U.S. capacity to export green technologies.

In closing, I would like to thank the subcommittee for the opportunity to highlight ITA's current efforts. I look forward to answering any questions you may have.

Thank you.

Mr. RUSH. The Chair thanks the witness, Ms. Saunders.

[The prepared statement of Ms. Saunders follows:]

MARY SAUNDERS
ACTING ASSISTANT SECRETARY FOR MANUFACTURING AND SERVICES
INTERNATIONAL TRADE ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
TESTIMONY BEFORE THE
HOUSE COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON COMMERCE, TRADE AND CONSUMER PROTECTION
"GROWING U.S. TRADE IN GREEN TECHNOLOGY"

October 7, 2009

Introduction

Chairman Rush, Ranking Member Radonovich, and Members of the Subcommittee.

Thank you for the opportunity to testify before you today on growing U.S. trade in green technology. As you are aware, this is an innovative and growing sector that has wide-ranging impact, both domestically and internationally. Global climate change mitigation efforts will drive increased world demand for these technologies and for the products and services they help produce. It is clear that rapid deployment of green technologies will be essential to achieve any mandates to reduce carbon emissions that might result from on-going discussions and negotiations in many fora to mitigate climate change effects.

Policies that support the early development and commercialization of green technologies are critical to the competitiveness of U.S. firms and improve their competitive edge in the global marketplace.

At the Department of Commerce we view expanding the opportunities to export green technologies as critical to maintaining the competitiveness of U.S. companies, creating jobs, and generating economic growth.

As the demand for green technologies grows, so do export opportunities for U.S. companies. And exports of green technologies, like any export, will also benefit the U.S. economy by creating and sustaining jobs here at home and by increasing revenues. There is significant potential for increased exports in this sector. Our ability to realize this potential depends on achieving U.S. leadership in the field. The Department of Energy estimates there could be up to \$40 billion/year in increased exports of green technologies, generating up to 750,000 green jobs by 2020.

General Electric CEO Jeff Immelt and venture capitalist John Doerr noted in an August Washington Post op-ed titled "Falling Behind on Green Tech," that Amazon, eBay, Google, Microsoft, and Yahoo were the leading internet technology companies and that they were all American companies. And yet out of the top 30 alternative energy companies in the world, only six are American.

“Green” Technology: What is it?

There is no one definition of green technology. However, in the broadest sense, the term generally refers to technologies that enhance clean energy solutions such as renewable energy, energy efficiency, and water and natural resource conservation as well as technologies that reduce air, soil, and water pollution. Green technologies can also include engineering and design technologies that support the production of environmentally sound products and services, as well as green buildings and sustainable infrastructure. For example, global investment in energy efficiency and renewable energy reached \$155 billion in 2008. While this number is likely to drop slightly in 2009 due to the financial crisis, governments around the world have provided over \$180 billion in stimulus funding focused on energy efficiency and renewable energy. The United States has provided a significant portion of this, including \$80 billion in clean energy investments through the American Recovery and Reinvestment Act of 2009.

The market for energy efficiency technologies is large and growing. According to the American Council for an Energy-Efficient Economy (ACEEE), over \$300 billion is invested in energy efficiency per year in the United States alone – a number that could grow to \$700 billion by 2030.

ITA’s Role in Supporting U.S. Competitiveness through Exports

Expanding exports is critical to economic growth and U.S. competitiveness. That is why Secretary Locke is leading the Commerce Department in a series of initiatives to further open up markets and provide tangible results to workers and businesses alike. The Department has an array of tools to help American companies at every point in the business cycle – from the birth of an idea, to establishing a company based on that idea, to finding markets once that idea has been transformed into a product or service.

The Department of Commerce’s International Trade Administration (ITA) is the lead export promotion agency in the Federal government. The mission of ITA is to create prosperity by strengthening the competitiveness of U.S. industry, promoting trade and investment, and ensuring fair trade and compliance with trade laws and agreements that enhance the ability of U.S. firms and workers to compete and win in the global marketplace. This mission is critical to enhancing America’s global competitiveness and expanding commercial opportunities for American manufacturers, farmers, and service workers throughout the world.

Three of ITA’s four units are dedicated to expanding export opportunities through a variety of means: 1.) The U.S. and Foreign Commercial Service (CS) designs and executes programs that provide companies with practical advice and assistance for exporting; 2.) Market Access and Compliance (MAC) focuses on opening foreign markets, monitoring and working with the Office of the U.S. Trade Representative to enforce trade agreements, strengthening respect for intellectual property rights, and further reducing or eliminating barriers to trade and investment overseas; 3.) Manufacturing and Services (MAS), the unit that I lead, provides industry expertise, research and policy analysis used by policy makers to develop and implement domestic and international policies that enhance U.S. (export) competitiveness. The fourth unit,

Import Administration (IA), enforces U.S. trade laws that prevent imported products from competing unfairly with U.S. products because of dumping, illegal subsidies, and other unfair trade practices.

Overview of Green Technology Programs and Activities in ITA

President Obama called for new policies to “advance a cleaner environment, a stronger response to the challenge of climate change and more sustainable natural resources and energy supplies.” One of Commerce Secretary Locke’s priorities is to enable new businesses to enter the market and increase the number of U.S. businesses that produce green products and services, with particular emphasis on manufacturing. ITA administers a series of programs designed to support these goals and priorities to enhance the competitiveness of U.S. industries and firms. We address industry competitiveness issues and opportunities related to climate change mitigation. Recent examples include:

- “ITA’s Energy Efficiency Initiative” to assist U.S. manufacturers to improve the energy efficiency of their operations as well as to deploy energy efficient technologies;
- United States-Indonesia Clean Energy Policy Mission on July 27-29, to Jakarta to promote U.S. exports;
- Industry events on low carbon energy sources and fuels to improve the domestic and international competitiveness of U.S. clean energy companies; and

Policy

On the policy front, we work very closely with the Departments of Energy, State and Treasury, and the Environmental Protection Agency, to ensure that our programs and activities are complementary and move our country towards the same goals and vision of improving energy security, increasing domestic prosperity, and addressing climate change through an expanded use of low carbon technologies. We also work with the Office of the U.S. Trade Representative to address problems often faced by companies in this sector when trying to enter foreign markets. These problems include weak intellectual property rights protection and enforcement, lack of financing for large and small projects, regulatory uncertainty, local content requirements, preferences for local ownership, and burdensome testing and certification requirements.

In addition to facilitating discussion on these issues, a critical part of ITA’s role is to educate our interagency partners on industry positions and trends. Last week for example, I hosted a roundtable focusing on the new and unexpected types of entrants in the environmental industry.

To ensure that U.S. companies in this emerging sector have meaningful access to markets abroad, ITA is working with its trading partners to ensure that protection of intellectual property rights (IPR) is available for green innovations. The protection of IPR is essential to encouraging innovation and competitiveness. This is particularly important in driving today’s growing green technology industry, as both U.S. industry and our global community stand to see great benefits

from new technologies and methods for addressing climate change. In addition, ITA provides via the Stopfakes website <www.stopfakes.gov> a broad set of products available to assist U.S. firms, particularly small and medium sized enterprises, to recognize their intellectual property and to take appropriate steps to register and enforce it.

Export Promotion Programs

With the rest of the world hungry for concrete climate change solutions, they are looking to the United States to act as an incubator of innovative technologies. ITA is actively promoting U.S. technology solutions to address government mandated requirements on climate change. The markets that are currently showing growth in this area are China; India; Scandinavia; the United Kingdom; Germany; France; Italy; South Africa; and parts of the Middle East. ITA's country and regional commercial strategies include promoting green technologies in these markets.

- ITA has held trade events and foreign buyer programs at major renewable trade shows and brought delegations from all over the world to these events.
- ITA has over 300 trade specialists located in U.S. Export Assistant Centers throughout the United States who provide in-depth, value added counseling to local companies to help them realize their export potential.
- Companies can work with ITA and its 126 offices overseas for country-specific information and assistance in resolving commercial issues.
- Companies can also call our Trade Information Center (TIC; 1-800-USA-TRADE), which is staffed by a team of trade experts who serve as a single point of contact to all potential exporters. The TIC provides basic export counseling and information on all U.S. Government export assistance programs. In fiscal year 2009, the TIC gave personal assistance to more than 36,000 inquiries, 75 percent of which were from small and medium-sized businesses.
- ITA is sponsoring a trade mission, scheduled for March, to Senegal and South Africa that is open to businesses in any sector, with an emphasis on those that provide green technologies. We have begun to accept applications for this trade mission.
- Companies competing for foreign tenders can engage ITA's Advocacy Center which, upon determining that the company qualifies for assistance, will work with relevant agencies to devise an appropriate advocacy strategy on behalf of the company.

ITA has an aggressive green technology promotion program with over 90 trade events planned worldwide for this year and 2010. These are in addition to the day-to-day services we offer U.S. companies, such as export counseling, Gold and Platinum Key programs, International Company Profiles, and International Partnership Searches. Clean technology and alternative energy are the central themes of several ITA initiatives, such as a Green Building event in Europe, a solar technology mission to India, an energy efficiency mission to India, and promoting best practice principles and sharing of experiences with regional trading partners to facilitate the deployment of U.S. clean energy technologies in regional fora like the Asia Pacific Economic Cooperation.

In November, we are organizing a five-city Green Build Road Show -- to Pittsburgh, Denver, San Francisco, San Jose, and Phoenix -- to help U.S. companies take advantage of the \$975 billion annual construction market in Europe. In addition, on April 12-16, 2010, Commerce will assist with a FedEx-organized certified trade mission to Europe. We have just launched a new Green Tech website that aggregates all of our promotion programs in a single place, providing easy access for industry.

Several of our trade promotion programs related to green technology are linked to the upcoming United Nations Framework Convention on Climate Change negotiations in Copenhagen this December. These promotion programs are central to the strategy of taking leadership in providing solutions to climate change challenges. Twenty-five U.S. companies are already committed to participate in the Bright Green Trade Show in Copenhagen, where we will highlight U.S. industry solutions to climate change to an international audience, including foreign delegations to the negotiations and international media.

Industry Outreach, Information Sharing and Best Practices

We have ramped up our efforts to promote the commercialization and export of green technologies through increased outreach to industry on best practices and markets, technical assistance and capacity-building events, and helping develop trade policies that favor cleaner technologies.

On July 16th, Commerce launched a concerted outreach effort that seeks to inform U.S. industry of developments in international negotiations on climate change, encourage industry to get more involved in discussions on climate change, analyze industry's related concerns, and highlight associated commercial opportunities. The July 16 event was held in Washington, D.C., as an industry roundtable discussion; we held similar events in Milwaukee and California (San Francisco, Fresno and El Centro), and are now organizing a national webinar for later this fall.

We are promoting sustainable construction by facilitating a dialogue between green building standards developers and building material producers. This dialogue will help to ensure that the metrics of green building improve the competitiveness of U.S. building materials suppliers and service providers in overseas markets and provide inroads to the export of green building materials and services.

In addition, in 2008, ITA released the second edition of the *Trade Finance Guide: A Quick Reference for U.S. Exporters*, which serves as a useful trade finance resource for small- and medium-sized enterprises (SMEs) in the green technology industry. This guide is designed to help U.S. SMEs learn the basic fundamentals of trade finance, so that they can turn green-tech export opportunities into sales.

We also published clean energy exporters' guides for China and India, providing valuable planning information to companies interested in exporting green technologies to these growing markets. The guides contain market overviews, analyses of the clean energy markets in these

countries, market opportunities for trade and investment through 2020, and resources available to U.S. businesses to help enter these markets.

Bilateral and Regional Dialogues

ITA has also been active in organizing events to spur the exchange of best practices with foreign governments and foreign industry. Such programs have ranged in focus from helping trading partners reduce greenhouse gas emissions in cement manufacturing to explaining what investment framework has been developed to attract investment to the renewable energy and energy efficiency sectors.

ITA has worked on climate change-related issues under the U.S.-EU Framework for Advancing Transatlantic Economic Integration and the U.S.-Brazil Commercial Dialogue, and assesses the impact of foreign regulations, such as the European directive on energy-using products, on U.S. interests.

Multilaterally, ITA works within the G-8, G-20 and the Asia-Pacific Economic Cooperation forum to represent the interests of U.S. industry, where climate change is becoming a priority, and represents Commerce on the U.S. delegation to the WTO Doha Development Agenda negotiations to conclude an agreement to liberalize trade in environmental goods and services. ITA monitors foreign government climate- and energy-related programs and proposals for potential countervailable or WTO-inconsistent subsidies.

Collaboration with DOC Science Agencies

Within the Department of Commerce, ITA joined forces with the National Oceanographic and Atmospheric Administration (NOAA) to inform industry of the breadth of NOAA's climate data resources, which are available to help U.S. businesses factor climate change into their short and long-term business planning to mitigate its impact. Together, NOAA and ITA have initiated a series of conferences on climate data around the country.

On technical issues, ITA coordinates very closely not only with standards development organizations but also with our sister organization, the National Institute of Standards and Technology (NIST), to ensure that standards and measurements that are developed do not unnecessarily harm U.S. industry. An example of ongoing technical collaboration between ITA, NIST, and industry is our joint work on standards for smart grid.

Sustainable Manufacturing Initiative

And, finally, ITA's Sustainable Manufacturing Initiative, which I mentioned earlier, addresses green technology implementation as a component of business competitiveness. The Initiative encourages U.S. companies to use sustainable practices that improve their bottom line. This can make them more competitive in the global marketplace, and therefore, potentially more interested in exporting. We are currently working on creating a searchable online database of government and private programs and resources that support sustainable business. We do this because we have found that although there are significant governmental and private sector

resources available to help companies implement more sustainable business practices, many manufacturers are unaware of these resources or have had difficulty determining which ones they need.

Another project of the initiative is SMART – Sustainable Manufacturing American Regional Tours. Many companies, particularly smaller companies, may not know where to begin the process of becoming more sustainable. They may be unclear regarding the economic benefits of sustainable manufacturing. Through SMART we try to show manufacturers firsthand how their neighbors have been able to find success through sustainable manufacturing. We also try to show companies that becoming sustainable is a process that takes time and effort and that there are relatively simple changes they can make to start going down that road. So these tours really provide a venue for sharing best practices.

We are working with our trading partners through the OECD to develop metrics for sustainable manufacturing. The goal is to produce a toolkit, which any company can use to measure its sustainable progress. The first draft of the toolkit will be completed by the end of the year.

Conclusion

We expect there will be increasing opportunities for exporting U.S. green technologies, as well as green products and services due to the increasing attention to climate change and the need to find ways to mitigate the negative impact of greenhouse gas emissions and adapt to those challenges.

So, how do we ensure that U.S. industries can make use of those opportunities?

The best thing we can do to encourage green technology exports is to build up our own market. You can't export what you don't manufacture.

For example, manufacturing investment was deterred by the yearly boom-and-bust cycle that characterized the U.S. wind market from 1999 through 2004. However, as a result of the continued expansion of U.S.-based wind turbine and component manufacturing since 2005, the American Wind Energy Association estimates that the share of domestically manufactured wind turbine components grew from less than 30 percent in 2005 to roughly 50 percent in 2008. As a result, that Association has approached ITA about partnering to develop overseas markets. Prior to 2008, the Association was focused solely on the development of the U.S. market.

Building up the U.S. domestic market will require effort by both industry and government. My remarks describe some of the programs that the International Trade Administration and the Department of Commerce are currently undertaking to encourage the competitiveness of U.S. industry in the development and deployment of green technology and to promote their export.

In implementing President Obama's call to "advance . . . a stronger response to the challenge of climate change and more sustainable natural resources and energy supplies" and Secretary Locke's priority to enable new businesses to enter the market and produce innovative solutions, Commerce will continue to give priority to improving U.S. competitiveness in this sector, to

aggressively promote U.S. exports, and to provide the support needed to develop policies that will enhance the U.S. capacity to export green technologies, products, and services.

In closing, I would like to thank you Chairman Rush, Ranking Member Radonovich, and Members of the Subcommittee for the opportunity to highlight what the ITA is doing to help U.S. companies compete in this area and I look forward to answering any questions you may have.

Mr. RUSH. The Chair now recognizes Mr. Tim Richards for 5 minutes for the purposes of an opening statement.

TESTIMONY OF TIM RICHARDS

Mr. RICHARDS. Thank you very much, Mr. Chairman, and members of the subcommittee, for holding this hearing today.

Mr. Chairman, as you have made very clear, the entire world needs cleaner- and lower-emissions technologies, and the United States has every opportunity to be a major exporter of these products and services.

The U.S. Energy Information Administration expects that total world energy consumption will grow by more than 33 percent by 2030 and that 92 percent of that growth will occur outside of the United States. And much of that future investment, if not virtually all of that future investment, is going to occur in areas that are more efficient and lower emission than we currently see today.

General Electric, with our energy business based in the State of Georgia, is succeeding in selling and creating cleaner, more efficient technologies, and we are selling those all around the globe. We have invested heavily in our ecomagination products, including high-efficiency gas turbines which have 200-plus U.S. small- and medium-sized enterprises as suppliers, technologies for smart grids, coal gasification, nuclear power, solar energy, high-efficiency appliances and lighting, efficient aircraft engines, and hybrid locomotives, to name some of the products and services, as well as wind turbines.

In this testimony, I would like to address three critical themes for promoting U.S. exports: First, the Foundation for Successful Clean Energy Exports lies with a robust domestic demand. Second, export competitiveness requires a commitment to competition both here and abroad. And third, the U.S. Government can assist the private sector by organizing itself to actively promote competitiveness and exports.

With regard to the first theme, robust domestic demand for renewable and other cleaner technologies is necessary to drive innovation, achieve economies of scale, and support a full-fledged manufacturing base, as Ms. Saunders has made clear. This in turn will provide the underpinning for strong exports.

Critical components of policy in this area are stable incentives, such as renewable energy tax credits and the development of binding national renewable energy standards such as many other countries have adopted, along with cap-and-trade legislation that establishes mandates and incentives. Unfortunately, U.S. policies currently in place to support renewable energy are insufficient to counter the current weak investor confidence, and they fall short of those systems maintained by other nations.

The second theme is the need to maintain competitive and open markets. Even as they call for projects that enhance energy security and reduce emissions, many governments maintain barriers to trade in the very goods needed to realize those projects. To cite a few examples, most WTO members still impose tariffs on wind turbines; in fact, those tariffs average 7.4 percent. In Brazil, it's 14 percent; in China, 8 percent; in India, 7.5 percent. The U.S. also

has a tariff on these products; it is only 1.3 percent, still worth reducing, but not as large as our competitors.

In addition to these tariff barriers, nontariff barriers are a serious issue. A few examples there. China maintains a “buy China” policy on wind turbines, and recently conducted a very large procurement in which no foreign-owned company sold any wind turbines in China.

In Canada, Quebec has applied local content requirements for wind turbine procurement. Ontario is considering similar election.

And here in the United States, of course, we have the “buy America” components of the economic stimulus. The protections represented by tariff and nontariff barriers reduces U.S. Exports and runs counter to the goal of promoting a globally competitive industry.

Open competition calls for a three-pronged solution. First, as Congressman Stearns has suggested, now is the time to roll back existing trade barriers and prevent the application of new barriers, and we can do this through the negotiation of an international agreement, eliminating those barriers for all environmental goods and services. This is a high-impact, cost-reduction step governments can take right now.

Second, the U.S. should lead by example and not include “buy America” provisions in future legislation.

And third, strong intellectual property rights protection, such as has been suggested by several members, is essential to create the economic incentives to develop and deploy new technologies around the globe.

The third theme is that there is a positive role for the U.S. Government. The Federal Government is in a position to facilitate the private sector’s growth by undertaking two sets of actions. First, export finance enhancements; and second, more active and improved coordination of American advocacy, led by the Commerce Department, for cleaner energy exports.

Thank you, Mr. Chairman, and members of the subcommittee, for the opportunity to testify before you this morning. The U.S. is an innovation leader and has the opportunity to become a world-class export leader in this field. And with the proper policy framework, we will achieve that distinction. Thank you very much.

Mr. RUSH. Thank you very much.

[The prepared statement of Mr. Richards follows:]

**Written Testimony of
Timothy J. Richards
Managing Director – International Energy Policy
General Electric Company
Hearing on Growing U.S. Trade in Green Technology
Before the Subcommittee on Commerce, Trade & Consumer Protection
Committee on Energy and Commerce
U.S. House of Representatives**

October 7, 2009

I would like to thank Chairman Rush, Ranking Member Radanovich, Vice Chairwoman Schakowsky and the members of the Subcommittee on Commerce, Trade & Consumer Protection for holding this hearing on "Growing U.S. Trade in Green Technology." This is a critical area for the United States that will define this country's ability to remain an innovative 21st century manufacturing nation. The need for more efficient and lower emissions technologies is not confined within the United States. The entire world needs these technologies, and the U.S. government and U.S.-based firms must consider that most of the demand for these cleaner technologies will come from abroad. For example, the U.S. Energy Information Administration expects that total "worldwide marketed energy consumption" will grow by more than 33% between 2010 and 2030 and that fully 92% of that growth will occur outside of the United States. Moreover, environmental policy is likely to require that an ever-increasing portion of that investment be in cleaner, more efficient products and services. The President has rightly committed the U.S. to be the global leader in cleaner energy. The U.S. is in a strong position to succeed in this endeavor, but to do so will require a combination of continued private sector innovation and investment, and effective, stable government policy.

There are many different policy factors that affect U.S. trade and competitiveness. Education, taxes, R&D spending, patents, human capital and immigration all have an impact. In this testimony I will address three critical themes for promoting U.S. exports:

- 1) The foundation for successful clean energy exports is robust domestic demand for renewable energy technology. Such a foundation will support long-term investment in the sector and build economies of scale.
- 2) Export competitiveness requires a commitment to competition here and abroad. The U.S. can lead in this effort by negotiating agreements to eliminate barriers to trade, rejecting protectionism and ensuring the protection of intellectual property rights in order to build truly competitive industries.
- 3) The U.S. government can assist the private sector by organizing itself to actively promote competitiveness and exports.

GE and Wind Industry Background

General Electric is succeeding in creating and selling cleaner and more efficient technologies across the globe. We have invested heavily in our ecomagination™ products, including high efficiency gas turbines, technologies for smart grids, coal gasification, nuclear power, solar photovoltaics, efficient aircraft engines and hybrid locomotives. No single technology better illustrates this success than our wind turbines, and this testimony will therefore focus primarily on wind turbines as a core renewable energy technology. Our company has sold and installed over 10,000 1.5-megawatt (MW) wind turbines. We have grown to become the second largest wind turbine manufacturer in the world in terms of number of turbines sold and are expanding into new product areas such as offshore wind turbines.

The energy business is a scale-driven business. Time horizons are measured in decades; capital investments in billions, and suppliers and competitors engage globally to deliver the lowest unit cost. Competitiveness and leadership in this industry require a long-term, sustained and highly committed effort. It requires massive investment, discipline, and vision that spans beyond the next quarter, the next fiscal year, or the next election cycle.

Over the past four years, the U.S. has been at the forefront of renewable energy, and that is particularly true of wind energy. A few years ago, domestically manufactured products accounted for less than 25% of the wind turbines and components used in U.S. wind projects. That figure is now approaching 50% with current manufacturing announcements. The U.S. wind industry hit its high water mark to date in 2008, when over 8.5 gigawatts (GW) of wind power were installed, enough to power approximately 7 million homes. According to the American Wind Energy Association (AWEA), 2008 industry investment reached \$17 billion and created more than 35,000 jobs. The 55 new facilities that came online, were announced, or expanded, increased our nation's total wind industry supply capacity by 50%.

That capped a three-year run, where the U.S. wind industry added over 16GW of power and brought total employment in the industry to 85,000 jobs. Wind energy is clean energy, and in the U.S. wind power avoids the emissions of 28 million tons of carbon dioxide from traditional power plants annually – equal to taking six million cars off the road.

GE has worked very hard to play a central role in the cleaner energy revolution, and our renewables business has grown dramatically to keep up with growing U.S. and global demand. Since entering the industry in 2002, GE has invested over \$850 million in renewable energy technology and production.

Wind energy lends itself to a localized manufacturing base and supplier network, and our U.S. business growth has therefore translated into new American jobs. In the U.S., GE employs more than 2,000 people in our Wind and Solar businesses. These include wind turbine manufacturing jobs in Pensacola, Florida; Greenville, South Carolina;

Salem, Virginia; Erie, Pennsylvania; and Tehachapi, California. They include solar manufacturing and professional jobs in Newark, Delaware; Montague, Michigan; and Golden, Colorado. And they include professional jobs at our headquarters in Schenectady, New York, where since 2007 we have added over 300 jobs in Engineering, Project Management, and Services to support our Wind and Solar businesses. In addition, more than 4,000 sub-supplier jobs have been created in the U.S. to support these endeavors.

At that high water mark in 2008, the U.S. briefly led the world in wind energy production and cumulative wind power generating capacity. Today, the story is much different. In the last year, the world has changed a great deal. With a slow-down in electricity demand, policy uncertainty, and lower natural gas prices, the U.S. is projected to install about 5GW of wind in 2009, or about half of what was installed in 2008. The American Recovery and Reinvestment Act (ARRA) might stir a couple of more gigawatts of installs, but even if the stimulus fulfills expectations, our projections show that the U.S. will still move from #1 to #3 in new wind installations, behind the EU and China, both of which have consistent, long-term policies to support renewable energy deployment.

For the wind industry, the impact of the U.S. stimulus will fade over the next few years. During that period, 2010-2013, we project that the U.S. wind industry will only average about 4GW of installations a year, half of what the industry delivered in 2008.

Creating a Robust Domestic Renewable and Cleaner Energy Sector

Given the current challenges in the U.S., the first priority for maintaining a dynamic cleaner energy industry is to restore domestic demand. Robust domestic demand for renewable and other environmentally friendly technologies is necessary to achieve the economies of scale that will drive down costs and support a full-fledged U.S. manufacturing base. This strong domestic capability, in turn, will provide the underpinning for strong exports.

Critical components of policy in this area are stable incentives, such as renewable energy tax credits, and the development of binding national renewable energy standards along with cap and trade legislation that establishes mandates and incentives. Comprehensive U.S. legislation that attaches a value to greenhouse gas emissions reductions is an essential means to achieve the adoption and utilization of cleaner products and services.

U.S. policies currently in place to support renewable energy are insufficient to counter weak investor confidence, and they fall far short of incentives now being put in place by other nations. As history has shown, technology will follow the promise of future commercial sales. The current trajectory would suggest the future technology and expertise in the renewables industry would be concentrated outside the U.S.

Stable Tax Incentives

For several decades, forward-thinking U.S. government policy has helped support the spread of clean energy and the economic opportunity it brings. The federal Investment Tax Credit (ITC) and Production Tax Credit (PTC) have helped companies and investors large and small bring highly innovative technologies to market that otherwise may not have had a chance.

These policies, standing alone, are an incomplete solution. The stimulus package extended both the PTC and ITC for renewable energy. The PTC is currently set at 2.1 cents per kilowatt-hour (kWh) for the first ten years of a wind facility's life. However, the availability of these tax credits has been unstable. Short-lived tax credits have led to a "boom-bust" pattern in the wind industry; when the production tax credit expired at the end of 1999, 2001 and 2003, wind power installations declined by 73-93%, with resulting detrimental effects on U.S. supply and manufacturing chains.

Many European countries on the other hand have made a concerted effort to develop stable tax and investment policies, and these nations now lead the world in renewable energy companies. The cleaner energy sector in Germany, for example, has benefited from a continued stable policy framework that includes investment tax incentives and feed-in-tariffs, among other policy tools. The E.U. is by far the largest exporter of wind turbines, while the U.S. is a large net importer of wind turbines, having imported \$2.5 billion in 2008 while only exporting \$22 million. Large domestic demand explains some of that huge import bill, but companies simply have not invested in the U.S. as much as they could have because the policy environment was so unpredictable. Tax credits and the complementary measures intended to ensure growth in the installation of cleaner energy technology solutions – along the lines of the grants included in the ARRA -- should be a permanent part of U.S. renewable energy policy.

Federal Renewable Energy Standards (RES)

More than thirty states across the U.S. have adopted Renewable Portfolio Standards (RPS) or renewables targets that support installations of renewable energy and the creation of tens of thousands of jobs. These state-based RPS policies, while helping to create individual pockets of renewable energy growth, are not sufficient to provide the strong national message and system that can maximize our potential to realize cleaner and more efficient energy deployment.

The adoption of a robust near- and longer-term Federal RES would facilitate the development of a stronger domestic industry to meet a growing demand for renewable electricity. Other nations have taken the policy lead in this area: China recently announced a goal to produce 15% of its electricity from renewable sources by 2020; the E.U. is committed to 20% renewable electricity production by 2020 and 60% by 2050; the recently elected Democratic Party of Japan has announced a 10% renewable electricity mix by 2020 on top of their already strong commitment to

nuclear energy. Despite the fact that many of the world's major economies have set or at least are openly debating RES policies, the U.S. has yet to put any strong renewable requirements into federal law. The setting of binding targets and goals, as part of a comprehensive policy approach at the federal level including appropriate incentives, would solidify domestic demand for green technology solutions. Domestic demand will then spur additional production capacity, facilitating the export of these goods.

AWEA has stated that the creation of a federal RES policy would be instrumental in generating more domestic jobs and that the status quo of state policies could actually hamper job growth and cause a plateau over the next decade. A study conducted by the Department of Energy in 2008 noted that achieving 20% wind energy production by 2030 would result in the support of more than 500,000 jobs in the industry and related sectors. The Solar Energy Industries Association (SEIA) and Navigant Consulting estimate that the solar energy industry employed in 2008, directly and indirectly, about 80,000 people – with over 15,000 jobs added during 2007-2008.

Reducing Trade Barriers

In order to stimulate domestic investment in cleaner energy technology and help American firms meet the world's need of this technology, the U.S. must lead global efforts to stimulate trade in environmental goods and services. Even as countries around the world seek to accelerate deployment of energy sources that enhance energy security and reduce emissions, many governments continue to maintain barriers to trade in the goods needed to realize those projects. Carbon-intensive energy sources are often less expensive than cleaner alternatives, and the cost advantage that carbon-producing energy sources enjoy will only widen if trade in cleaner alternatives is restricted and the development of large-scale manufacturing is inhibited. Liberalization of trade for green products and services offers a rapid, high-impact step governments can take to lower the cost of cleaner energy technologies, resulting in more economically viable solutions for reducing greenhouse gases.

Challenges

According to the U.S. International Trade Commission (USITC), five nations (Denmark, Germany, India, Japan and Spain) exported a combined 91% of wind turbines in 2008. Similarly, more than 93% of wind turbine production is concentrated among firms based in seven nations: Denmark, U.S., Spain, Germany, India, China and Japan. The concentration of wind turbine production reflects the benefits of economies of scale inherent in the manufacture of sophisticated, technology-intensive products. This does not mean wind turbine production will not expand to additional countries – in fact, such expansion is occurring. However it does indicate how counterproductive it is to maintain or create tariff barriers.

As of July 2009, a majority of WTO member nations still impose tariffs on wind turbines and solar panels. For wind turbines, tariffs are levied by nearly 60% (91 of 153) of the countries, with a mean tariff of 7.4% and a median of 5.0%. The table below (Table 1) shows applied tariff rates on wind turbines imposed by the U.S. and our key trading partners. With manufacturers fighting to reduce costs and make renewable energy competitive with less environmentally friendly alternatives, it is difficult for any nation to justify the government imposition of these additional tariff costs.

The rapidly growing volume of green technology trade means that the total value of tariffs imposed is becoming quite significant. In 2008 trade in wind turbines and wind turbine parts reached nearly \$6.6 billion, from \$1.4 billion in 2003. The U.S. imported \$2.6 billion of these products (approx. 39.2% of the world-wide total) and imposes an average tariff of 1.3% on its imports. The U.S. has an opportunity to lead by example in this area. If the world's largest economy and importer of wind turbines eliminated tariffs, many of our trading partners would consider following suit in order to stimulate their own economies and trading activity.

Table 1 – Wind Turbine Tariffs

Wind Turbine Tariffs	
Brazil	14.0%
Mexico	10.0%
China	8.0%
S. Korea	8.0%
India	7.5%
Russia	5.0%
U.A.E.	5.0%
E.U.	2.7%
U.S.	1.3%

Source: World Trade Organization, "Tariff Download Facility." HS Code: 850231. Accessed online, 24 September 2009. Brazil rate based on recent tariff rate change in Brazil.

In addition to tariffs, non-tariff barriers (NTBs) can serve as impediments to trade and are often even more destructive to greenhouse gas reduction goals and worldwide economic recovery than traditional tariffs. These barriers can take several forms: import bans, local content regulations, preferential contract bidding for domestic firms, restrictive technical standards, and government procurement restrictions, among others. Amid the global recession, many nations have instituted new NTBs. The table below highlights three recent NTBs in China, Canada and the U.S.

Table 2 – Recent Global NTBs

Country	NTB Type
China	Government procurement; preferential contract bidding; "Buy Chinese"
Canada	Local content restrictions; Quebec and Ontario
U.S.	Government procurement; "Buy American"

Source: News releases and legislative records.

China

China represents both a great opportunity, because of the country's need to find alternatives to traditional coal-fired power, and a competitive challenge in the field of environmentally friendly power generation products. The Chinese government announced a \$586 billion stimulus package in November 2008 to shore up the nation's economy, but included a government procurement restriction. Dubbed the "Buy Chinese" policy, the stimulus mandated that "government investment projects should buy domestically made products unless they cannot be obtained in reasonable commercial conditions in China." At the same time, China has designated "Independent Innovation Products" and provides special procurement preferences for those products.

In June 2009, no foreign-owned wind turbine supplier was selected in a \$7 billion wind turbine competition. Fundamental factors such as life cycle cost and investment rate of return were not considered in the evaluation process. According to the Chinese Wind Energy Association, only 24% of newly installed capacity in 2008 was sourced from abroad.

Canada

The Canadian province of Quebec applied a local content requirement for wind turbines in 2007, and Ontario may replicate the policy this year. The Quebec policy mandates that at least 60% of wind turbine development costs must be incurred locally in Quebec. In addition to being a difficult metric to track, concentrating development costs in a single province may lead to increased energy prices due to the reduced pool of suppliers and engineers.

Ontario passed its Green Energy Act in June 2009 and one of the provisions that is currently being finalized is the local content restriction. Foreign governments and corporations have requested it be limited to 10-15%, but some politicians in Ontario have called for a 60% level, analogous to Quebec. Analysts have already said that a stringent local content restriction can harm the economy of Canada's largest wind-power-producing province and increase overall energy costs for end-users.

U.S.

“Buy American” provisions were included in the American Recovery and Reinvestment Act of 2009. Although the final legislation exempted “relevant manufactured goods [that] are not produced in the United States in sufficient and reasonably available quantities,” and required the U.S. to abide by its international trade obligations, Buy American provisions remained in the law. The stimulus earmarked \$43 billion for green technology and thus the policies affecting its investment are quite significant.

Solutions

In order to prevent a reduction in the global trading of green technologies and to increase the competitiveness of American goods, the U.S. government should adopt a three-pronged solution. First, now is the time to roll back existing trade barriers on environmental goods and services and to prevent the application of new barriers through a binding Environmental Goods and Services Agreement (EGSA). Second, the U.S. needs to lead by example and reject protectionism by not including Buy American provisions in future legislation. Third, strong intellectual property rights protection must be ensured internationally so that the economic incentives exist to develop and deploy new, cleaner technologies, and export products based on those technologies.

U.S. Leadership to Adopt an Environmental Goods and Services Agreement

An EGSA to promote free trade in cleaner and more efficient technologies can make a critical contribution to the growth of U.S. exports in the sector. Countries should strongly consider the adoption of a distinct EGSA, outside of the currently stalled Doha Round negotiations. An EGSA would have the benefit of not being mired in the more controversial trade issues that lack broad support. The long-term goal of an EGSA should be universal WTO member participation in removing both tariffs and non-tariff barriers for an agreed list of goods and services. The path to realizing that goal may involve interim agreements in the interest of demonstrating progress and removing barriers as rapidly as possible. For instance, an initial agreement might eliminate tariff barriers only, be limited to an already agreed upon product list (for instance, the list developed by the World Bank in 2007) and be adopted by a subset of WTO members accounting for most current trade in these products. Subsequently, additional countries could sign on to the agreement, more products could be added and coverage could be extended to services and non-tariff barriers.

Reject Protectionism

Protectionism is a dangerous economic philosophy that will ultimately damage the reputation and competitiveness of the American economy. The G20 has repeatedly pledged to “reject protectionism in all its forms,” and has largely followed through on this commitment. However, the temptation to close markets during these tough economic times has not subsided, and no country – including the U.S. – has been able

to resist instituting some protectionist measures in the past few months. The most glaring and disruptive example in the U.S. is the Buy American provision in the stimulus package. By applying these rules to the states, and limiting options for federal procurement, the Buy American provision in ARRA has delayed the spending of stimulus money and prevented job creation at a time when these jobs are sorely needed.

Water provides an illustrative example. The water industry in the U.S., which is supported by local communities, is closely intertwined with its Canadian counterpart. Due to the uncertainty of applying ARRA Buy American rules to state and local procurements, many cities across the country were not confident in how to spend their stimulus money, and so delayed implementing water projects that would have created much-needed jobs. Additionally, federal agencies such as the FCC and EPA must now issue waivers for certain products, adding a layer of red tape that delays the results that ARRA was intended to deliver. Finally, ARRA's Buy American provision adds confusion to already uncertain economic conditions by sending precisely the wrong signal to the global economy about the importance of a global marketplace. Because ARRA's Buy American provision generates confusion, creates a costly layer of bureaucratic red tape, and can disrupt productive economic relationships with our closest allies, it should not be repeated in future legislation.

Assure Intellectual Property Rights Protection

Further research and development is necessary to create new innovative technologies and enhance existing clean energy technologies, and the most important set of government policies for promoting such innovation is the protection of intellectual property rights. Some developing countries have proposed that a post-Kyoto U.N. climate agreement should include provisions allowing the forced transfer of climate change-related intellectual property. Such measures would be counterproductive from the point of view of combating climate change because they would deter innovation and technology deployment. In addition, they would be severely detrimental to U.S. export interests.

Intellectual property rights protection does not only promote the initial innovation. It also encourages commercial deployment of existing technologies. Companies will be careful to avoid licensing technology or even selling products to customers in countries where those customers could reverse engineer, take and use the intellectual property rights.

Comprehensive U.S. Government Export Support

The U.S. government can assist the private sector by reorganizing itself to actively promote competitiveness and exports in cleaner energy goods and services. The federal government is in a position to facilitate the private sector's growth by undertaking two sets of actions: 1) export finance reform and 2) the coordination of American advocacy for cleaner energy exports.

Export Finance Reform

The U.S. Export-Import Bank (Ex-Im Bank) plays a vital role in financing U.S. exports. This long-standing support has been increased in recent years and has been essential in bridging financing gaps during the recent credit crisis. For fiscal year 2008, the Ex-Im Bank authorized more than \$14.4 billion through its various programs, representing a 22% increase over the prior year. However, foreign countries often have simpler rules and regulations concerning their export credit agencies and American firms currently are often disadvantaged due to our restrictions.

A preliminary set of export finance reforms should include a shift towards a national interest test for Ex-Im Bank financing and the retooling of U.S. cargo preference requirements. The difficulty and expense of tracking content by nation in an increasingly global economy and the decreased level of competition for suppliers often leads to higher prices for U.S. goods, thus rendering them less competitive abroad. A shift towards a national interest test would reduce compliance costs and allow domestic exporters better access to Ex-Im Bank financing. A national interest standard could be especially beneficial to small exporters who lack the expertise and resources to undertake such complex compliance.

The national interest test should be structured so that exporters can access financing from the Ex-Im Bank if the goods exported would further our nation's interest and influence in a given sector or industry. This would prevent situations in which financing is denied because local content criteria are not met but the U.S. has a compelling strategic interest to compete in the sector. This is especially relevant in the green technology industries where the U.S. faces foreign competitors with strongly supportive government policies.

The parallel issue of cargo preference requirements, as applicable to the Ex-Im Bank, should also be addressed and modified. No other country has cargo preference requirements associated with this type of financing.

Coordinated Advocacy for Exports

Export advocacy should be a key element of U.S. international engagement and be featured in Presidential, cabinet-level and legislative interactions with foreign counterparts. European and Asian countries have successfully implemented this strategy and have opened access to new markets as a result of it. Similarly, an effort to make commercial advocacy for cleaner technologies a priority for all agencies should be led by the Commerce Department. Both the U.S. & Foreign Commercial Service and the U.S. Trade & Development Agency should be strengthened, with a focus on increased staff and budgets in embassies abroad. These investments would yield benefits to the U.S. economy that are multiples of the original funds. Expanded participation in trade and industry shows would also help promote American exports.

France and Canada, for example, spend almost ten times more than the U.S. does in trade show participation, relative to the size of their national budgets. Finally, the United States should strengthen the international outreach of U.S. technical agencies so that they can seek international standards that will promote, not inhibit, American exports.

Conclusion

Developing competitive exports of cleaner energy technology goods is critical for the viability and growth of the U.S. economy. The foundation for this competitiveness starts with creating strong domestic demand for these technologies. Domestic demand will spur long-term investment in the sector and result in the economies of scale needed for a healthy export industry. In conjunction with a strong domestic sector, the U.S. government can lead by example in eliminating barriers to trade, rejecting protectionism and ensuring the protection of intellectual property rights. Policies that adhere to those criteria will foster innovation and global trade. Furthermore, government reorganization to promote the competitiveness of American exports would give exporters a boost in securing new orders overseas. Addressing these central and critical themes would result in major progress towards a healthy and vibrant export-focused green technology sector.

I would like to sincerely thank the Chairman, Ranking Member, Vice Chairwoman and members of the Subcommittee for their time and attention this morning. I look forward to your questions and comments.

Mr. RUSH. Now the Chair recognizes Ms. Jacobson for 5 minutes for the purposes of opening statement.

TESTIMONY OF LISA JACOBSON

Ms. JACOBSON. Thank you, Mr. Chairman, and members of the subcommittee. The Council very much appreciates your leadership on this very important set of issues.

The Council is an industry coalition that includes businesses and trade associations from around the country representing currently available technology options to meet pressing energy, national security, economic, and environmental challenges. The Council is committed to enactment of domestic and international policies designed to deploy clean energy technologies, such as renewable energy, energy efficiency, and natural gas.

The House Energy and Commerce Committee is a leader in the advancement of comprehensive energy and climate change legislation in this Congress with the passage of the American Clean Energy and Security Act. This bill includes vital provisions to support domestic clean energy manufacturing and export promotion.

In addition to what's included in the American Clean Energy and Security Act, I would like to offer additional areas that Congress may wish to consider.

Given the global nature of clean energy markets, especially for solar, wind, and efficiency products and components, the U.S. has an opportunity to embark on an aggressive and sustained strategy to expand domestic manufacturing and U.S. exports. The strategy should include six components:

First, strong U.S. markets. Establishment of strong domestic markets will build the foundation for manufacturing and exports. Sending the right signals at home through the adoption of domestic investment and manufacturing incentives coupled with strong, coordinated, and long-term policy commitments to clean energy sectors is critical.

Examples of important initiatives include a national renewable electricity standard and a national energy efficiency standard, support and expansion of the manufacturing tax credit, support for the U.S. Department of Energy Loan Guaranty Program. Those are just a few.

Second, as others have acknowledged, a free and fair trade policy that includes liberalization of tariff and nontariff trade barriers to clean energy products and services. Sound trade policy that recognizes the urgent need for clean energy products and technology transfer will help make U.S. products more competitive.

A concern expressed by some clean energy industries is that some foreign markets are more restrictive to our own. Tim Richards made some very specific points in that regard. I would just like to mention again, some nations have domestic content requirements, tariffs, and numerous other protections. These issues should be considered as part of a clean energy trade liberalization effort.

Third, intellectual property right protection. Again, there seems to be consensus on that topic. As our domestic industries grow and new technologies are developed, it is critical to protect the intellectual property rights of firms that invest and offer innovations to the marketplace.

In support of this, I refer to section 1120(a) of the Foreign Relations Authorization Act for fiscal years 2010 and 2011. This section directs the U.S. Government to prevent weakening and fully protect intellectual property rights of energy and environmental technologies.

Fourth, flexible and innovative government financing. U.S. firms are best able to compete in foreign markets with instruments that leverage public and private capital and focus on the creation of enduring markets. While still in its earlier phases, the World Bank's Carbon Investment Fund seeks to embrace this approach.

In addition, to better compete with foreign firms, U.S. companies need to be able to match the export promotion support that other governments provide. U.S. firms often face competition from conditioning of overseas development assistance as well as tied aid, as was mentioned by Congressman Barrow.

Currently, the Export-Import Bank of the United States has a process to assist firms, but this process is burdensome and needs to be made more flexible and streamlined.

Finally, government financing should be made available to support capacity building and the regulatory and institutional frameworks required to open new markets to clean energy products and services.

Fifth, expansion of clean energy technology promotion programs. These should have a strategic high-level focus and involve multiple agencies, and they should support small, medium and large companies over the full project development and funding cycle.

Government assistance ranges from identification of market opportunities and business partners to pre-feasibility and feasibility studies, to assistance with financing and overcoming other market barriers. The U.S. has existing programs in these areas, but would benefit from expanded funding, enhanced coordination, and consistent high-level engagement. Other nations approach market development for these sectors in a highly strategic fashion. We can do that too, we just need the high level and sustained support.

Finally, global agreements on climate change in the establishment of a global price on carbon. Clear and long-term market signals, such as the establishment of a global price on carbon emissions that contribute to global climate change, would offer a more competitive environment for U.S. firms going into a marketplace which continues to include more regulations in other countries to reduce greenhouse gas emissions.

Finally, I would like to very quickly acknowledge the important questions that Congressman Scalise mentioned about the impact of clean energy jobs and support for clean energy industries. The National Renewable Electricity Laboratory recently released, August 28 of this year, a response to a study that I believe Congressman Scalise may have been referring to. It was called, "The Study of the Effective Employment of Public Aid to Renewable Energy Sources." That was the name of the report that was released. And NREL has a technical response to some of those methodologies, and I think it has a slightly different perspective on how support for clean energy industries impacts job creation. So I just wanted to mention that for the record.

Mr. RUSH. Thank you very much. Have you concluded your—

Ms. JACOBSON. Yes, thank you very much. I appreciate the opportunity.

Mr. RUSH. Thank you so much, Ms. Jacobson.
[The prepared statement of Ms. Jacobson follows.]

**Testimony of the Business Council for Sustainable Energy
Before the House Committee on Energy and Commerce
Subcommittee on Commerce, Trade and Consumer Protection**

**Growing U.S. Trade in Green Technology
October 7, 2009**

Mr. Chairman and Members of the Subcommittee:

My name is Lisa Jacobson, President of the Business Council for Sustainable Energy. I appreciate the opportunity to testify today before the House Subcommittee on Commerce, Trade and Consumer Protection and share the Council's views on initiatives to expand U.S. clean energy technology exports that will support U.S. manufacturing and domestic job creation.

The Council is an industry coalition that includes businesses and trade associations from around the country, representing currently available technology options to meet pressing energy, national security, economic and environmental challenges. They include: advanced batteries, biomass, biogas, fuel cells, geothermal, hydropower (including new waterpower resources such as ocean, tidal and instream hydrokinetic), natural gas, solar, wind, and supply-side and demand-side energy efficiency.

The Council is committed to the enactment of domestic and international policies designed to deploy clean energy technologies. Since its inception in 1992, the Council has advised policymakers at state, regional, federal and international levels on clean energy market development and the design of market-based initiatives to address energy and environmental concerns.

It is important to note that as a diverse business coalition, not all Council members endorse or take positions on the entire set of recommendations provided below.

Realizing a Clean Energy Economy and a Revitalized Manufacturing Sector

The importance of deploying existing clean energy resources and technologies – such as renewable energy, energy efficiency and natural gas – has never been more prominent on the policy and public agenda. Clean energy technologies provide essential benefits for the domestic economy, U.S. national security and the environment. The House Energy and Commerce Committee has been a leader in the advancement of comprehensive energy and climate change legislation in the 111th Congress through passage of American Clean Energy and Security Act, which includes vital provisions to support domestic clean energy manufacturing and export promotion.

In addition to what is included in the American Clean Energy and Security Act, I would like offer additional areas that Congress may wish to consider to increase domestic manufacturing, jobs and exports in U.S. clean energy sectors.

The State of Clean Energy Investment

Clean energy industries have experienced strong growth in recent years, and even with the significant challenges in the capital markets, clean energy sectors are a bright spot in our economy.

According to New Energy Finance, clean energy sectors accounted for ten percent of global infrastructure investment in 2008. Further, new investments in clean energy saw a significant increase in the second quarter 2009, up from \$13 billion in the first quarter to over \$28 billion in the second quarter. Third quarter estimates show a slight dip to roughly \$26 billion in investment.

Business Council for Sustainable Energy
Testimony to the House Committee on Energy and Commerce, Subcommittee on Commerce, Trade and Consumer Protection
October 7, 2009

Of note, second and third quarter 2009 investments in U.S. clean energy sectors were weak compared to Europe, the Middle East and Africa. This can be attributed to the shortage of debt finance, and limited investment due to expected government stimulus spending, but could also be associated with less established U.S. clean energy policies and markets.

Trends in U.S. clean energy investments are expected to improve as the hundreds of billions of dollars of funds from the American Recovery and Reinvestment Act continue to flow through the economy. With this new influx of clean energy funding, the U.S. government should establish high-level, strategic and coordinated inter-agency domestic support and export promotion activities.

Key Components of a U.S. Clean Energy Manufacturing and Export Strategy

Given the global nature of clean energy markets – especially for solar, wind and efficiency products and components – the U.S. has the opportunity to embark on an aggressive and sustained strategy to expand domestic manufacturing and U.S. exports in these sectors.

The strategy should include six components:

I. Strong U.S. Markets

Establishment of strong domestic markets will build the foundation for manufacturing and exports. Sending the right signals at home through the adoption of domestic investment and manufacturing incentives, coupled with strong, coordinated and long-term policy commitments to clean energy sectors is critical to continued growth in domestic manufacturing, job creation and exports.

According to the American Wind Energy Association, the share of domestically manufactured wind turbine components has risen to 50 percent in the wind turbines installed in the U.S. in 2008, up from less than 30 percent in 2005. With the adoption of energy policies such as a strong national Renewable Electricity Standard, U.S. manufacturing in the wind industry can continue to increase.

In recent years, domestic production in the U.S. solar photovoltaic industry has kept pace with domestic installations. However, to ensure this trend continues, we need to maintain a strong and healthy market for solar energy. This means continuing to improve demand-side incentives to install solar energy capacity and expanding incentives to locate manufacturing facilities in the U.S. to a level that is on par with incentives offered in other countries. As such, Congress should maintain and expand the Manufacturing Tax Credit (MITC).

An example of a valuable initiative that supports domestic clean energy industries and exports is the U.S. Department of Energy Loan Guarantee program. Authorized by the Energy Policy Act of 2005, the Loan Guarantee Program provides federal support of clean energy projects that use innovative technologies, and spurs further investment in these advanced technologies. While still in the early stages, the loan guarantee program should provide strong underpinnings for further cost reductions in clean energy technologies, making newer technologies more competitive with retail electric prices worldwide. As the demand grows for the technology with reduced prices, manufacturing that produces the technology should increase.

Business Council for Sustainable Energy
 Testimony to the House Committee on Energy and Commerce, Subcommittee on Commerce, Trade and Consumer Protection
 October 7, 2009

Another challenge clean energy industries face is a lack of coordinated support by U.S. government initiatives and procurement spending. For example, manufacturing incentives are not well coordinated with worker training initiatives and the federal government could better aggregate its procurement dollars within federal agencies to support clean energy investments.

2. Free and Fair Trade Policy that includes Liberalization of Tariff and Non-Tariff Trade Barriers to Clean Energy Products and Services

Sound trade policy that recognizes the urgent need for clean energy products and technology transfer will help make U.S. products more competitive in foreign markets and offer a more level playing field for U.S. goods.

One quarter of U.S. gross domestic product is linked to trade. A study by the Institute for International Economics shows that a half century of gradually opening markets has created additional yearly income of \$10,000 for the average American household. Future policy liberalization could add another \$5,000 per household per year.

A concern expressed by some clean energy industries is that some foreign markets are closed than U.S. markets. For example, some foreign nations have domestic content requirements, tariffs, and numerous other protections. These issues should be considered as part of a clean energy trade liberalization effort.

3. Intellectual Property Right Protection

As our domestic industries grow and new technologies are developed it is critical to protect the intellectual property rights of firms that invest and offer innovations to the marketplace. In support of this, I refer to 1120A of the Foreign Relations Authorization Act, Fiscal Years 2010 and 2011 (HR 2410). This section directs the U.S. government to prevent weakening and fully protect intellectual property rights of energy and environmental technologies, including wind, solar, biomass, geothermal, hydro, landfill gas, natural gas, marine, trash combustion, fuel cell, hydrogen, micro-turbine, nuclear, clean coal, electric battery, alternative fuel, alternative refueling infrastructure, advanced vehicle, electric grid, or energy efficiency-related technologies.

4. Flexible and Innovative Government Financing

U.S. firms are best able to compete in foreign markets with instruments that leverage public and private capital and focus on the creation of enduring markets. While still in its early stages, the World Bank's Carbon Investment Funds seek to embrace this approach.

In addition, to better compete with foreign firms, U.S. companies need to be able to match the export promotion support that other governments provide. U.S. firms often face competition from the conditioning of overseas development assistance as well as tied aid. According to a 2006 report by the Organization for Economic Cooperation and Development (OECD), only 42 percent of Official Development Assistance is considered "un-tied" aid.¹

U.S. firms need to be able to compete and match such actions. Currently the Export-Import Bank of the U.S. has a process to assist firms that encounter tied aid challenges, but the process is burdensome and should be made more flexible and streamlined. Finally, government financing

Business Council for Sustainable Energy
 Testimony to the House Committee on Energy and Commerce, Subcommittee on Commerce, Trade and Consumer Protection
 October 7, 2009

should be made available to support capacity-building and the regulatory and institutional frameworks required to open new markets to clean energy products and services.

5. Expansion of Clean Energy Technology Export Promotion Programs

U.S. clean energy export promotion activities should be high-level and involve multiple agencies. They should have a strategic focus and provide support for U.S. businesses over the full project development and funding cycle. Domestic and export promotion programs should be catered to the needs of both small to medium-sized businesses as well as large businesses. Businesses of all sizes benefit from government support – ranging from identification of market opportunities and business partners to financing issues and overcoming market barriers.

Specific activities would include upstream support through trade missions and reverse trade missions under the Department of Commerce (and other agencies) as well as support of pre-feasibility and feasibility studies through the U.S. Trade and Development Agency. In addition, such programs would assist with project finance through the Overseas Private Investment Corporation and the Export-Import Bank of the U.S. Export promotion efforts should also coordinate with the multilateral and regional development banks that have made clean energy investment and climate change top priorities. The U.S. has existing programs in these areas, but would benefit from expanded funding, enhanced coordination and consistent high-level engagement.

Other nations approach clean energy market development and exports in a highly strategic fashion. This is currently happening at a less formal basis in the U.S., but we would benefit from a formalized and strengthen commitment between agencies.

6. Global Agreements on Climate Change and the Establishment of a Global Price on Carbon

Clear and long-term market signals, such as the establishment of a global price on carbon dioxide emissions that contribute to global climate change would offer a more competitive environment for U.S. clean energy firms. With many countries focused on economic growth that is decoupled from growth in greenhouse gas emissions, a global price on carbon will increase the financial value of clean energy products and services, provide a more level playing field for U.S. companies and will drive demand for these sectors in other countries.

On behalf of the members of the Business Council for Sustainable Energy, thank you for the opportunity to share our views on expanding U.S. manufacturing and exports in clean energy sectors. We appreciate the Subcommittee's leadership in development of new approaches to improve our economy and create jobs. Thank you.

The Business Council for Sustainable Energy is an industry coalition that includes businesses and trade associations representing the energy efficiency, renewable energy and natural gas industries. These industries comprise a suite of currently available technology options that can strengthen domestic energy security, create new high-quality jobs and reduce emissions of greenhouse gases that contribute to global climate change. For more information about the Council, please visit our website at www.bcse.org.

ⁱ OECD. (2006). *2005 Development Co-operation Report*. Volume 7, No. 1. Paris: OECD. ISBN 92-64-03651-2
 Available for download: [OECD Journal on Development, Development Co-operation Report 2005](http://www.oecd.org/dataoecd/11/59/36512005.pdf)

Mr. RUSH. Dr. Larson, you are recognized for 5 minutes.

TESTIMONY OF ANDREA LARSON

Ms. LARSON. Thank you for the opportunity to contribute my testimony to the topic today of "Growing U.S. Trade and Green Technology." I have three recommendations for the subcommittee.

The first is to support green technology and clean commerce. Second, use that support to drive economic recovery, urban revitalization, and economic development going forward. And third, leverage from the base that's already there, and the base can be expanded to support U.S. competitiveness in world markets because the United States is now being eclipsed by other countries.

Why should the committee listen to these recommendations? I have 35 years of work on economic development, product safety, environmental issues, and sustainability topics. The last 25 years were focused on the private sector entrepreneurship, innovation, and corporate strategy. And for the last 15 years, I have conducted research and taught MBA students and executives exclusively on the topics of the intersection of sustainability, innovation, and entrepreneurship. My work is about clean commerce.

To start with, it is worth noting what we mean by clean commerce. First and foremost, it is about creating jobs and delivering equal or superior product performance to customers at comparable prices compared with the existing alternatives. It is about cost-cutting, profitability, and competitive differentiation for firms. It's about dramatically cutting or eliminating pollution and toxic waste. It's not just about efficiency, it's about innovation first and foremost.

It includes green technology, but it's not limited to technology; it also includes nontechnical innovation. And critically important, it's not just about energy. Economies are built on energy and materials. Clean commerce means constant progress towards clean energy and benign materials.

Drawing from my knowledge base, I can tell you the green technology and clean commerce arena is the biggest opportunity in world markets now and for the foreseeable future. It is the new game. Any country that is willing to invest to build infrastructure, to innovate, to educate and train, and to support private equity and corporations to build capacities to meet domestic needs and engage in global markets will win at this game.

I have watched the United States being left behind in this game over the last decade. The follower strategy, which is what we're doing now, is a legitimate one in the corporate world, and perhaps that's what the United States wants to do. Certainly, that is the signal it's sending right now. Yet this is the growth area that's taking off worldwide.

The drivers of the changes, the drivers that are creating this huge opportunity are not going away. This is not a fad or a temporary phenomenon.

To give you a sense of what's happening in global markets, Denmark, Germany, India, Japan, and Spain account for 91 percent of global exports of wind power in 2008. The world's 12 major economic stimulus packages propose to invest \$180 billion in clean

tech in the next few years. Spain invests \$430 per capita compared to the United States \$57 per capita in renewable energy.

In 2008, China became the world's largest manufacturer of photovoltaic solar panels, the 95 percent of their volume exported. China has 60 percent of the total global capacity for solar thermal water heaters. And China protects its domestic clean energy companies, reserving contracts and restricting foreign firms.

If you were to point to the leaders in stimulating innovation in clean commerce and driving clean tech, you would look to Japan, Denmark, Spain, Germany, Brazil, China and India. The European Union is taking the lead in setting high performance standards for clean consumer products, recycling and product take-back. So you see leadership there as well.

Denmark and Spain have allowed individuals and companies to sell excess electricity generated back to the grid over a decade ago. Germany guaranteed grid access for renewable energy producers as far back as 1991. The United States has just begun to focus on these issues. States are moving to make changes in light of the fact that the Federal Government has not been active, but utilities continue to fight these measures.

The leaders, countries and companies, global companies have already committed to significant changes. They have set, and many have achieved, greenhouse gas emission reduction targets, and new ones are then set. They have set and are meeting energy efficiency targets. They have set and are meeting cogeneration targets. They have set and are meeting renewable energy source targets that reduce their national oil dependency, stabilize energy prices, and avoid energy security threats. And that's just the energy picture. As I said, there is comparable progress being made by other countries on clean materials.

What we are seeing is national strategies characterized by clear and consistent policies, gradual amendments to update those policies, protections to control consumer costs, mitigation for windfall profits, and simplicity to keep public administration costs low and individual, and corporate transaction costs minimal.

Given global trade competition in green tech and clean commerce, given that it is fierce—and that's going to only increase—and it's being shaped by national strategies to support and protect domestic innovation and manufacturing, the U.S. is now at a significant competitive disadvantage compared to other countries that have already experimented, learned, adapted and refined integrated national policies that mobilize citizen behavior, corporate investment, education, and government purchasing.

The future of global trade is absolutely clear, and clean commerce and green tech are at its core. For emerging and developing economies alike, industrial and commercial activities that support the provision of clean energy and green-chemistry-designed materials bring green buildings, sustainable grown foods and clean transportation so that clean air, clean water, and healthy soil are preserved by design, these actions are increasingly recognized as delivering on capitalism's promise of prosperity. And if you are adopting these strategies, companies and countries can gain competitive advantage.

The companies and the countries that understand this new reality will dominate world trade in critical growth industries. The question is: Do we want to lead or follow? Thank you.

Mr. RUSH. Thank you very much, Dr. Larson.

[The prepared statement of Ms. Larson follows:]

Testimony of Professor Andrea Larson
Darden School of Business, University of Virginia*
Before the U.S. House Committee on Energy and Commerce
Subcommittee on Commerce, Trade and Consumer Protection
Topic: "Growing U.S. Trade in Green Technology"
Wednesday, October 7, 2009
larsona@darden.virginia.edu

The Subcommittee is interested in exploring how the U.S. trade in "green technology" might be expanded. My comments are captured in three interrelated recommendations:

- **INVEST IN CLEAN ENERGY & MATERIALS**
- **USE GREEN TECH TO DRIVE ECONOMIC DEVELOPMENT DOMESTICALLY**
- **SUPPORT U.S. GREEN TECH COMPETITIVENESS**

Green technology and clean commerce are the future. Green technology has become, and will increasingly be, a major economic growth area for the U.S. and world trade. There is no reason the U.S. cannot be a world leader through export of clean technology and clean commerce innovation, and U.S. leadership should be a strategic goal.

Why? Because:

1. Investing in clean energy and clean materials is essential for intelligent economic development, human health protection, and ecosystem preservation
2. U.S. leadership in clean energy and materials (green technology) creates jobs, stimulates innovation, drives exports, and differentiates U.S. technology, education, and skills in global markets
3. The U.S. could have an advantage in world trade, but on the current path the U.S. will continue to fall behind

Green tech and clean commerce is the future. Population and economic development pressures are colliding with the ability of nature to deliver clean air, water, and soil. Yet the design of the industrial system that brought us to this point in history was based on assumptions of limitless resources and limitless capacity for natural system regeneration, even in the face of our waste streams. Responding to climate change and green tech opportunities are just the beginning of a major shift in this century for business. New design for business is imperative because the forces of change are accelerating.

It is not just the current economic downturn that confounds us. We face unacceptable income and opportunity disparities at home and poverty worldwide as global population grows from 6.5

to 9 billion in the next few decades. Worldwide over 2 billion people are moving rapidly into the middle class, and they will want all the opportunities and material wealth that the richest populations in western societies now view as normal. Today we concurrently face an economic downturn, a climate crisis, an energy security crisis, energy price volatility, new environmental health challenges, and ecological systems in dramatic decline.

If that were not enough, the U.S. also faces a competitiveness crisis as it loses ground to other countries that are already strategically committed to mobilizing state resources behind domestic businesses that will produce solutions to these problems. Other countries have mounted national efforts to reach clean commerce goals (e.g. renewable energy, domestic “green” companies, dramatic efficiencies, accelerating advances in PV solar design innovation, advancing clean public transportation, protecting consumers from toxic materials, and providing subsidies and incentives to advance their industries in global markets).

The larger picture shows capitalism as currently designed is at a crossroads.¹ It must deliver on its promise of broad prosperity, yet its very design appears to undermine the ecological systems and healthy communities on which it depends. It needs an overhaul: clean energy and materials provide an answer. The U.S. should be leading this change, not following.

Personal Introduction

I serve on the faculty of the Darden School and have conducted research and taught there for twenty years in the areas of innovation and entrepreneurship, strategy, and sustainability (cleantech, clean commerce). Prior to that I worked on consumer product safety, clean energy, and environmental concerns in the public (state and federal agencies) and non-profit sectors. My work has enabled me to see first-hand the emergence and rapid growth of a “clean commerce” approach to business that is re-designing the delivery of products and services. This approach – if fully understood and supported – can provide jobs, urban revitalization, health benefits, clean energy and transportation, sustainably produced and healthy foods, and – if appropriate policies are in place – offer the U.S. the opportunity for global leadership in green tech and clean commerce, capitalism’s next chapter.

Defining Green Technology

Green technology is one term of several used today to encompass a range of activity and innovation to simultaneously address economic development needs, health protection, and preservation of ecosystem services (e.g. the natural systems that provide us with clean air, water, soil, and food). Other terms include sustainability, clean commerce, cleantech, sustainable business, and sustainability innovation. The activities these terms reference challenge existing ways of designing and delivering not just energy, but the entire set of interdependent systems and supply chains that provide food, shelter, consumer products, and transportation modes.

We will use the abbreviation GT/CC throughout this testimony to refer to green tech and clean commerce, two terms that represent the ideas under discussion.

^{*}this testimony is provided as an individual statement

¹ Stuart Hart, *Capitalism at the Crossroads* (Wharton School Publishing, 2005).

GT/CC refers to technology innovation, but also non-technical innovation, the latter represented by innovative supply chain management or innovative financing mechanisms to install urban PV solar installations that pay residents to sell excess electricity back to the grid. The non-technical innovative frontier must also be a focus for green tech and clean commerce innovation and U.S. competitiveness.

Furthermore, GT/CC is not just about energy. The fundamental basis of commerce and trade is energy AND materials. Both must be managed and designed to meet human needs and optimize ecological system functions. Thus green chemistry and green engineering practices are equally as important to green tech and clean commerce (GT/CC) as renewable energy technologies. PV solar systems that expose their production workers to toxins, are thrown away in landfills after use, then pollute water supplies, are not the solutions we need. "Fresh" vegetables and fruit grown with agricultural chemicals, processed, and transported thousands of miles and lacking fundamental nutrients that urban garden-grown food provides are not the solutions we need. More efficient lighting replacements that create mercury waste may save energy but are still poor designs. In other words, poorly thought out, so-called green technology improvements focused on today's hot topics (climate and energy are the focus today) are common. But a deeper design perspective is needed. First, a systems view is required. One that understands every "green" energy solution, in fact every energy AND product selection by a company or a consumer, reflects materials choices and embedded energy decisions that must be made visible, examined and evaluated for their life cycle implications. Fortunately this is now happening, led by innovative entrepreneurs. But it must be expanded and accelerated.

Nor is green technology just about efficiency. It is about that, but more importantly it is about innovation. Efficiency just allows us to do the same old things at lower cost and using less energy and fewer materials. A laudable improvement, but not the solution. Innovation creates fundamentally new solutions, preferably systems-oriented solutions that prevent and eliminate the problems we face now with climate alteration and unsafe products.

The concept that ties together innovation and both clean energy and materials is the notion of cradle to cradle design.² Our current commercial practices extract raw materials, make products, generate waste streams that impact air and water, expose production workers, sell to consumers who use the products and throw them away, and leave the materials to decompose and contaminate our air and water from the landfill, incinerator or Third World country dumping destination. Think about how the costs and benefits are allocated in this linear system. This is called a cradle to grave product life cycle. The alternative is cradle to cradle design derived from systems thinking, that reduces or eliminates energy and material inputs, including toxicity BY DESIGN FROM THE OUTSET to avoid employee, user/consumer, and ecosystem contamination. Under a cradle to cradle design, selected materials can be safely returned to the earth or maintained within closed recycling systems that use waste from one production and use process, as the feedstock for another.

The "greentech" issues or what I am calling the green technology and clean commerce issues (GT/CC) constitute a central challenge for governments. Providing ever growing volumes of products and services (under current design parameters) to support economic development also gives us pollution and costs that are externalized (and inequitably so) onto the population in one

² William McDonough, Michael Braungart, *Cradle to Cradle* (New York: North Point Press, 2002).

form or another (higher taxes for regulation, disease, and more expensive health insurance for chronic illnesses). Examples are air pollution (excessive concentrations of toxins in the air contributing to the asthma epidemic, among other respiratory problems), unsafe foods (linked to diabetes, obesity, and food contamination), excessive carbon dioxide concentration in the atmosphere (climate change and volatility), and water supply threats and shortages due to industrial contamination.

As world population rises to 9 billion in the next few decades and capitalism as currently designed stumbles in its promise of greater prosperity and results instead in wealth creation accompanied by income disparities, climate change, and waste streams increasingly tied to chronic human health challenges, a clean commerce solution is emerging. This is an alternative approach to business that we call green technology and clean commerce. This movement is obvious in the current emphasis on clean energy alternatives in response to climate change.

Less visible is the movement to design out molecular toxins in everyday products. This is the *clean materials design revolution*, the counterpart to the clean energy movement. Together the clean energy and clean materials efforts offer a way to simultaneously address environmental health problems, clean air and water supply issues, low carbon solutions for energy and transportation, job creation, and urban and rural revitalization while moving away from fossil fuels (with their energy security, health, and climate/ecological problems) and building American competitiveness in the fast-growing clean commerce markets worldwide.

This is already happening but at a scale and scope that needs to be magnified – and likely will be – over the next few decades. GT/CC encompasses material and energy system design characterized by what we have discussed thus far. This means it includes products (consumer and B2B) designed with green chemistry and engineering principles, renewable energy sources (solar, wind, geothermal, hydro, or wave), and every other effort underway to move from fossil fuel feedstock and toward more systemically benign ways to meet human needs (biofuels and bio-materials; smart grid innovation; energy efficiency; advanced batteries, fuel cells, and hydrogen transport/energy systems all designed from a life cycle perspective; clean cars and public transportation; sustainable agriculture; and green building and construction).

Next we shift to the core question of these hearings, the challenge of growing the U.S. clean commerce presence in world markets. A major challenge for the U.S. is the extent to which it currently lags other countries. The American Recovery and Investment Act of 2009 (ARRA) begins to address these issues but there is still much that can be done to lift the country to a trade and commerce leadership position.

U.S. Competitiveness

Transformation in the next decade to an alternative mindset about energy and materials is key to U.S. competitiveness and mandatory if global society is to handle the challenges of population growth, energy demands, and material throughput volumes required to provide prosperity for billions more people. We can choose to let others lead or we can mobilize and combine all the elements we have in this country to lead.

This discussion acknowledges that the U.S. has declared 25% renewable energy goals by 2025 with the February 2009 ARRA legislation. The clean technology stimulus accounts for about \$66 billion, just ahead of China's stimulus investment. The important fact, nonetheless, is that we come to the table late. By way of example, according to the U.S. International Trade Commission, "Denmark, Germany, India, Japan, and Spain accounted for a combined 91 percent of global exports of wind-powered generating sets in 2008."³

Globally, investments in GT/CC have been growing rapidly. For instance, new investments in sustainable energy increased between 25% and 73% annually from 2002 to 2007, until growth fell to only 5% in 2008 following the 2007-08 recession.⁴ Nonetheless, even in 2008, total investments in sustainable energy projects and companies reached \$155 billion, with wind power representing the largest share at \$51.8 billion. Meanwhile, the world's 12 major economic stimulus packages proposed to invest another \$180 billion collectively in coming years.⁵ Also in 2008, sustainability-focused companies as identified by the Dow Jones Sustainability Index or Goldman Sachs SUSTAIN list outperformed their industries by 15% over a six-month period.⁶ Longer horizon analyses indicate companies screened for sustainability factors match or exceed the performance of conventional firms. These are companies that focus not only on renewable energy sources but also energy conservation, environmentally safer products, and improved corporate governance.

Despite being a leader in some areas, however, the U.S. was not an overall leader in GT/CC. From 2000 to 2008, venture capital investments in U.S.-based renewable energy companies increased from 0.6% of all VC investments to 11.84%, and in 2008, venture capital and private equity made new investments in energy efficiency and renewable energy worth \$7.72 billion in North America and \$3.05 billion in Europe.⁷ Moreover, the U.S. had the most GT/CC business incubators in 2008, with 56.⁸ The UK was next in incubators with 21, and 16 were in Germany. Yet Europe as whole was home to 46% of the global total of incubators, versus 40% for the U.S.⁹ Furthermore, North American investments in sustainable energy shrank 8% in 2008 to \$30.1 billion, while in Europe they increased 2% to \$49.7 billion. Many other major emerging economies also saw investments in their renewable energy sectors increase: Brazil's increased 76% to \$10.8 billion (mainly due to ethanol), China's increased 18% to \$15.6 billion, and India's increased 12% to \$3.7 billion.¹⁰ Even in Spain investments reached \$17.4 billion in 2008,¹¹ or \$430 per capita compared to North America's \$57 per capita. For investments specifically in publically traded renewable energy and efficiency companies, Chinese companies led in 2008 with \$2.8 billion, followed by Portugal (\$2.6 billion), the U.S. (\$2.1 billion), and Germany (\$1.5 billion). In fact, in 2008, China became the world's largest manufacturer of photovoltaic panels,

³ United States International Trade Commission, "Wind Turbines: Industry and Trade Summary," July 2009, iii.

⁴ UNEP, *Global Trends in Sustainable Energy Investment 2009*, 10.

⁵ UNEP, 10.

⁶ A.T. Kearney, Inc., "Green Winners," 2009, 2.

⁷ UNEP, 30.

⁸ Clean Edge, Inc., *Clean Energy Trends 2009*, 6; UNEP, 26.

⁹ UNEP, 26.

¹⁰ UNEP, 12.

¹¹ UNEP, 19.

with 95% of them destined for export.¹² This output means China may soon surpass both German and American manufacturers.¹³

Indeed, China has recently made massive moves toward a CT/CC economy. For instance, China now has 60% of the total global capacity for solar thermal water heaters. Even such a relatively minor innovation saved 3 million tons of oil equivalent in 2006 according to the International Energy Agency.¹⁴ China is also nurturing and protecting its domestic wind power producers, reserving contracts for them and restricting foreign firms. The size of China's market for GT/CC creates significant opportunities for development of domestic innovators and mass producers. Nonetheless, China has a way to go: other countries have put themselves into leadership positions over the past two decades through a series of policies. Those world leaders have been Japan, Denmark, Spain, and Germany.

In 1996, Japan set a target by 2010 of using 3% (roughly 19 gigaliters oil equivalent) of primary energy supply from renewable sources excluding hydropower and geothermal energy. In 2008, the target was amended to represent an upper bound while 15.1 Gt was established as a lower bound.¹⁵ That goal plus grants for residential solar PV installations allowed Japan to lead the world in installed solar capacity from 1999 to 2005, which also allowed Japanese companies such as Sharp to gain an early manufacturing lead. Sharp and other Japanese companies remain competitive in the U.S. market to this day, even though Germany overtook Japan in installed capacity in 2006.¹⁶ In 2007, Japan established Renewable Portfolio Standards that required utilities to use renewable sources of electricity generation, to reach 16 TWh by 2014.¹⁷ The RPS also set prices for solar PV rates, and in December 2008, Japan allocated another \$9 billion for solar subsidies, which is less than California's current solar subsidy program but reaches more eligible people.¹⁸ Japan continues to invest in solar research, including space-based solar energy.

Denmark began to shape its lead in GT/CC in 1976, when its Energy Research Program granted generous subsidies to renewable energies.¹⁹ Danish renewable energy companies turned heavily toward wind power, selling that technology domestically and abroad, especially in California. In 1989, new laws required utilities to buy electricity from renewable sources and co-generation plants, and a series of subsidies and other government support boosted GT/CC through the 1990s. By 2003, Denmark dominated the global market for wind-power generator sets, selling \$966 million or 79.5% of the market.²⁰ Denmark still gets a larger share of its energy from wind than any other country and sold \$1.2 billion worth of generator sets in 2008, or 23.4% of the

¹² UNEP, 34, 49.

¹³ Keith Bradsher, "China Racing Ahead of U.S. in the Drive to Go Solar," *New York Times*, Aug. 24, 2009, http://www.nytimes.com/2009/08/25/business/energy-environment/25solar.html?_r=1; UPI, "West vs. China in solar war," Sep. 9, 2009, http://www.upi.com/Energy_Resources/2009/09/09/West-vs-China-in-solar-war/UPI-25781252515090/.

¹⁴ IEA, *World Energy Outlook 2008*, 176.

¹⁵ IEA, <http://www.iea.org/textbase/pm/?mode=re&id=4248&action=detail>.

¹⁶ UNEP, 19.

¹⁷ IEA, <http://www.iea.org/textbase/pm/?mode=re&id=3591&action=detail>.

¹⁸ UNEP, 20.

¹⁹ IEA, <http://www.iea.org/textbase/pm/?mode=re&id=76&action=detail>.

²⁰ United States International Trade Commission, "Wind Turbines: Industry and Trade Summary," July 2009, 40-41.

global market.²¹ Meanwhile, Danish Vestas controls 17.8% of the wind turbine market, putting Danish companies behind Germany and ahead of the U.S., Spain, and China in that field.²² In 2008, the Danish government's Agreement on Energy Policy sets goals of 20% of gross energy consumption from renewable sources by 2011, with incentives for de-centralized production, research, and other activity.

On the other side of Europe, Spain had a mere 979 GWh of renewable energy generation, almost all of it hydro-electric, in 1990. Yet in 2007, that same generation had risen 33-fold to 32,714 GWh, with wind accounting for about two-thirds of total.²³ A series of steps similar to those in Japan and Denmark led to this rapid rise, which has ultimately left Spain a major force in the world's solar and wind energy markets. Spain's 1980 Law for the Conservation of Energy first established subsidies for renewable energy sources feeding into grid. In 1997, the Law of the Electricity Sector guaranteed grid access for renewable sources and later laws set prices as well as targets, such as 12% of energy from renewable sources by 2010. With this support, Spain ranked third globally in 2008 in installed wind capacity with 16.8 GW and controlled 8.8% of the market for wind generator sets and 14.9% for turbines.²⁴ It has also been a leader in solar thermal plants, building Europe's first in 2007 and continuing to develop others.

Germany, finally, has achieved some of the broadest, most profound changes en route to a GT/CC economy. It reached its Kyoto Protocol emissions target of a 20% reduction of GHG emissions from 1990 levels in 2007, a year early. A series of policies has enabled this progress, such as the 1991 Feed-in Tariff Act that required utilities to purchase electricity from any supplier on the grid. Later laws, such as the 2000 Renewable Energies Act and its subsequent updates, have guaranteed prices for renewable energies and set broad environmental targets. Germany in 2009 set even more ambitious plans for reducing overall emissions and dependence on fossil fuels.

The German Government's targets at a glance:

Greenhouse gas emissions are to be cut by 40 % by 2020 compared with 1990 levels. By the end of 2007 Germany had already achieved a reduction of – 21.3 %.

Energy productivity is to be increased by 3 % per annum. This means that by 2020, energy use will be twice as efficient as in 1990.

The proportion of renewable energies is to be continuously increased to account for

- 18 % of final energy consumption by 2020, compared with around 10 % today;
- At least 30 % of gross electricity consumption by 2020, compared

²¹ Eurostat, "Share of renewables in gross inland energy consumption - %," <http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&init=1&pcode=tsdcc110&language=en>; IEA, *World Energy Outlook*, 166; ITC, 40-41.

²² ITC, 3.

²³ Pablo del Rio Gonzalez, "Ten years of renewable electricity policies in Spain: An analysis of successive feed-in tariff reforms," *Energy Policy* 36 (2008):2917-2929, 2918.

²⁴ Federal Ministry for the Environment, Nature Conservation and Nuclear Energy, "Renewable Energy Sources in Figures: National and international development," 2009, 55; ITC, 3, 40-41.

with around 15 % at present, with continuous further expansion thereafter;

- 14 % of heat energy demand by 2020, compared with just under 8 % today;
- By 2020, the proportion of biofuels is to be increased to such an extent that greenhouse gas emissions will have been reduced by 7 % by 2020 compared with the use of fossil fuels, corresponding to an approximate energy share of 12 %;
- 50 % of energy consumption by 2050.

The share of electricity production derived from cogeneration (CHP) is to be doubled to 25 % by 2020.²⁵

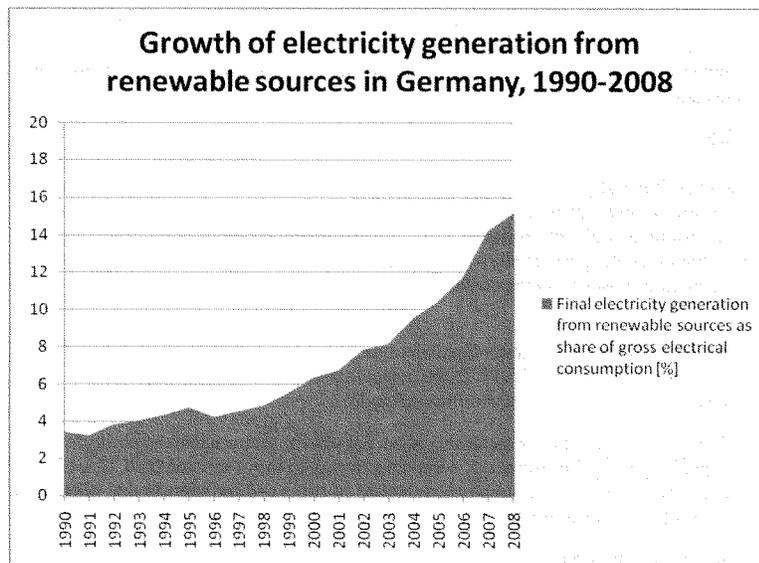
In 2008 in Germany, revenue from construction of renewable energy facilities was 13.1 billion Euros (approximately \$19.7 billion) and from operation was 15.7 billion Euros (\$23.6 billion), representing approximately 278,000 jobs in all. The total revenue from these two activities increased 188% relative to 2003.²⁶ Meanwhile, the German government's Market Incentive Program, through grants and other incentives, encourages renewable energies by direct funding, which attracts additional investment. From 2000 to 2008, 1.2 billion Euros of direct funding attracted an additional 8.6 billion Euros of outside investment, with government funding for renewable energy R&D directed mainly to solar and wind.²⁷ The results have been a near quintupling of electricity generated from renewable sources since 1990. In contrast, U.S. government subsidies totaled \$29 billion from 2002-2008 for renewable energies, more than half for corn ethanol, which paled in comparison to \$72 billion in subsidies for fossil fuels.²⁸

²⁵ Federal Ministry, 10.

²⁶ Federal Ministry, 29-30, 31.

²⁷ Federal Ministry, 39, 42.

²⁸ Environmental Law Institute, *Estimating U.S. Government Subsidies to Energy Sources: 2002-2008, 2009*, http://www.elistore.org/Data/products/d19_07.pdf.



Source: Created from data in Federal Ministry for the Environment, Nature Conservation and Nuclear Energy, "Renewable Energy Sources in Figures: National and international development," 2009, 16.

What you see when reviewing different countries' strategies is policy variation customized to local conditions but built upon a consistent pattern of core features that includes protections to control consumer costs and mitigation for windfall profits to any players. Simplicity is important to keep public administration costs low and company and individual transaction costs minimal. Consistent policies, gradual amendments to update, and stable supports (whether direct investments or tax incentives) are essential to encourage equipment manufacturers to innovate and to mass produce. Clear and consistent signals also reassure investors that markets will be relatively predictable within adequate time frames for generating returns. In summary, successful government policies appear to include key stakeholders and set ambitious targets, and then address concerns about price-gouging and the factors that typically drive innovators and companies away: instability, uncertainty, and inconsistency.

The U.S. can catch up, but when other countries are working from 20 year-plus guaranteed grid access for renewable energy producers in Spain and Germany (starting in 1991 in Germany) and well-established Spanish Feed-In Tariffs (TIFs) that built on German and Danish examples established well over a decade ago, it suggests the magnitude of the catch up challenge. These countries jumped in early, learned and adapted, and can now act faster and more effectively to build their CT/CC going forward. For the huge and rapidly growing markets for GT/CC in India and China, the U.S. faces governments quickly moving to protect and support fledgling

industries that will produce clean cars and public transportation technologies to address pollution impacts, clean energy production (to offset reliance on dirty coal), and the state of the art green components and systems to address the many development and pollution/health problems they know they must solve.

Final Thoughts

The economic growth paradigm and accompanying common knowledge that told us growth had to come first, followed only much later by investment in environmental and health protection (the path of western industrialized societies) will not be sufficient for India and China. I tell my MBA students that given the pace of innovation in those countries around clean commerce goals, the U.S. will be buying most of its clean technology solutions from Indian and Chinese companies in 10 years.

I would also suggest that the U.S.'s geopolitical decline, should it come to pass, will be reflected in our unwillingness to step up to the GT/CC challenge that current population, resource, pollution, and technology development conditions impose.

I am not an advocate of government regulation unless the private sector lacks the ability to provide for the public good. Unfortunately, companies trying to move toward GT/CC, while admirable, are in a race against the cumulative decisions of firms and individuals that continue to erode the commons that is our ultimate source of all wealth, social and financial.

We tend to think of the commons as natural systems (air, water, or land); we might want to consider adding our children's bodies to that collective commons. The Centers for Disease Control extensive research on contaminants in human blood, immune, and reproductive systems suggest that this century long industrial experiment that clearly has had decisive negative influences on our ecological systems and atmosphere, is also at work on the human body and children's health. Are we surprised?

The last thing I want to see is unnecessary regulation. I work with private sector innovators and emphasize the amazing capacity of markets and entrepreneurial forces in society to create the changes we need to see. But this activity must be framed with enabling and supporting policy that sets the rules and provides consistent and intelligent guidance so that markets and human ingenuity can do the rest.

In addition, let us keep in mind, in the polarized and ideologically laced discussions that pass for policy debate, that there are no purists. State subsidies and consistent long-term government support for fossil fuels played a large part in giving us the energy and materials system we live with today. Subsidies, just in recent years alone, explain why GT/CC activities remain vulnerable and investment capital moves slowly.²⁹

Can the U.S. build a GT/CC strategy? Through insufficient investment and lack of policy leadership the U.S. continues to lose ground in its learning pace and its domestic experience to countries willing to back their companies with capital and create mutually reinforcing incentives to mobilize citizen behavior, corporate investment, education, and state decision making. While the hesitancy of the U.S. to create industrial policy to lead in GT/CC is historically

²⁹ Environmental Law Institute, *Estimating U.S. Government Subsidies to Energy Sources*.

understandable, other countries without our political and ideological history (and gridlock) have put policies in place. First we must get our own house in order. It is only then that we will have built the necessary platform for leadership in world trade.

The challenge is straightforward, if ambitious. Future prosperity depends on economic development solutions that address poverty and extreme disparities in income distribution while simultaneously delivering on job creation, skill development, and education for the future. Industrial and commercial activity that fails to actively support provision of clean, healthy products, and clean air, water, shelter, transport, and food, by definition undermines that prosperity. Fortunately the know-how and tools are now available in the form of GT/CC practices and innovation. If the Subcommittee member would like to know more about these topics, this is what I teach, and I would be happy to pass on that information as well.

Mr. RUSH. Mr. Hayward, you are recognized for 5 minutes.

TESTIMONY OF STEVE HAYWARD

Mr. HAYWARD. Thank you, Chairman Rush, and members of the committee.

Over at the American Enterprise Institute, I spend a lot of time with a team of seven or eight people—economists, lawyers, a couple of scientists even, some trade experts—puzzling over the whole picture of energy that changes like a kaleidoscope every day. It is on the one hand exhilarating and also daunting. Every day something new comes along and something you thought you knew looks differently.

I think that whatever happens in the next 10 or 15 years, it's probably different than what we expect right now. And that puts me in the frame of mind of the old comment from either Sam Goldwyn or Yoggi Berra—I'm not clear which—who said "Never prophesy, especially about the future."

That being said, I think there are two broad issues, some of which have already been suggested here today, that need to be thought about long and hard. The first is, what are the actual dynamics of the present marketplace and how will those market dynamics change under a variety of policy regimes, either enacted by the industrial world, or the entire world in concert? Specifically, schemes—whether cap-and-trade or a tax to put a higher price ban for carbon-based energy.

And then, second, what are some of the cross-cutting factors that will come to bear on how trade flows will unfold in the real world? I think there are two factors in that category. One has already been suggested, but I'll sharpen it a little bit further. We face the prospect of incipient trade protection and retaliation for things such as border adjustment tariffs that are contemplated in the Waxman-Markey bill, but also the problem that everyone has mentioned of intellectual property rights for energy technology innovations that the United States may bring to the marketplace over the next several decades.

Above all, I am always a little troubled about claims for new jobs or new businesses that depend vitally upon subsidies or mandates from Washington. I think Congress in general is well advised to resist schemes in which business profits are more dependent on the political marketplace in Washington rather than the competitive marketplace outside Washington.

Now, you can point to a lot of energy innovations and efficiency improvements. My favorite is jet aircraft engines, which GE and Pratt & Whitney, for example, are leaders in the world in developing, they have neither subsidies nor mandates. In fact, as I look at the top ten categories of American manufacturing exports, starting with civilian aircraft equipment, \$73 billion in 2007, none of those need subsidies and mandates, with the possible exception of financing from the Export-Import Bank and so forth.

At the present time, as has been mentioned, the U.S. runs a trade deficit in renewable energy technologies. I think there is good reason to expect that to continue and maybe even get worse instead of better.

I have a table in my testimony showing from the latest complete figures I could find, from the Department of Energy and the Census Bureau from 2003, of a breakout of the substantial deficit in our wind power production, our wind power exports and imports, because we import an awful lot of the raw materials for the wind power that we make and install.

I notice that the compact fluorescent light bulbs I've been buying lately are made in China. I think Congress might well ask industry for assurances that, in return for subsidies and mandates, expanded production capacity will be located here in the United States, and not overseas, that have lower materials and labor costs. I am skeptical that such assurances can be achieved.

And beyond that, if we really are going to make, say, 20 percent of our electricity by wind power by the year 2030—which the Department of Energy says is feasible—I'm skeptical that we can clear the litigation alone for the siting of power lines to do that. But never mind that; if we are going to do that, I wonder if we really are going to be able to expand our own manufacturing capacity enough to meet that kind of ambiguous target and have additional new capacity to export it to overseas markets.

Meanwhile, I note that roughly 80 percent of the world's premium reserves of hydrocarbons are based in less developed nations. And even if you got a global carbon price of, say, \$28 a ton—that's the figure now contemplated over in the Senate in the Kerry-Boxer bill—hydrocarbon energy will still be cheaper than present renewables at scale and other renewable technologies that the United States might export.

And so in other words, if we place a higher price on carbon in the developed world and the developing world does not—I wouldn't be at all surprised if 10 or 15 years from now, our leading energy exports continue to be oil- and gas-drilling equipment where we have the best in the world and where we still enjoy, by the way, a trade surplus.

Now, the example of oil and gas technology I think illustrates the last point, which is some of the train wrecks that are unfolding in the architecture of our policy in these matters. A lot of our specialized oil- and gas-drilling technology companies guard their intellectual and proprietary property very closely, seeking to work through partnerships rather than selling licenses or even selling their products overseas, because they worry about their intellectual property being stolen by the Chinese, for example.

And yet, as Mr. Scalise pointed out, we are being told that the dimensions of the climate crisis means we should essentially give away a lot of technology in the interests of the world. Well, maybe so, but I note that over \$1 billion in private capital this year, at least \$1 billion is going into algae-based biofuels—a long way off, but I know a lot of people are very optimistic. It's hard to believe our entrepreneurs putting up this much capital are going to want to give away that technology.

In the meantime, a lot of developing nations at their opening bid at Copenhagen are saying the developed world should provide \$100 to \$200 billion a year in foreign aid so they can buy our technology. Either way, it looks like American companies will be asked to sell

or give away their products cheaply or that American taxpayers will be made to pay for it.

And finally, I already mentioned the prospect of border adjustments or high-carbon imports contemplated in some legislation—even if it doesn't run afoul of WTO rules—is likely to be, in my mind, counterproductive. And I will stop there.

Thank you, Mr. Chairman.

[The prepared statement of Mr. Hayward follows:]

Testimony of Steven F. Hayward to the House Committee on Energy and
Commerce, Subcommittee on Commerce, Trade and Consumer
Protection

“Growing U.S. Trade in Green Technology”
October 7, 2009

Steven F. Hayward
F.K. Weyerhaeuser Fellow in Law and Economics
American Enterprise Institute

Mr. Chairman, members of the committee:

There are two main issues that should be considered when assessing the prospects for increased export potential for American energy technology of all types.

First, what are the actual dynamics of the present market environment, and how will those market conditions change under a variety of policy regimes, such as “cap and trade” or other methods to enact a higher price band for carbon-based energy?

Second, what are some of the cross-cutting factors that will come to bear on how trade flows will unfold in the real world? The main two factors in this category are incipient trade protectionism or retaliation for policies such as carbon-content “border-adjustment” tariffs that are contemplated in Waxman-Markey, but also the status of intellectual property rights for energy technology innovations that American companies may bring to the marketplace over the next several decades.

Above all, policymakers should regard with skepticism claims of net new jobs in the energy sector that depend on subsidies or mandates. Ironically there is an economic term for such policies: unsustainable. Congress should resist schemes in which business profits are more dependent on the political marketplace in Washington rather than the competitive marketplace outside Washington. Most genuine energy efficiency improvements—jet aircraft engines come to mind as an excellent example—are sufficiently market-driven that they need neither subsidies nor mandates.

At the present time, the U.S. runs a trade deficit in renewable energy technologies, and there is good reason to expect this to continue, especially if there is a significant expansion in the deployment of renewable sources here in the U.S. Take wind power as an example. In 2003, the latest year for which the Dept of Energy reports data, the U.S. ran a nearly \$20 billion trade deficit in wind power components. (See Table 1 below).

Table 1: Wind Power Trade Balance, 2003

	Exports (2003)	Imports (2003)	Balance (2003)
All Other Plastics Product Manufacturing	7,498,247,596	8,705,044,281	-1,206,796,685
Iron Foundries	402,809,347	448,981,346	46,171,999
Fabricated Structural Metal Manufacturing	472,991,262	1,101,860,855	628,869,593
Ball and Roller Bearing Manufacturing	1,264,739,974	1,496,519,859	231,779,885
Industrial and Commercial Fans & Blower Manuf.	320,594,432	618,889,420	-298,294,988
Turbine and Turbine Generator Set Units Manuf.	4,354,604,794	2,390,977,528	1,963,627,266
Speed Changer, Indust. High-Speed Drive & Gears	701,635,808	1,591,409,650	889,773,842
Mechanical Power Transm. Equipment Manuf.	716,042,247	1,034,775,537	318,733,290
Printed Circuit Assembly Manuf.	1,145,197,487	17,945,051,089	16,799,853,602
Other Measuring and Controlling Device Manuf.	2,217,994,511	1,172,791,287	1,045,203,224
Motor and Generator Manufacturing	3,213,473,343	5,569,294,815	-2,355,821,472
All Other Misc Elect. Equip. & Component Manuf.	3,652,366,459	3,537,572,937	114,793,522
Total (in U.S. Dollars)	25,960,697,260	45,613,168,604	-19,652,471,344

Source: EIA and Census Bureau

While the cost curves and innovation in renewable energy are moving at a fast pace at the moment, if there is a substantial increase in the deployment of wind and solar power in the U.S. over the next decade it is not automatic that there will be an expansion in manufacturing capacity sufficient to provide a simultaneous increase in exports. In other words, to reach some of the ambitious targets set out in recent legislation, we're going to need every windmill we make right here at home, and more likely we will continue to import wind and solar energy components from overseas. Congress might well ask industry for assurances that in return for subsidies and mandates, expanded production capacity will be located here in the U.S. rather than outsourced overseas to lower cost nations. I am skeptical that such assurances can be achieved.

Meanwhile, given that roughly 80 percent of the world's proven reserves of hydrocarbons are located in less developed nations, and given that even with a global carbon price of \$28 a ton (the ceiling now contemplated the Boxer-Kerry bill just introduced in the Senate), hydrocarbon energy will still be cheaper at scale than most renewable energy technologies that we might export. If the U.S. and Europe place a higher price on carbon while the developing world does not, it will ironically make fossil fuels *more* attractive for the developing world. Either way, it is easy to predict that in ten years our leading energy technology export will still be oil and gas drilling equipment, where we currently enjoy a trade surplus.

The example of oil and gas technology exports is instructive here, and points to some potential train wrecks in the unfolding architecture of American climate policy. Many specialized oil and gas technology companies in the U.S. work very

hard to protect their intellectual property rights against piracy, and in many cases do not sell or license their proprietary technology, seeking instead to work through foreign partnerships in which they keep direct control of their products.

Developers of renewable energy technology rightly worry about their intellectual property being stolen or pirated by developing nations such as China, yet this runs headlong into foreign demands that we essentially give away our technology on account of the dimensions of the climate crisis. This tension needs to be confronted more directly.

Second, American renewable energy producers rightly point to existing trade barriers and tariffs as an obstacle to expanded trade in energy technology, yet the proposals for “border adjustments” of high carbon-content imports in the Waxman-Markey bill, even if it does not run afoul of WTO rules, is likely to be highly counterproductive.

Mr. RUSH. The Chair thanks all the witnesses. And now the Chair will proceed with the questioning segment of this hearing, thereby recognizing himself for 5 minutes for the purpose of questioning the witnesses.

As I said in my opening statement earlier, in many instances we see that other countries have policies that make it difficult for U.S. companies to compete in the global market. Emerging markets in countries like Russia, China, India, and Brazil have tariff barriers. Countries with the largest demand for green technology products, like China, EU member states, and Japan, have increased their demand and thus their production capacity. Moreover, Denmark and Germany are promoting their exports through international development programs.

As a result of this, out of the top 30 countries in solar, wind, and advanced batteries, we can count only six American companies. It is not a surprise that we have a trade deficit in this sector.

My question is really to each and every one of you. How would you characterize our current energy policy, especially as it relates to export promotion of green technologies? And as a follow-up to that question, obviously in order to return to a positive balance in trade, the U.S. needs to have a policy that addresses competition on more than one front. And if you had to prioritize what needed to be done to increase our exports, what would be the first action the Federal Government must undertake?

Those are two questions I would like for answers, beginning with Ms. Saunders.

Ms. SAUNDERS. Thank you very much.

As to characterizing the U.S. energy policy, I would characterize it as evolving. There are quite a few legislative proposals on the table as well as regulatory proposals from, for example, the Environmental Protection Agency.

Mr. RUSH. Is it slowly evolving or rapidly evolving?

Ms. SAUNDERS. Evolving. And let me say this: Deployment, rapid deployment of clean or green technologies does depend heavily, as I think several of the other speakers have noted, on the policy environment. That's true here in the United States, that's true in foreign countries as well.

So our export markets will be enhanced insofar as we see a policy environment in other countries, such as China, India, Brazil, which stimulates clean technologies.

I think Dr. Larson mentioned that in her opinion some of those governments are ahead of the U.S. Government. But the major point remains that the policy environment is critical to facilitate rapid deployment of clean technologies.

We are working as effectively as we can at the Department of Commerce within the current level of funding and the current level of responsibilities. Secretary Locke intends to call the first meeting of the Trade Promotion Coordinating Committee later this month and meet with the principals. This is the 19 agencies that have trade promotion responsibilities. And I know that a key topic of discussion will be the clean technology discussion on how to coordinate the resources of those 19 agencies, which include the State Department, Department of Commerce, the U.S. Trade Representa-

tive's Office, and many other agencies, to ensure that we're doing all that we can to promote exports by U.S. companies.

Mr. RUSH. Thank you.

Mr. Richards.

Mr. RICHARDS. Thank you. Mr. Chairman, first of all, in terms of the U.S. energy policy, I think the important point is that under the status quo, we are actually going to see a reduction in the total of installation of wind turbines and other renewable products this year, probably about half of what was installed last year. So current policy combined with the situation with the recession has resulted in a dramatic decline from what was being achieved before, and we do need long-term, significant policy reform in order to turn that around.

In terms of prioritizing actions, of all the things that I talked about in my remarks, I think the thing that the United States could lead on and do quickly that is purely export-oriented is to negotiate an agreement internationally that removes many of the barriers you talked about, remove tariffs and remove nontariff measures, and do it for environmental goods and services.

Mr. RUSH. Thank you.

Ms. Jacobson.

Ms. JACOBSON. Yes, thank you.

I think I'll start by echoing that last comment made by Tim Richards. We very much support a streamlined effort to liberalize clean energy goods and services. So I hope that that will be taken up by the coordinating committee and that it will continue to get support in Congress.

Very briefly, in terms of where things stand with energy policy and clean energy export programs, in talking to my industries, I think they have seen significant improvement in the last several years. There are many more programs that support them. They are being more effective, and generally speaking, there has been improvement. But compared to what is seen in other countries like Germany, a very strategic pinpoint effort that is high level and sustained, we are not quite there yet. And so we need to take that opportunity to have a strategic, coordinated, sustained and high-level effort on clean energy export promotion.

And then finally, again, support for domestic market will help our export opportunities and the U.S. players in the export industries.

Thank you.

Mr. RUSH. Yes, Dr. Larson.

Ms. LARSON. I would characterize the energy policy as very fragile and new and slow-moving, given that it's coming out of a void for a number of years; there really has been no national energy policy. So that answers the first question you had.

The second, What would be the most important thing to try to reinforce exports at this stage? There is an enormous amount of entrepreneurial activity—venture capital activity, private equity investment—going on now in this arena. It has just exploded in the last few years. If there are ways to reinforce this activity to build domestic capacity for innovation and then scalability, and immediately followed by export—which will happen if we have the vol-

ume—if we have the scalability and we have the volume, that’s what I would focus on.

I also think, though, that there is an issue in this country with—we lag not just on commerce, but we also lag in education and training. And if you don’t pay attention to those issues in this arena of clean commerce, then we can’t develop the intellectual—the skills and practical training capacity that we need to build our domestic infrastructure. And without that, it’s very hard to be able to export.

Mr. RUSH. Thank you very much.

Mr. Hayward.

Mr. HAYWARD. I think I will just limit myself to a comment about a state of energy policy. I am always kind of in despair about the matter, in part just because of all the moving parts involved—the Federalism of the country, our balkanized electricity grid, State authority regional differences in the kind of energy mixes generating electricity, and so forth.

I liked Ms. Saunders’ analogy to evolution. Of course, evolution never ends, right? Sometimes it is fast. Sometimes it is slow. But one part of evolution—if I could extend that metaphor a little bit, of course—is natural selection, whereby you kill off the uncompetitive organisms—right?—and the weaker genes, so to speak. It is hard to do that in the energy field.

A case in point would be—and I hesitate to do this because it would be interpreted as a reproach of this body, but the whole ethanol program, which even most environmentalists now say is not what we thought it would be when we started. Yet it is very hard, for all the usual reasons, to change course on that. You know, that is ultimately, maybe, going to be in the way of, say, algae biofuels if we make a breakthrough there.

By the way, one of the moving parts in the ethanol story is our very high tariff against imports of Brazilian ethanol, which would probably make sense if we really want to focus on that goal of reducing oil imports or use of traditional petroleum products. I will just limit it to that.

Mr. RUSH. Thank you very much.

The Chair now recognizes the ranking member, Mr. Stearns.

Mr. STEARNS. Thank you, Mr. Chairman.

In listening to this hearing, I am starting to believe that this is really a question of whether we have an energy policy that is based upon economics or a social policy. Perhaps it could be a mix of the two. But when you look at our free trade agreements with the 17 countries, you see how we actually have a surplus.

As I mentioned in my opening statement, dealing with manufacturing, we had a \$21 billion surplus; in dealing with services, we had \$144 billion. So when you have free trade agreements, you do not need to necessarily go in and subsidize all of these industries, including green technology.

Ms. Saunders, you mentioned a potential increase of \$40 billion per year in green technology exports. But, obviously, that is going to consist of a little bit of subsidizing by taxpayers. We had \$80 billion set aside in the American Recovery and Reinvestment Act for clean energy investment. The President has indicated he wants to invest another \$150 billion into R&D. So my question to you is:

This \$40 billion you are talking about, couldn't we just get this by additional trade revenue generated by just passing pending trade agreements that we have to get this number that you offered?

Ms. SAUNDERS. Thank you, Mr. Stearns.

That number is from the Department of Energy, a projection on the value of potential exports and its relationship to jobs in that sector.

To speak to free trade agreements, there are tremendous benefits, as you have already illustrated effectively, both in terms of markets—tariff-free or low-tariff markets—for finished products, but I think equally important is opening up markets for intermediate inputs that U.S. manufacturers input as part of their supply chain. So it frees up both the ability of manufacturers to locate facilities here in the United States and import inputs as part of their supply chain as well as the markets for their end products; and we have seen a tremendous benefit, as you noted, from the 17 current free trade agreements.

The areas where we have the key markets for green technologies and also where we have some of the greatest challenges are China, India, and Brazil, for example.

Mr. STEARNS. Well, with that in mind, how do U.S. tariffs for green technology imports compare to tariff levels imposed by other countries for similar products and technologies?

Ms. SAUNDERS. Generally, U.S. tariffs are lower, on average, than tariffs in most other countries.

As several of the speakers said earlier, we agree it is critically important to push for a negotiation of an agreement on environmental goods and services. These are new products, new tariff lines, which are not necessarily covered under existing WTO commitments and perhaps not under existing free trade agreements, and so we have called them out as a special set. Then, as a subset of environmental goods and services, the U.S. and the European Union have both joined to push for particularly rapid movement in the areas of clean energy technologies because of the demonstrated global need for those technologies.

So we agree it is very important to negotiate environmental goods and services agreements to lower both tariff and non-tariff barriers. We are trying a variety of means to support a global agreement, which includes bilateral discussions with key trading partners as well as moving issues through the Asia-Pacific Economic Cooperation, which sometimes provides a good venue to tee-up concepts that can then go global.

Mr. STEARNS. Mr. Hayward, I will let you respond to that.

You might also talk in response, as you talk in your testimony, about how domestic mandates on the energy supply can actually decrease exports of green technology. You might touch on that, too, and expand a bit on it.

Mr. HAYWARD. Well, by that, all I mean is something very simple, which is, if we really do try and seriously ramp up wind, solar, and other renewable energy installations in this country on a large scale, as is contemplated in various policies, it seems to me we are going to be using all of our own production capacity ourselves and, quite possibly, since we are going to need a lot of minerals that we

are not currently producing in large enough quantities in this country we will have to import some.

That is not necessarily a bad thing. I am trying to speak narrowly to this question of are we actually going to see growth in energy exports across the board or are we actually going to end up importing more? As I say, that is not necessarily a bad thing, but let's not get too carried away with ourselves thinking there is a free lunch here in that if we expand our renewable energy production that we are going to be selling lots and lots of it overseas, even if we can fight through the tariff barrier problems.

Mr. STEARNS. What are the economic downsides when you take money out of more productive areas of the economy through taxes or increased national debt to less efficient sectors in the economy? Is there an economic response to the subsidies and what the danger could be?

Mr. HAYWARD. Well, that gets back to some classical economic ideas that have fallen out of favor. You know, the classical old idea was the broken window fallacy. You know, if somebody throws a rock through a storekeeper's window, the glassmaker gets a job. On the other hand, the storekeeper is not spending that capital on something else that might be net more productive across an economy.

So lots of things are changing fast, and cost curves are shifting very quickly in solar and wind and the other things we are talking about—you know, maybe hydrogen in 15 years. Who knows? But, at the present time, most renewable technologies we are trying to develop at scale are quite a bit more expensive.

It also will mean, if we are serious about closing, you know, 100 coal-powered plants in the next 20 or 30 years, we will be retiring assets before their useful life is up, so we will be diverting some capital in the classic sense of opportunity costs, and that will have some effect on the economy elsewhere.

Now what I would like to say is, you know, we are a rich country, or we used to be until a year ago, and we will be again, and, you know, we can afford a lot of these things in the service of we are wanting to change our greenhouse gas emissions and so forth. But unless the entire world follows along with us, it is going to make a lot less difference to the bottom line on climate change in 30, 40 years.

Mr. STEARNS. Mr. Chairman, I will just close.

I just want each of the panelists to answer yes or no. Do you support the three pending free trade agreements, and do you support pursuing new free trade agreements? Just down the line. Yes or no?

Ms. SAUNDERS. Yes.

Mr. STEARNS. Mr. Richards.

Mr. RICHARDS. Yes to both questions.

Ms. JACOBSON. Yes.

Ms. LARSON. I do not know enough to comment.

Mr. HAYWARD. Yes.

Mr. STEARNS. OK. Thank you, Mr. Chairman.

Mr. RUSH. The Chair now recognizes the gentleman from Georgia, Mr. Barrow, for 2 minutes for questioning.

Mr. BARROW. Thank you, Mr. Chairman.

Mr. Hayward, the broken window theory has different meanings in different contexts. I understand the meaning that has been immortalized in the motion picture *The Fifth Element*. Some job is in it for somebody. If you break something, there is always somebody who is going to get something good out of this.

In the law enforcement context, it has an entirely different notion. You take care of the little things, and the big things will take care of themselves.

If you have got crime running rampant in the streets, if you enforce the zoning laws and the building maintenance laws—little things you can get a handle on, you know, get rid of graffiti—you will find the bigger problems sort of take care of themselves because of the ripple effect. You have the miracle of compound interest in terms of folks' involvement in their communities, is sort of one way of looking it.

Also, about the little thing about a level playing field. Because the sense I get is the WTO ain't even trying to address free trade in environmental goods and services.

So if I get the sense of what the witnesses are telling us today, it is not that the whole approach of free trade has been tried and found wanting so much as it has not been tried at all in the first place. Is that the sense of things?

Mr. HAYWARD. I would not—I actually was, when you made your opening statement—

Mr. BARROW. No, it doesn't have to be you.

Is anybody willing to say that the WTO is actually focused on this like it is on agriculture and other sectors? Is anybody willing to say that?

Mr. HAYWARD. No. I think you are generally right about that.

Mr. BARROW. OK. Well, that is a concern I have got. Because we have so much experience in the areas where the WTO is active, and that is not very satisfactory for us. If, for example, in Denmark, they are using laws that are ostensibly for safety standards but essentially what they are doing is protecting the domestic industry, at the same time, they are using the tax expenditure policy to essentially raise money from their taxpayers to lend to customers in other countries to buy stuff only on the condition that it is made in their country. They are using both laws and the public fisc to promote their industries for those folks who want us to engage in advocacy and to use the tax expenditure policy of this country to promote industry here.

I want to point out that we ain't going to be doing that on a level playing field if our laws are going to be laying us wide open to unfair competition; and we are asking the taxpayers in America, basically, to compete with both the lawmakers and the taxpayers in other countries. That ain't a level playing field.

Can anybody help us understand how free trade in this area can work in some way that is not a one-way street?

Mr. RICHARDS. Mr. Barrow, I think that you are correct. The WTO, for the most part historically has not addressed energy trade, by and large. However, there is growing recognition in the WTO and among member states of the WTO that this is an important area to move into.

The WTO did have its first—the first that I am aware of—conference focused on different types of cleaner energy technologies and what needs to be done to remove barriers to those technologies, and there will be another conference that is cosponsored by the WTO in a couple of weeks in Geneva.

There were also some statements in the press, both by the European Union and by the U.S. Trade Representative, last week that they are seriously looking at this idea of an environmental goods and services agreement; and they talked about its being done probably within the confines of the WTO to make it binding.

The value of this, Mr. Barrow, would be that it allows the United States, which has, as Ms. Saunders said, relatively low tariffs, to move to a level playing field with our competitors if we get them to sign onto this sort of agreement.

Mr. BARROW. Thank you, Mr. Chairman.

I will only note that there will only be a level playing field if the rules are going to be enforced fairly. What I am concerned about is we have very little confidence, in the way things have been run so far, to think that the rules that have supposedly opened up their markets on the same terms that ours will be open to them will be played on a level playing field. That is just a concern I have got.

Thank you, Mr. Chairman.

Mr. RUSH. The Chair recognizes Mr. Scalise for 2 minutes.

Mr. SCALISE. Thank you, Mr. Chairman.

I know that in a lot of these new technologies we are talking about wind turbines and some of the different hybrids with the battery technology requirements. The actual components to build those—and I will talk specifically about some of the metals and the rare elements—copper, zinc and others—that exist in the United States but really are not accessible because of Federal policies, and so we end up importing a lot of those from places like China.

As we try to look at the different effects of green jobs and the increased requirement to bring in more of these products to make some of these different things—Ms. Saunders, if you could start—how does our country address that when we actually have policies that block us from making access to a lot of our own natural resources here?

Ms. SAUNDERS. Well, I can address what we are doing in the international trade space. We are well aware of the critical resource issues that are facing U.S. companies and tariffs and other, you know, materials, raw materials; and we are well aware that China has been buying up lots of mining rights in various parts of the world in those areas. You may know that, recently, China has proposed to initiate a limit, or a restriction, on exports of those critical materials; and they have yet backed off from that policy under a lot of pressure from the United States Government and other governments.

So we are well aware it is a critical issue. We work closely with both U.S. companies that need access to those materials as well as with the Department of Defense and its critical national stockpile of critical materials.

Mr. SCALISE. So are you all going to be doing anything in policy to open up more of the United States' natural resources so that we do not have that dependence on countries like China to produce?

Ms. SAUNDERS. Well, that is something I will take back to the Department. That is not within the purview of the International Trade Administration, but I will take that back.

Mr. SCALISE. I understand, but it still impedes our country's ability to truly export if we have to import in order to make the products that we want to export.

Mr. Richards, your company, when you are making decisions on where to locate manufacturing facilities, how much of a factor is the geographical relationship and the ability to access the natural resources that you need to make those products? How much of that is a factor in where you locate the manufacturing facilities?

Mr. RICHARDS. In our particular area, if you think of wind turbines or solar panels or efficient gas turbines, those rare Earth minerals are not actually a major component of our decision making in where to locate. More important are questions of transportation costs, what the investment environment is like in any given location, what the market is like in that location, but I would not say that the rare Earth minerals has been a big issue for us.

Mr. SCALISE. Mr. Hayward, I know you have talked about some of these issues.

Mr. HAYWARD. Well, I mean, one example that comes to mind is battery technology. If someone or some company can come along and make a battery technology that is comparable in its energy potency to a gasoline engine—gasoline storage in a gas tank—it changes everything. That would be the game changer we would need that would be equivalent to the green revolution in agriculture that Norman Borlaug brought us 40 years ago.

If we use some variation of existing lithium ion technology that, right now, we use in all our laptops, well, we would need a whole lot of lithium. We do not have a lot of it here. The leading supplier is Bolivia. We talk about how we do not like to buy resources from countries that do not like us, which sounds sensible to me; and this week Bolivia does not like us. So we are trading one kind of problem for another, potentially.

So yes. I mean, once again, it is not entirely a black-and-white situation; and I always like to say—and will sort of abstract slightly—that the idea of energy independence interpreted strictly as a four-square production of all our energy inside the borders of the U.S. is really a nonsensical idea. We should be looking for energy resilience and energy diversity, so it might include importing a lot of lithium from Bolivia, but it will mean that our trade flows are going to continue to be kind of murky.

Mr. SCALISE. I yield back. Thank you, Mr. Chairman.

Mr. RUSH. The Chair now recognizes Mr. Murphy for 2 minutes.

Mr. MURPHY. Thank you, Mr. Chairman.

I first want to start by pointing out that one of the things that happens is we recognize wind power is wanted, but Congress does a lot of things to prevent them from being built in their districts. That also means we need power lines to send electricity from a source like that to other places, too, but Members of Congress oftentimes block building grids in their districts.

We know that nuclear energy is a valuable, clean source, but Members oftentimes say, let's not store that nuclear fuel, and let's not recycle it.

We recognize natural gas is a valuable, clean resource, but Members of Congress block building facilities in their districts and block taking down bridges so ships can move through there.

Of course, it was Members of Congress who would oftentimes block free trade agreements to deal with the tariffs, so I do not have a lot of optimism here that Congress is working smoothly for these things. But I have a couple of questions here on a couple of specific issues.

Mr. Richards, in some of your testimony here, you talk about the number of jobs being created through wind energy. I think you list about 4,000 overall that are growing from here. Does that sound about right as to what growth GE is seeing?

Mr. RICHARDS. That is correct. That is jobs within GE and our suppliers here.

Mr. MURPHY. I might note for the record that is about the same number of jobs it takes to build and operate one coal-fired power plant.

I also noticed that you have worked very hard at sending jobs over to China for bulbs—light bulbs—and are working to send some locomotive manufacturing jobs over to China as well. Can you tell me how that helps our exports, please?

Mr. RICHARDS. Congressman, we invest in many countries all around the world, and we are investing heavily in the United States.

Mr. MURPHY. Well, then what percentage of your windmills are actually manufactured in the United States?

Mr. RICHARDS. I cannot give you the exact figure, but it is well over 50 percent.

Mr. MURPHY. So just under 50 percent then is manufactured in other places around the world?

Mr. RICHARDS. That is correct. We have manufacturing in the European Union—in Germany.

Mr. MURPHY. Does the place in the European Union also manufacture windmills and solar panels? I am just wondering, in other markets, how are we creating these that will actually sell to the markets if other countries are building them as well and we have tariffs and other things in line that block our products from being sold. So how are we going to compete in other countries?

Mr. RICHARDS. Very frequently we will export the highest technology components of a product, even if we are doing final assembly in another country. For instance, with high-efficiency gas turbines, that is generally what we do; and we manufacture those here in the United States.

The same is true with locomotives. When we have the final assembly of locomotives in another country, usually we are making the highest technology component of that in Grove City, Pennsylvania, and in Erie, Pennsylvania, for export.

So it truly is a global economy, and we have to be able to have local manufacturing in some cases, but that does not mean that it precludes U.S. exports. Often that facilitates U.S. exports.

Mr. MURPHY. So, with regard to some of those things then, when you find that you can make them less expensively in other countries, that is obviously a business decision that GE makes. So what assurance do we have in opening up these markets, if that is where

the growth is going to be in some of these areas, that you are not just going to move that manufacturing over to other countries? How is that helping U.S. exports? Because you have done it in the past. How is that going to help?

Mr. RICHARDS. Congressman, we have maintained U.S. manufacturing in virtually every one of the areas that I spoke of with our ecomagination projects. We have a commitment to growing our manufacturing presence in the United States, and we have a desire to be—

Mr. MURPHY. Now, do you plan on making any compact fluorescent bulbs in the United States?

Mr. RICHARDS. Congressman, I am afraid I do not have that information. I would have to—

Mr. MURPHY. Well, that is an important green source of jobs, and that does not help us if you export those.

That is all I have, Mr. Chairman.

Mr. RUSH. The Chair now recognizes the gentleman from Georgia for 2 minutes.

Dr. GINGREY. Mr. Chairman, thank you.

Mr. Hayward, in your testimony, you briefly and succinctly indicated that American renewable energy produces—rightly point to existing trade barriers and tariffs as an obstacle to expanded trade in the energy technology. In my opinion, one of the easiest, most beneficial ways to assist these companies is to help remove tariffs by enacting free trade agreements. Specifically, the United States has already signed three free trade agreements that have yet to be fully implemented by the Democratic majority.

The first of these is the Colombia Free Trade Agreement. Over 10,000 companies are already exporting to Colombia; and, of these companies, 85 percent are small- to medium-sized companies. In 2007, the United States exported close to \$8.6 billion in goods to Colombia. By enacting this FTA, we will greatly benefit, particularly in the agricultural industry, by eliminating high tariffs on items that could inevitably be used in renewable energy production. Since the signing of the FTA with no congressional action, United States' exports have faced an estimated \$1.1 billion in tariffs in Colombia, while 91 percent of imports from that country have entered the United States duty free.

In addition to the Colombia FTA, this Congress has still not acted on the Panama Trade Promotion Agreement; and it was signed back in 2007. In that year, the United States employed a large trade surplus of \$3.3 billion with the Central American country. Under this agreement, 88 percent of American commercial product would be allowed to enter duty free immediately; and this could certainly benefit American manufacturers during these most difficult economic times.

Lastly, the United States has signed but not enacted a free trade agreement with South Korea. The United States International Trade Commission estimates that the reduction of Korean tariffs and tariff rate quotas on goods alone would add between \$10 and \$12 billion to our annual GDP and around \$10 billion to annual merchandise exports to Korea. Enacting this free trade agreement would have a direct impact on jobs growth in the United States by opening additional markets for export.

The U.S. Chamber of Commerce recently released a study on the price that inaction on these FTAs has cost American business and exports. This study, entitled "Trade Action or Inaction: The Cost for American Workers and Companies," indicates that a failure to implement FTAs with South Korea and Colombia alone will lead to a decline of \$40.2 billion in U.S. exports of goods and services. A failure to act would also leave \$44.8 billion in missed opportunity of U.S. output, while also missing the chance to create 400,000 jobs for hardworking families right here at home.

Mr. Hayward, I have outlined the benefits of these free trade agreements and the cost of inaction for the purpose of explaining how we can take immediate and decisive steps to help bolster exports, including in the arena of green technology, by facilitating free and fair trade. Although you only briefly mentioned the trade barriers that exist due to tariffs, I would like to get your thoughts on this matter.

Mr. HAYWARD. Well, I guess I would say that we are in heated agreement.

I would make two comments of a general nature.

One is, you know, of all things economists argue about, the thing they argue about the least is free trade. I mean, there is almost no daylight between Milton Friedman and Paul Krugman, which is really amazing when you think about it. I mean, there is probably no greater economic issue for which there is greater consensus, I would say, among probably 95 percent of professional economists than on free trade.

But as a political matter, it seems to me, the case for ratifying those treaties is overwhelming, especially in the case of Colombia, which is a country friendly to us, under tremendous political pressure at the moment, vulnerable to a civil war. It would be much better to assist them with free trade and expanded trade than it would be to contemplate what the alternatives might be if that country falls apart.

Panama and South Korea are under some pressures as well, also, but certainly, in the case of Colombia, the political reasons to do it seem to me overwhelming.

Dr. GINGREY. Mr. Chairman, thank you. I took a long time framing that question. I thought it was important.

I appreciate, Mr. Hayward, your direct and succinct answer. I agree with you 100 percent.

Mr. Chairman, I will yield back.

Mr. RUSH. The Chair thanks the gentleman.

We will engage in a second round of questioning. We will limit the questioning to 2 minutes, and I would ask the witnesses to be as succinct as possible in their answers.

The Chair recognizes himself for 2 minutes.

Recently, we have seen Uni-Solar Ovonics, a Michigan-based company, which produces thin film solar, partnered with Montcalm Community College to provide training for current and future employees. If each of you could answer this question: I am curious to know what education level will be required for individuals to adequately perform the jobs created from the expansion of the green technology market both at home and abroad. Secondly, are certain skills that are attained from other industries easily transferable?

Would each one of you take a stab at those two questions?

Ms. SAUNDERS. This is not my area of expertise.

What I have heard from companies and from State economic development administrations and community colleges in my travels around the country is that there will be a variety of jobs from the technician level to the undergraduate degree in engineering to a master's degree in engineering. There will be a variety of levels, but the basic level will be the technician level.

Then, in some areas, job retraining is not terribly difficult. I really do point to and congratulate the various State programs that have gotten out in front of this issue. As I said, the Economic Development Administration is working with universities and working with community colleges to provide training programs, working with companies. I am sure GE has programs like that. These are critical skill development opportunities that we need to make more broadly available.

Mr. RUSH. Are there any model States?

Ms. SAUNDERS. Well, I will not call it a "model State," but I was just mostly recently in Toledo, Ohio, on an energy efficiency road show. Toledo has done—that area has done an excellent job of reinventing itself as a leader in solar technology, and it was impressive to see the university and the local community colleges and the manufacturing extension partnership and all of the resources working together, but that is just because it was a recent trip.

Mr. RUSH. Thank you.

Mr. Richards.

Mr. RICHARDS. Thank you, Mr. Chairman.

I would agree with the points made by Ms. Saunders and would just add one personal note about the point that many of the skills, in fact, are transferable.

I was with a group that was recruiting at the U.S. Naval Station in Norfolk, and we were recruiting for wind service technicians there. Because we found that many of the naval personnel who had worked in technical jobs in the Navy actually had the skills that we needed to perform maintenance and service on wind turbines. So I think that, in fact, there are, obviously, a large subset of skills that are transferable and others that require further community college and other worker training.

Mr. RUSH. Ms. Jacobson.

Ms. JACOBSON. I concur largely. I can just add another industry layer. I often speak with our solar industry, and they talk specifically about how they work with the roofers. You know, that, for them, is a very transferable skill set, a very good group of high-quality jobs, and they are very happy to work with them.

But what I hear universally, because I represent efficiency both on the supply and demand side, a wide range of renewable energy technologies and natural gas, is that we have a tremendous need for this workforce right now, and they have a very difficult time finding qualified workers across the whole supply chain and across the whole spectrum of job opportunities.

So thank you.

Mr. RUSH. Thank you.

Dr. Larson.

Ms. LARSON. I would just like to emphasize that one of the ways that we develop our domestic capacities in order to excel in global markets is to have constant feedback into the process of innovation so that your technologies and the ability of people to work with the application of those technologies have to be continuously upgraded. This is an area of innovation that most people overlook. It is imperative that we have people who are trained in the communities to be able to install new technologies, work with them, provide feedback—sensible feedback—to manufacturers to continue to refine and upgrade and innovate. Currently, we do not really have that capacity at the local level.

A lot of the skills definitely are transferable—there is no doubt about that—and the stimulus package has moved money into my community in Charlottesville, Virginia; and some of that money will be used to train people to be able to work on improving the community's efficiency—this is in neighborhoods and residential and businesses—as well as the installation of clean-tech equipment. There is a huge opportunity there.

You know, I do not really understand why one member has referred to some of these ideas as social versus economic. You know, having a really skilled workforce around the introduction and use and in the continued improvement of these technologies is an economic decision, and that is a really critical piece of this picture that has to be addressed.

Mr. RUSH. Thank you.

Mr. Hayward.

Mr. HAYWARD. I do not have an opinion on this particular question, Mr. Chairman. Thanks.

Mr. RUSH. All right. Thank you so much.

The Chair recognizes Mr. Stearns.

Mr. STEARNS. Thank you, Mr. Chairman.

Mr. Hayward, Mr. Barrow was here because the argument is made that if we subsidize the greening technology industry—so you give government subsidies to these people. Then they go out and compete with similarly foreign companies that are also subsidized. Then the competition is based pretty much on who gets the most from the government. So, in effect, taxpayers are supporting the competition for industry to export their products.

If we develop an export industry that is almost entirely dependent upon these Federal subsidies, obviously, the taxpayers are going to be affected; and I do not know if that is a sustainable model when there is probably an alternative model, which is to allow the free trade and perhaps to give loans to these companies but not to subsidize them.

So you might just touch on the fact, of the heavily subsidized industries in America, how do we compete—like in Mr. Barrow's argument, if other governments are subsidizing their industry and we do not subsidize ours and yet we have free trade, don't the other governments then, by providing subsidies to their companies, gain an advantage? So this goes to the fundamental aspect of how free markets work and why competition and not subsidizing sometimes gets more innovation.

Mr. HAYWARD. Yes. I think in a lot of cases what you will find is, in technologies that are comparable—and this is an important

point to come back to in a moment—it ends up being a zero sum game. I am sorry Mr. Barrow left, because I have been puzzling over his opening statement, which I have a lot of sympathy for, and I think a key distinction needs to be kept in mind here.

When you are talking about roughly comparable products—you know, windmills of X efficiency versus X plus 5 percent efficiency, that ours might be better—and maybe we have a 10 percent better price—then some of those tariff barriers and local content requirements will tip the balance unfairly in favor of a foreign country's own producers.

On the other hand, there are a lot of areas where we have massive competitive advantage. I am thinking, by the way, again of our leading manufactured export from 2 years ago, which was aircraft equipment. We beat the world at most areas of that, especially jet engines. And we have seen the case of where, I think, we did win—I did not follow this intimately, but I think we did win the WTO complaint against subsidies for Airbus production. Although I notice Airbus—most of them use our engines because ours are so much better than theirs that those marginal preferences—in other words, the preferences you try and give either through a 10 percent tariff or for a local content requirement, we simply blow right through those because ours are so much better.

So the challenge for industry is please subsidize us for solar or wind power or other technologies that other countries can make almost as well as we can and, therefore, we are fighting something of a zero sum game, which is: Can our industries make those technologies that are so much better? It is true of our oil and gas equipment, which is superior in many respects. Drilling equipment is superior in many respects. That all those kinds of attempts that these other countries use to prefer their own producers, you simply blow right through them because ours are better. That is the challenge, it seems to me, for industry.

I think I will just stop and leave it at that. It seems to me that is a distinction that needs to be laid out and that people need to get their hands around.

Mr. STEARNS. Just another question for Ms. Saunders. You state the Department of Energy estimates green technology will export up to 750,000 jobs by 2020. How many jobs will be lost due to green technology displacing them, particularly if we subsidize green technology?

Ms. SAUNDERS. I do not have the answer to that question. I can go back and try to see if I have an answer to that question.

Just a brief comment on subsidization, which I agree with you is an important issue to consider: Our import administration, which is a component of the International Trade Administration, is very active in enforcing the existing trade laws which address antidumping and countervailing duties for goods that are coming into the United States that are either subsidized in foreign countries or are being produced at less than production cost, and we have quite a few cases ongoing right now.

Mr. STEARNS. Thank you, Mr. Chairman.

I would ask Ms. Saunders to just respond to my question in writing, if she could—basically, you know, of the cost risk analysis.

Mr. RUSH. The Chair thanks you.

The Chair recognizes the gentleman from Pennsylvania, Mr. Murphy, for 2 minutes.

Mr. MURPHY. Thank you, Mr. Chairman.

I want to continue to follow up on some of my questions here and follow up on Mr. Stearns' question as well.

Continuing on with General Electric, how many jobs have we lost from closing our light bulb plants in the U.S.?

Mr. RICHARDS. Congressman, I do not have those figures with me, but we would be—

Mr. MURPHY. How many jobs has China gotten from your opening up factories in China to make light bulbs?

Mr. RICHARDS. Again, Congressman, I do not have any information with me at this time.

Mr. MURPHY. Ms. Saunders, just to follow up on Congressman Stearns' question, too, about the displacement of jobs, I am assuming for all of you, if you went to the doctor and the doctor said, "I want you to take some medicine," one thing you would want to know is what are the side effects.

If the doctor says, "I am clueless. I never studied the side effects of medicine. I will just tell you what it is going to do to you," you would think he is kook, and you would leave the room, right?

So I would like to know what are the side effects of this. Because we have to balance all this out because we want to make sure, as Congress, we are doing this in a way that we are not losing jobs. We want to promote these technologies in solar and wind and all of these other things and make sure we have this but to not do this in a way that actually hurts our job development.

So does anybody have an answer to that question? Then you should not be here. Not a single one of you should come unprepared with that, because that is important to us. I think that is extremely important, because we have got to know how we balance this out.

So let me ask this then, too: As we go through these issues then on—well, I see I am out of time here. You are going to keep this at 2 minutes, but you get my point. Please come prepared and give us an answer.

Thank you.

Mr. RUSH. I think that the gentleman made a strong point. However, I think that the witnesses have really adequately addressed the questions of most of the members of the subcommittee. I do not want the witnesses to think that their time and their participation was for not.

I think you provided us with some really important information that we can proceed with, and you have been a real help to the work of this subcommittee, and I do not want you to get the impression that we do not really appreciate your time and your comments and your input. We want to thank you for participating with us here and for taking the time out from your busy schedules.

We want to just inform the members of the subcommittee that the record will be open for 7 days and that, if there are any questions that the members of the subcommittee would like to address to the witnesses in writing, you have 7 days to prepare those questions. We would ask that the witnesses take an additional 7 days

to get back to us with answers to the questions. I want to thank you again so very much.

The subcommittee is now adjourned.

[Whereupon, at 11:45 a.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

Statement of
Representative John D. Dingell
Committee on Energy and Commerce
Subcommittee on Commerce, Trade, and Consumer Protection
Hearing on "Growing U.S. Trade in Green Technology"

October 7, 2009

Thank you, Mr. Chairman, for holding today's important hearing on U.S. trade in green technology products. While there exists no consensus on the precise definition of such products, suffice it to say that we have a basic understanding of the term's broader meaning (*e.g.*, products that generate revenue associated with environmental protection, such as pollution control and prevention) and a healthy appreciation of that industry's potential for growth. The United States, however, finds itself at a disadvantage vis-à-vis certain of our trading partners in this area, as we have incurred a trade balance for these products and have only recently begun to foster their domestic production. Consequently, I welcome the input of our witnesses today concerning how best to promote research, development, and production of green technologies in this country, as well as how to level the playing field for their trade on the international market.

On a related note, my home state of Michigan has had some success in fostering the growth of the green technology manufacturing, specifically as it relates to the automotive industry. For example, A123 Systems, with considerable help from Department of Energy grants, is beginning production of advanced battery technology in my district, which will be used in the next generation of hybrid-electric and battery-electric vehicles. I understand that federal and state grants alone cannot ensure the long-term viability of companies like A123; rather, sufficient and consistent consumer demand must exist for such companies' products in order to guarantee their success. Thus, in addition to our witnesses' opinions on supply-side incentives for the manufacture of green technology products and how best to facilitate their fair trade, I would ask their advice concerning how best to perpetuate domestic and international consumer demand for such products.

You are to be commended for calling today's hearing, Mr. Chairman. Green technology, while not a panacea for this country's economic woes, presents an opportunity to transform our economy, as well as reinvigorate our heretofore ailing manufacturing sector. I once again bid our witnesses welcome, thank them for their testimony, and yield back the balance of my time.

CONGRESSMAN G. K. BUTTERFIELD
OPENING STATEMENT
SUBCOMMITTEE ON COMMERCE, TRADE AND CONSUMER PROTECTION
HEARING: GROWING US TRADE IN GREEN TECHNOLOGY
OCTOBER 7, 2009

Chairman Rush, thank you for holding today's hearing entitled "Growing US Trade in Green Technology." I strongly support efforts by this and other Committees to increase exports – particularly in the area of green technology.

Our country is ripe with innovative products that will lower energy consumption wherever they are employed. In my Congressional District, a company named Microcell has developed microfiber hydrogen fuel cell technology that meet the Department of Energy's need for cost-effective, reliable, high

performance fuel cells for transportation and building applications. This technology helps to reduce green house gas emissions, and decreases US dependence on foreign oil. Microcell plans on employing up to 500 people in an extremely rural portion of my District. Companies like Microcell have the products and manpower necessary to make America a leader in green technology exports. They simply need good Federal policies that encourage exports and foster economic growth.

The Department of Commerce's International Trade Administration has been proactive promoting US exports of green technologies. ITA has an

Environmental and Energy Industries office that advises the federal government on environmental trade issues. I look forward to hearing from Ms. Saunders who joins us from ITA on what Congress can do to equip ITA and the Office of Environmental and Energy Industries with exactly what is needed lower tariffs and increase US exports of green technology.

I look forward to hearing from today's witnesses. I am confident that if we work together to develop strong policies that will promote domestic production of green technology, other nations will see their benefits and we will see an increase in export capacity.

Thank you, I yield back the balance of my time.

Statement of the Honorable Doris O. Matsui
Commerce, Trade, and Consumer Protection Subcommittee hearing:
“Growing US Trade in Green Technology”
Wednesday, October 7, 2009
Estimated time: 2 minutes

Mr. Chairman, thank you for calling today’s hearing on U.S. Trade relating to Green Technology.

I would also like to thank today’s witnesses for sharing their expertise on this critical issue.

As our nation moves towards a more energy-efficient environment, small businesses will be important contributors to the clean energy economy...and assist us in our ongoing recovery efforts by creating millions of new jobs.

My district of Sacramento serves as a laboratory for the clean technology industry.

Sacramento represents about 100 clean technology companies that focus on the production of bio-fuels, solar, and wind energy...among others.

This new investment in green technology has created more than 2,000 jobs in my district and has generated roughly \$650 million in local investment.

In fact, just yesterday I announced a Recovery grant awarding more than \$2.4 million to the Sacramento Employment and Training Agency to train workers in green technology and renewable fuels programs.

Yet...like in most communities...green technology firms in Sacramento are just beginning to explore overseas markets.

However, these overtures remain difficult.

There are many challenges facing U.S. companies seeking to increase their green technology exports...many of which I look forward to being addressed today.

The federal government, in partnership with the private sector, must embrace the initiatives of these new start-up green technology firms to expand their businesses here at home...and abroad.

Effective partnership will be crucial to ensuring that our nation continues to lead on clean, green technology.

The President has often stated the goal that the United States will serve as the global leader in exporting clean technology to other countries...an objective I wholeheartedly support.

I look forward to working with my colleagues on the Committee to ensure we create a successful environment for our green technology industry.

I thank you Mr. Chairman for holding today's hearing. I yield back the balance of my time.

October 26, 2009

Ms. Mary Saunders
Deputy Assistant Secretary for Manufacturing Services
International Trade Administration
1401 Constitution Ave., NW, Room 3832
Washington, DC 20230

Dear Ms. Saunders:

Thank you for appearing before the Subcommittee on Commerce, Trade, and Consumer Protection on October 7, 2009, at the hearing entitled "Growing US Trade in Green Technology".

Pursuant to the Committee's Rules, attached are written questions for the record directed to you from certain Members of the Committee. In preparing your answers, please address your response to the Member who submitted the questions and include the text of the question with your response, using separate pages for responses to each Member.

Please provide your responses by November 10, 2009, to Earley Green, Chief Clerk, in Room 2125 of the Rayburn House Office Building and via e-mail to Earley.Green@mail.house.gov. Please contact Earley Green or Jennifer Berenholz at (202) 225-2927 if you have any questions.

Sincerely,

Henry A. Waxman
Chairman

Attachment

The Honorable Bobby Rush

1. The American Recovery and Reinvestment Act of 2009 allocated 36.7 billion dollars in funding to the Department of Energy. Of that, 16.8 billion dollars was distributed to the Office of Energy Efficiency and Renewable Energy for various green technology programs. An additional 4 billion dollars was allotted to the DOE's Loan Guarantee Program. To date, of the total allocated funds for the DOE, several billion dollars are still available and have yet to be awarded or spent.

- a. What is your evaluation of the DOE's management of the Recovery Act's funds so far?

We are encouraged that the distribution of funds to date will help stimulate development of green technology, and look forward to seeing U.S. companies and consumers ultimately benefiting from increased use of energy efficiency processes and of renewable energy.

- b. Do you have any suggestions as to how the Department of Energy can best award and spend the remaining funds?

Awarding funds for projects that have the potential for commercialization of products and services will help U.S. companies take advantage of new green technologies that can cut operating costs and increase their global competitiveness.

2. In Ms. Jacobson's testimony, she referred to the American Clean Energy and Security Act of 2009 as an essential piece of legislation for the future exporting of green technology. We reported this bill out of the Committee on Energy and Commerce on June 6, and it was passed by the House of Representatives on June 26. It is now placed on the Senate Legislative Calendar.

In the House version, the American Clean Energy and Security Act supplies key support for domestic clean energy manufacturing, such as energy-efficient appliances and electric plug-in vehicles, in order to significantly reduce U.S. emissions of greenhouse gases. It also promotes U.S. exports of green technology to assist developing countries with limiting their greenhouse gas emissions.

- a. In your opinion, what are the most crucial provisions of the American Clean Energy and Security Act, in regards to the development and export of clean energy?

Clean energy companies have said that putting a price on greenhouse gas emissions, reflecting their true environmental cost, will drive the development and adoption of clean energy technologies. With market certainty and an accurate cost for greenhouse gas emissions, investments in clean energy and energy efficient technologies will likely increase and the U.S. competitive advantage in developing such technologies will grow. This in turn presumably would have a generally positive impact on exports, overcoming the current market failure biasing energy investment towards fossil fuels.

- b. What are the potential benefits to the green technology industry from the American Clean Energy and Security Act?

A business environment, supported by clear policies, provides certainty and predictability, which are critical to the deployment of clean technologies. Too many companies, entrepreneurs, and investors are sitting on the sidelines because of the lack of certainty in U.S. policy. Legislation that can provide that certainty should be enacted as soon as possible. (OMB should review)

3. Regarding Small Businesses, today, America's entrepreneurship can be observed through the many small businesses participating in all sectors of our economy. Many green jobs are generated by small businesses and small businesses are essential to our economy. We are dependent on them to remain competitive in a globalized economy.

- a. For small businesses who want to compete internationally, how important is it for them to have a sustainable domestic market for green technology?

A strong domestic market – especially one as large as the United States -- is very important in helping companies build economies of scale and limit risks. A healthy, predictable, and rational green technology market would help the U.S. development of environmental technology because "green technology" is generally developed to address either local environmental challenges or renewable energy needs. Much of this technology is still at the early stages of commercialization.

- b. How can federal government intensify its role in creating more green jobs?

ITA's mission is to promote prosperity by strengthening the competitiveness of U.S. industry, promoting trade and investment, and ensuring fair trade and compliance with trade laws and agreements. For ITA, that means increasing efforts to create opportunities for government to get feedback from industry that can help shape policy to create green jobs. We organize trade promotion activities in addition to conducting economic and trade analysis on all sectors of the economy. ITA also participate in negotiations to liberalize trade in climate change-related technologies, such as the current World Trade Organization Environmental Goods and Services Agreement negotiations, led for the U.S. Government by the Office of the U.S. Trade Representative. Ultimately, we strive to strengthen U.S. competitiveness globally and as a result, create many of the green jobs needed to sustain economic growth. I look forward to working with our interagency colleagues and industry stakeholders to accomplish this goal.

- c. Should we be revisiting how we award federal contracts to small businesses for green technology advancements?

The process for awarding contracts, especially to small business, should be as streamlined and transparent as possible, while guarding against fraud and waste. Any improvements to the current system that further those objectives would encourage small-and medium-sized businesses to bid for contracts for green technology advancements.

- d. What is needed in order to create the demand in the domestic market so that small businesses can then have the ability to export in the near future?

Countries with strong domestic markets are fed by incentive policies that enable clean tech companies to grow into firms capable of exporting to world markets. Without U.S. Government support providing domestic policy incentives to develop U.S. companies, it is likely that clean technology markets will emerge elsewhere that U.S. companies are unable to supply.

Support can come in a wide variety of methods. The climate legislation passed in the House includes a cap-and-trade and renewable electricity standard, both of which can encourage the development and deployment of energy technology and give project developers and utility companies the incentive to install renewable energy facilities.

4. The Department of Commerce's International Trade Administration is one of the government agencies charged with promoting U.S. exports of green technology. They advise the federal government on environmental trade issues and publish guides assisting U.S. businesses in international markets. However, several other government agencies are active in this field, including the Export-Import Bank, the Overseas Private Investment Corporation, the Department of Energy and the Trade and Development Agency.

- a. Do you find that the International Trade Administration is able to work effectively with these other government agencies charged with promoting U.S. exports of green technologies?

Yes, ITA has worked on numerous events with EXIM, OPIC, DOE, TDA, and the Department of State. These events include trade missions, road shows, seminars, and trade shows, as well as long-term strategic planning. Secretary of Commerce Gary Locke, as chair of the Trade Promotion Coordinating Committee (TPCC), recently initiated a Greentech Working Committee of the TPCC to facilitate coordination and focus on how best to advance the goals of green tech export promotion. These agencies are members of the TPCC.

- b. Do you believe there is a problematic overlap of goals or responsibilities among these various agencies?

No, the goals are fairly clearly defined.

5. Other countries are applying stronger safety standards and quality certifications to their green technology imports. Those requirements have made it difficult for green technology manufacturers in the U.S. to penetrate their domestic market.

- a. Do you believe this the trade liberalization effort should be accompanied with a safety standard harmonization effort as well?

The WTO Agreement on Technical Barriers to Trade supports greater harmonization of *technical regulations*, which are standards that have been made mandatory by a WTO Member, by encouraging Member participation in international standards development. The United States supports a largely market-driven approach to standardization, offering industries freedom to rapidly innovate, develop, and market new, more energy-efficient technologies. When the United States participates in international standardization activities with the goal of harmonizing technical requirements, a thorough analysis of the relevance, effectiveness, and appropriateness of such standards is necessary. Harmonization of technical regulations to ineffective and inappropriate standards may actually hinder U.S. innovation and undermine what otherwise may be legitimate regulatory objectives and the public good.

Efforts to harmonize standardization are occurring, independent of trade liberalization efforts, reflecting the realities of today's global marketplace. As new technologies emerge, product standardization follows, including safety standards. Users of the standards participate in international standardization efforts, with the goal of developing one standard, one test, accepted everywhere. Early engagement of stakeholders to inform or educate interested parties about standardization efforts can usually assist in harmonization.

- b. Do you believe the higher standards and certifications imposed by other countries could be an incentive for the U.S. to implement stricter regulations too?

It could be either an incentive or a disincentive. If the foreign country's more stringent mandatory standards and certification requirements support the achievement of legitimate objectives, U.S. regulators would be wise to monitor the foreign regulatory developments. If, however, foreign technical regulations and certification requirements are found to be more trade-restrictive than necessary to meet legitimate regulatory objectives, or discriminatory, the U.S. Government and industry would be ill-served by the implementation of similar regulations which would result in unnecessary obstacles to trade and which could hinder technological innovation.

It is not usually stricter mandatory standards that impede market access for U.S. products, but rather the need for U.S. products to meet different national or regional standards that are based on competing green technologies. International standardization of green technologies will enable greater market access in foreign markets, and U.S. exporters can anticipate that engagement in international standards development will increase opportunities for market access in the long run. Other market access issues that U.S. manufacturers face can include the requirement for certifications by national certification bodies in addition to certifications from international bodies, a country's domestic testing or certification requirement that may create import delays due to the country's limited capacity for testing or certification, and certification based on specific technologies.

As U.S. regulators consider how green technologies factor into home and workplace safety, they may consider regulating products based on these technologies, or consider how these products are governed by existing regulations. According to the National Technology Transfer and Advancement Act, U.S. regulators are directed to use standards that already exist in the marketplace for their regulatory needs unless inconsistent with law or otherwise impractical. Federal regulators, in developing standards, are also required to take into consideration

international standards, and shall, if appropriate, based their standards on international standards, under the Trade Agreements Act of 1979.

c. Shouldn't our companies be able to meet those higher standards?

Yes, U.S. companies should be able to adapt to international market conditions, depending on their business models, and as long as those foreign technical requirements do not create unnecessary obstacles to trade. DOC's Trade Agreements Compliance Program helps U.S. companies receive the full benefits of all U.S. trade agreements, including the WTO Agreement on Technical Barriers to Trade, which obligates Members to adopt technical regulations that are no more trade-restrictive than necessary to meet legitimate objectives.

Our companies can usually meet different standards or certification requirements. But in meeting those standards or certification requirements, they may incur additional expenses. Those expenses could be for changing production lines to meet the differing standards or costs for additional certification. Sometimes the companies make a business decision not to enter certain markets because the expenses they would incur to meet the requirements outweigh the benefits of entering the market.

In other instances companies face other related barriers, such as lack of information about the standards and conformity assessment procedures that are required. Commerce market access and compliance services can readily assist those companies to successfully export in most cases.

6. The U.S. turned from being a net green technology exporter to becoming a net importer. We moved from a positive trade balance of \$14 billion in 1997 to a trade deficit of \$ 8.9 billion.

a. What should the Manufacturing and Services Unit within the Department of Commerce intend to do to reverse this trend? Do you think it has a comprehensive strategy?

To boost the global competitiveness of the U.S. environmental and clean energy sectors, Manufacturing and Services (MAS) is implementing an integrated approach that focuses on such things as market research and industry analysis. MAS works to ensure that the cost to U.S. companies for implementing domestic and foreign regulations are as low as possible, while ensuring the statutory goals of health, safety, and environment are met. Additionally, MAS solicits advice from industry to understand what policies and practices would benefit the industry. MAS then combines that advice with solid, objective economic analyses and works with other federal agencies to apply that information in policy-making.

As a member of the Trade Compliance Center Program, MAS also works to reduce or eliminate foreign trade barriers that obstruct U.S. exporter market access, including green technologies. The program coordinates the Department's efforts and resources to systematically monitor, investigate and ensure that foreign governments are in compliance with the over 270 international trade agreements to which the United States is party.

b. In your opinion, which factor or set of factors has exacerbated this decline?

Many large economies including China already have policy incentives such as a national level renewable target that is driving their industry to scale up production of green technologies. In addition, studies suggest that our international competitors are becoming more innovative and increasingly aggressive in pursuing global market opportunities. As global green technology competition heats up, it is becoming increasingly challenging for U.S. companies to retain and gain market share. Innovative policy incentives such as cap and trade, tax incentives, and effective IP enforcement abroad could reverse this decline.

7. In his testimony before the Senate, Commerce Secretary Gary Locke, said that “the U.S. will become a leader in addressing climate change or will fall behind.” In other words, we need an aggressive policy that includes an export promotion component that will allow our industry to lead the green economy.

a. What policy does the Commerce Department need in order to assist with the active participation of our industries in the global green technology market?

The U.S. manufacturing and services industries need clear and definitive policies, benchmarks, and priorities to stabilize and grow. Most notably, access to affordable capital and financing programs is a major concern. Companies need access to capital, especially at state and local levels. Helping to facilitate the flow of capital will readily precipitate the transformation of the U.S. manufacturing and services sectors into green technology leaders.

However, we do have a lot of tools. For example, the Commercial Service in just the last three years has sponsored over 500 clean tech activities that promote U.S. products and companies.

b. What active role do you believe the private sector plays within the global green technology market?

The U.S. private sector must necessarily lead the growth of the global clean technology market. Though the clean tech industry is still heavily reliant on government policy, the government alone cannot be the permanent engine of growth. Instead, the U.S. Government should support market development and trade promotion, helping to seed world markets and providing opportunities to U.S. firms.

One of ITA’s role is to help bring companies to export readiness and to use our expertise on the ground internationally to assist and advise industry on market opportunities. In the end the solutions are brought to the market by industry.

8. Throughout our history, innovation has been one of our nation's greatest characteristics. It has been said that "strong intellectual property rights are the underlying force driving innovation." In fact, most of our companies rely on IP rights to keep their businesses afloat internationally, especially in the green technology industry. However, many developing countries oppose IP rights and instead use a system known as compulsory licensing, which is used to circumvent and undermine IP rights. The use of compulsory licensing is viewed by developed countries as a major impediment to the future export of green technologies from industrialized to developing countries.
- a. What can the U.S. do to ensure the protection of intellectual property rights for domestic green technology manufacturers?

As you note, protection of intellectual property rights (IPR) is essential to encouraging innovation and competitiveness. Patents, for example, provide inventors with a temporary exclusive right to their invention in exchange for sharing with society information about their new creation. This exchange benefits us all: the possibility of profit encourages innovators to make the sometimes risky, initial investment in research and development, and society enjoys access to progressively better technologies. Today, this trade-off has particular relevance in the growing green technology industry, as both U.S. industry and our global community stand to see great benefits from new technologies and methods for addressing climate change. In order to ensure the continued protection of IPR for green technologies, and thereby continued advances in those technologies, we must be clear in our international discussions that IPR is an incentive and not a barrier to technology transfer. We must also work with developing countries to ensure that their legal frameworks provide for such incentives to draw the investment and technologies necessary to effectively address their particular climate change mitigation and adaptation challenges.

9. Some countries have promoted their renewable energy industries through their International Development programs. For instance, Denmark has offered direct grants and project development loans on favorable terms for use of Danish wind turbines. The German government also has aid programs to build wind farms in developing countries using German technology. Essentially, they are using foreign aid to open up new markets.
- a. Which regions in the world present the most promising opportunities for the exportation of U.S. manufactured green technology?

There is hardly a region without opportunities. China and India obviously have enormous needs and potential. Europe is the largest market in the world and has commitments under the Kyoto Protocol and mandates passed into law that have created enormous opportunities. Eastern Europe has huge needs still to convert from older economic models to more energy efficient infrastructure. Brazil and Mexico have large programs, though many of them are internally focused. The Middle Eastern markets are also expanding programs of wind, solar and green building. Africa has massive needs and markets like South Africa and Angola have great potential for more renewable energy.

b. What types of green technology are most suitable in these regions?

Every region has a need for clean technologies. Asia, driven mostly by China and India, has invested heavily in wind and solar technologies. The ASEAN countries and Australia appear more interested in biomass and geothermal as result of their resource endowment being tilted towards those technologies.

In North America, the United States leads the world in wind, geothermal, biomass, and concentrated solar power and is a leader in most other clean technologies as well. Canada is a large market for U.S. clean technology firms, but thanks to a newly-announced feed-in tariff in Ontario, it could become a leading *global* market.

Europe is currently the largest market for clean technologies and offers the most generous policy incentives. Green buildings, energy efficiency, and renewable energy are all key markets in Europe and offer opportunities for U.S. firms, although competition from European companies makes the market difficult to enter.

All markets offer the potential for smart grid technologies and energy efficiency, particularly, industrial energy efficient equipment and green building technologies. Almost every region is currently assessing its electricity transmission infrastructure and trying to promote the development of a smarter grid capable of connecting intermittent renewable power sources and conserving energy through storage and demand-side management.

10. Some emerging market governments have been outspoken about maintaining their ability to industrialize and grow their economies, and how that ability could be compromised by the adoption of effective climate and energy strategies. Some even go on to make the claim that developed countries should tolerate their transitions into becoming market economies, which not only takes time but is the same path that nations with more mature market economies have to travel on their respective roads to sustainable development.

a. How do we deal with these tensions and these arguments from emerging market governments?

The United States is working actively with emerging markets like China, Brazil and India to help them better understand that, contrary to arguments they are making in international fora, adopting more sustainable manufacturing practices would be the best way to grow their economies. Addressing climate change is an economic opportunity, not a burden. The United States supports the fundamental right of a nation to develop. However, the only way to achieve a sustainable development future is through a *low-carbon* pathway. Both India and China have taken steps to reduce energy intensity, boost renewables and strengthen vehicle standards. Yet they can and will need to do much more. We are working to help them realize that the link between clean, sustainable energy and robust economic growth will only become stronger for all countries in the 21st Century global economy.

- b. It is reasonable to assume that emerging markets may want to play a more active role in developing or constructing some of these green technologies and products if they are going to become significant importers of these products. Is that possible and how would that work?

Countries such as China and Brazil have taken steps to develop and manufacture green technologies. While there are exceptions, countries that are the most competitive in manufacturing and exporting green technologies, such as renewable energy equipment, generally have become exporters only after developing their own market for these technologies. The goal of developing and manufacturing green technologies at home is best accomplished by an open and competitive market.

For example, despite losing an early lead in wind energy technology to Japanese and European countries in the 1980s and 1990s, U.S. workers and local economies benefitted from national policies that attract foreign companies to invest in the U.S. wind market. Foreign firms created thousands of new wind manufacturing jobs in United States last year alone, attracted by low import tariffs, tax incentives equal to those received by U.S. firms, and strong intellectual property protection. In 2008, Germany's Siemens heralded the creation of a research and development center in Boulder, Colorado. Denmark's Vestas followed with announcements of two new research centers in Boston and Houston and -- in addition to its wind turbine production facility in Windsor, Colorado, that opened in March 2008 -- new production facilities in Brighton and Pueblo, Colorado. Developing countries should be encouraged to follow the United States' example in developing their own green technology markets.

The Honorable George Radanovich

1. In your testimony, you discussed a potential increase of \$40 billion in green technology exports per year by 2020.
- a. On what current market trends and policies is this number based? Is this figure the result of extrapolation from present data?

The number comes from the National Renewable Energy Laboratory (NREL) benefits estimates, derived from IEA, IPCC, and other sources. The estimate is based on their reading of current trends and policies.

- b. How does this compare to the additional trade revenue that could be generated by passing the pending free-trade agreements with Korea, Panama, and Colombia?

While we cannot provide an estimate of additional trade revenue that could be generated by passing the pending free trade agreements (FTAs), we are sure that passage of these agreements would significantly enhance opportunities for our exporters in these markets.

Under the U.S.-Colombia FTA, over 80 percent of U.S. exports of consumer and industrial products to Colombia will be duty-free immediately under this agreement, with remaining tariffs

phased out over ten years. Again, many of our key sectors face high tariffs in the Colombian market, such as information technology equipment at 8 percent, machinery at 11 percent, and building products at 13 percent.

Finally, over 88 percent of U.S. exports of consumer and industrial products to Panama will be duty-free immediately under the U.S.-Panama FTA. This agreement will create new market access opportunities for U.S. exporters by eliminating barriers such as Panama's current 13.9 percent tariff on transportation equipment and 10.9 percent tariff on consumer goods.

Under the U.S.-Korea FTA, almost 95 percent of U.S. merchandise exports to Korea will become duty free within three years of the Agreement's entry into force. U.S. exports of manufactured goods can be expected to benefit significantly from the elimination of Korea's relatively high average tariff on industrial goods of 6.6 percent, compared to the U.S. average of 3.2 percent. Korean tariffs on high-trade U.S. products such as certain heat exchange units, certain filtration and purification machinery and parts thereof, and distilling plants will be eliminated immediately upon implementation of the Agreement.

2. You noted that only 20 percent of the top alternative energy companies are American. How does this number relate to U.S. companies' access to rare earth metals, which are essential elements in nearly all energy efficient products?

The Administration is committed to becoming the world leader in green technologies. To this end, the American Clean Energy and Security Act (ACESA) would provide significant incentives for all forms of low- and no-carbon generation and for energy efficiency. Putting a price on carbon emissions will create significant opportunities for thousands of U.S. firms, including those that manufacture and install renewable energy technologies, weatherize and retrofit existing buildings, and construct new energy efficient homes and office buildings.

The President wants to turn the challenge of addressing climate change into an opportunity by making the United States the global leader in these new technologies. Delays in passing legislation could have a negative impact on our ability to compete in emerging global markets. Certainly, our competitors in the green technology industry are not waiting.

The business community has been clear in their desire for clear policies that provide certainty and predictability, also critical to the deployment of clean technologies. Too many companies, entrepreneurs, and investors are holding off on making investment decisions because of the lack of certainty in U.S. policy. Legislation that can provide that certainty should be enacted as soon as possible.

3. The World Bank identified Colombia as one of the leading greenhouse gas emitters among developing countries. The World Bank also noted Colombia imposes high tariffs on climate-friendly technology that is necessary to reduce its greenhouse gas emissions.
 - a. How could passing the Colombia FTA affect the U.S. green export industry?

Colombia is a fast-growing and friendly export market for the United States. In 2008, U.S. merchandise exports to Colombia totaled \$11.4 billion, up 35.5 percent from the previous year. The U.S. Commercial Service has identified pollution control equipment as a best prospect for U.S. exports to Colombia. If the Colombia FTA were to enter into force, Colombia would offer immediate duty-free treatment to 79 percent of U.S. environmental goods and equipment exports. Also, Colombia would immediately eliminate its prohibition on the importation of remanufactured environmental goods and equipment, which would provide additional business opportunities for U.S. green exporters and their workers. The U.S. agricultural industry would also benefit from the elimination of high tariffs on items that could ultimately be used in renewable energy production.

- b. What effect could access to cheaper, greener technologies have on Colombian greenhouse gas emissions?

The large scale deployment of clean energy technologies is critical to reducing global greenhouse gas emissions. Removing trade, regulatory, and policy barriers to such deployment could reasonably be expected to make critical technologies more available, thereby encouraging their use and lowering GHG emissions.

- c. Would you consider passing the Colombia FTA a form of support for green exports?

Lower tariffs mean more choices for Colombians. The FTA would offer Colombian government and private sector buyers access to the best U.S. green technology at competitive prices. By reducing costs (through lower tariffs) and providing capacity building and technical assistance, we can ensure that state-of-the-art U.S. technology is available for purchase by buyers in Colombia and around the world.

4. You stated it is critical to have policies that support the early development and commercialization of green technologies. To what forms of "support" are you referring, and does "support" include taxpayer provided financial support for startup industries? If so, could this pose a problem for our trade partners as these are the same barriers we identify in their markets as protectionist?

It is critical to have policy support for the early development and commercialization of the clean technology industry. At the U.S. Department of Commerce, we have worked hard to provide support to the clean tech industry through industry promotional events, publications, and several bilateral and multilateral dialogues. .

It is important that the U.S. clean technology market stay open and transparent with the U.S. government facilitating its development rather than shutting out foreign competitors. Foreign investors provide jobs and economic growth to communities across the country. For example, one Spanish company, Iberdrola, received a loan guarantee from the Department of Energy for \$295 million to develop wind projects in Texas, Oregon, Minnesota, and Pennsylvania. The largest portion of the funding will be used to further develop an existing wind farm in South

Texas. When finished, the new development will power the needs of 70,000 homes, producing 3% of all the wind power in the United States and creating hundreds of American jobs.

It is difficult to know how a trading partner will react to our policies. Not all government support is distortive or the subject of trade friction. What is essential here is the transparency and openness of any such measure in order to avoid misunderstanding.

5. Does the U.S. currently apply countervailing duties on any green imports that are subsidized by their country of origin?

While the term “green imports” has not been clearly defined, an examination of existing countervailing duty orders does not reveal any measures on imports that would normally be considered “green.” The vast majority of the Commerce’s countervailing duty orders cover steel, and chemicals.

6. Could subsidizing U.S. industries cause our trading partners to react with anti-free trade policies against the United States?

It is difficult to know how a trading partner will react to our policies. Not all government support is distortive or the subject of trade friction. What is essential here is the transparency and openness of any such measure in order to avoid misunderstanding.

7. You state the Department of Energy estimates green technology exports will generate “up to 750,000 jobs by 2020.”
 - a. Were current or potential subsidies for U.S. green tech industries included in this estimate? If so, how many jobs would be lost as a result of these subsidies?

The Department of Energy would be best able to explain these figures and their conclusions that were published in *Strengthening U.S. Leadership of International Clean Energy Cooperation*.

- b. With regard to jobs lost as a result of subsidies, was that number accounted for in the “750,000 jobs” figure?

The Department of Energy would be best able to explain these figures and their conclusions that were published in *Strengthening U.S. Leadership of International Clean Energy Cooperation*.

8. Some observers have studied intellectual property rights (IPR) and their relationship to technology diffusion. The greater the IPR protection, the greater diffusion. The weaker the IPR protection, the less diffusion and fewer exports. Would you agree or disagree with this assessment?

ITA fully agrees with that assessment. Investing in the research and development of new technologies is both expensive and risky. IPR provides one type of assurance to investors that

their investment and resulting innovations will be protected at least during the technologies' infancy. It is no surprise then, as we have learned in our discussions with industry, that companies determine whether to enter a given market based in part on the strength of IPR protection and enforcement there. Weak IPR regimes discourage manufacturers from deploying their patented technologies to certain foreign markets, thus preventing widespread technology transfer. Therefore, not only can one conclude that effective IPR regimes encourage the development and diffusion of green technologies, but that ineffective IPR regimes actively discourage the deployment of such technologies worldwide.

9. Does the Administration have a position on the recent push by developing nations to subject green technology to compulsory licensing? Would you agree that compulsory licensing of green technology could lead to what would essentially be foreign governments sanctioning IP violations by their domestic companies?

The Administration will not support language in the UN Framework Convention on Climate Change (UNFCCC) that seeks to undermine or weaken protection and enforcement of intellectual property rights. We have made this very clear in the negotiations, where we have argued intellectual property is an essential building block for technology innovation that we will need if we are to achieve the ultimate objective of the Convention.

The threat of compulsory licenses for green technologies would have a number of adverse implications for both innovators and developing countries seeking transfer of technologies. I will mention just a few here. First, industry has indicated that, in the face of compulsory licensing for patented technologies, we could see a shift from patent to trade secret protection, thus eliminating public disclosure of innovative green designs and methods under the patent system. Second, compulsory licensing risks stifling the nascent green industry's development since producers already have a relatively small profit margin, thanks to the healthy competition in the green industry and high cost of materials. If compulsory licensing forces companies to sell their green technology only slightly above or at cost, the lesser returns could leave little or no capital to reinvest in their company's or technology's further development. Finally, compulsory licenses fail to effectively disseminate technology because many key aspects to implementing the technology, such as know-how and institutional capacity, are not conveyed along with the data contained in the patent. Under negotiated license agreements, however, cooperative technology transfer by industry often results not only in sharing protected data, but in building knowledge and capacity to support the use of such technology, as well. This comprehensive approach to technology transfer establishes a solid foundation upon which developing countries' budding green sector can then build.

10. How important is a consensus on the definition of green technology, and what are the hurdles to reaching that consensus?

The Administration does not think that consensus on a definition of "green technology" is essential for obtaining market access for technologies that will help achieve our climate change goals. We prefer to work toward market access for any technology that will help mitigate greenhouse gas emissions.

11. Other witnesses testified how nations such as Spain and Denmark are global leaders in the areas of green technology and clean commerce. Yet according to recent studies, the average government subsidy per job created in the Danish wind industry is estimated at between \$90,000 and \$140,000. For Spain, depending on the industry, each green job created required approximately \$750,000 to \$1.4 million in government subsidies. Is this a result the U.S. should pursue and for which the taxpayers should pay?

Regarding the specific subsidy estimates for Spain's renewable energy industry, the Department of Energy's National Renewable Energy Laboratory found that the study that produced these numbers was fundamentally flawed. The broader point in response to your question is that the global renewable energy industry has been small and often unwilling to export products or expertise to countries without a firm belief that their involvement would be profitable. For countries with relatively small markets for renewable energy, like Denmark and Spain, this meant they could attract global investment by guaranteeing high rates of return through direct subsidies. As such, these markets became highly competitive quickly, but their initial growth has been largely dependent on subsidies. As the renewable energy industry has matured, these resources have become increasingly competitive with fossil-based power generation.

The United States is one of the largest markets in the world for renewable energy and enjoys a robust and varied resource endowment. Thus with positive incentives, regulation, and policy certainty, market forces would likely create thousands of jobs without a net burden on taxpayers.



Timothy J. Richards
Managing Director – International Energy Policy
General Electric Company
1299 Pennsylvania Ave., NW
Suite 900-W
Washington, DC 20004
T: +1 (202) 637-4407

November 16, 2009

The Honorable Henry Waxman
Chairman, House Committee on Energy and Commerce
2125 Rayburn House Office Building
Washington, DC 20515-6115

Dear Mr. Waxman:

Thank you for the opportunity to testify before the Subcommittee on Commerce, Trade and Consumer Protection on October 7, 2009, at the Subcommittee's hearing on "Growing U.S. Trade in Green Technology."

On October 26th, you sent a set of written questions for the record from your colleagues on the Subcommittee. Enclosed are responses to those written questions. Should any further clarification be required on these points, please do not hesitate to contact me.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Timothy J. Richards".

Timothy J. Richards

The Honorable Bobby Rush

1. The American Recovery and Reinvestment Act of 2009 allocated 36.7 billion dollars in funding to the Department of Energy. Of that, 16.8 billion dollars was distributed to the Office of Energy Efficiency and Renewable Energy for various green technology programs. An additional 4 billion dollars was allotted to the DOE's Loan Guarantee Program. To date, of the total allocated funds for the DOE, several billion dollars are still available and have yet to be awarded or spent.

a. What is your evaluation of the DOE's management of the Recovery Act's funds so far?

American Recovery and Reinvestment Act funds appropriated to the DOE represented a procurement effort several orders of magnitude above the capacity of the Department's steady state contracting staff. This situation is not unique to the DOE and has created a general shortage of qualified government contracts-skilled employees to award and administer these funds. The DOE has attempted to mitigate this challenge by using third-party support and leveraging staff at its national labs. While this approach undoubtedly helped, several challenges remain. From RFI through contracting, there have been significant delays. In fact, many of the programs already awarded have yet to begin final contract negotiations, resulting in the further delay of the infusion of federal funds in the economy. The DOE may want to consider leveraging procurement organizations within other federal agencies and temporarily suspending other non-essential workloads to increase ARRA utilization.

An area of specific concern to GE is the DOE's Title XVII Loan Guarantee Program. While we applaud the DOE's efforts to streamline the National Environmental Policy Act (NEPA) review process, it is still more expensive and time consuming to comply with when compared to Export-Import Bank and Small Business Administration programs. The loan guarantee programs at the Ex-Im Bank and SBA are generally longer term, more flexible and feature less restrictive application and review processes.

b. Do you have any suggestions as to how the Department of Energy can best award and spend the remaining funds?

Considerable time and resources are required to write and evaluate proposals. The DOE likely received many more technically qualified proposals than it had funding to cover. The Department should leverage those proposals that fell below the line on the first round to expedite any additional procurement plans. As a general course of business, the DOE should establish and maintain a prioritized collection of proposals to be executed with additional funds as they become available. Additionally, the DOE should consider utilizing pre-competed contractual vehicles such as Indefinite Delivery Indefinite Quantity (IDIQ), where there is an expectation of recurring procurements.

Responses to "Growing U.S. Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

Furthermore, a supplemental appropriations bill enacted in August provided for the replenishment of the "Cash for Clunkers" program under the Consumer Assistance to Recycle and Save Act by redirecting \$2 billion originally appropriated in the ARRA for cleaner energy financing under the DOE Title XVII loan guarantee program. GE believes that those funds should be restored for their original purpose.

2. In Ms. Jacobson's testimony, she referred to the American Clean Energy and Security Act of 2009 is an essential piece of legislation for the future exporting of green technology. We reported this bill out of the Committee on Energy and Commerce on June 6, and it was passed by the House of Representatives on June 26. It is now placed on the Senate Legislative Calendar.

In the House version, the American Clean Energy and Security Act supplies key support for domestic clean energy manufacturing, such as energy-efficient appliances and electric plug-in vehicles, in order to significantly reduce U.S. emissions of greenhouse gases. It also promotes U.S. exports of green technology to assist developing countries with limiting their greenhouse gas emissions.

a. In your opinion, what are the most crucial provisions of the American Clean Energy and Security Act, in regards to the development and export of clean energy?

b. What are the potential benefits to the green technology industry from the American Clean Energy and Security Act?

The response below pertains to Questions 2a and 2b

One of the most critical provisions in the American Clean Energy and Security Act is the setting of a long-term price on carbon, by means of a cap-and-trade mechanism. Once a price on carbon is set, there will be market-based incentives for the efficient reduction in overall and sectoral carbon emissions. Furthermore, the combination of a carbon price with a federal renewable energy standard (RES) and an incentive for carbon capture and sequestration (CCS) will drive the development of cleaner energy technologies. These technologies will in turn assist in the reduction of carbon prices, so that long-term development of cleaner energy solutions will become increasingly economically viable. We also believe that provisions such as the Best In Class Appliance Deployment Program, which includes incentives for the manufacture and purchase of energy efficient appliances, will be critical for the development of a Smart Grid, a significant enabler of reduced emissions not only in the use but also the production of electricity in our country.

3. Regarding Small Businesses, today, America's entrepreneurship can be observed through the many small businesses participating in all sectors of our economy. Many green jobs are generated by small businesses and small businesses are essential to our economy. We are dependent on them to remain competitive in a globalized economy.

Responses to "Growing U.S. Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

a. For small businesses who want to compete internationally, how important is it for them to have a sustainable domestic market for green technology?

A sustainable domestic market for green technology is critical for small businesses that wish to compete in international markets. It is much easier for small businesses to develop products in the U.S. and then export to other countries, rather than moving to immediate exports.

Cleaner energy goods typically require a complicated and diffuse supply chain. For example, small businesses may not be directly involved in the final manufacture of wind turbines, but they will likely be integral in the creation of parts and components necessary for the finished product. The U.S. supply chain, and thus the role of small businesses, has been undermined by inconsistent federal policies with respect to the Renewable Energy Production Tax Credit (PTC) and Investment Tax Credit (ITC), which have expired and been renewed several times. GE encourages the government to be proactive in expeditiously working to make the PTC and ITC incentives permanent.

b. How can federal government intensify its role in creating more green jobs?

The most important and immediate step that the federal government can take in creating more green jobs is to adopt a federal renewable energy standard that ensures continued growth of this sector.

c. Should we be revisiting how we award federal contracts to small businesses for green technology advancements?

This is not an issue where GE has experience.

d. What is needed in order to create the demand in the domestic market so that small businesses can then have the ability to export in the near future?

The adoption of a federal renewable energy standard is the most important step in creating a domestic market for small businesses, so that these businesses could export in the near future.

4. The Department of Commerce's International Trade Administration is one of the government agencies charged with promoting U.S. exports of green technology. They advise the federal government on environmental trade issues and publish guides assisting U.S. businesses in international markets. However, several other government agencies are active in this field, including the Export-Import Bank, the Overseas Private Investment Corporation, the Department of Energy and the Trade and Development Agency.

Responses to "Growing U.S. Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

a. Do you find that the International Trade Administration is able to work effectively with these other government agencies charged with promoting U.S. exports of green technologies?

Yes, the International Trade Administration has been able to work effectively with other government agencies in promoting U.S. exports of cleaner energy technologies. However, one area of improvement would be the increased use of tied aid to match foreign government tied aid in seeding renewable energy technology around the globe. European and Asian governments have successfully employed this strategy and we would encourage the stronger use of the U.S. government's tied aid war-chest to counter this.

b. Do you believe there is a problematic overlap of goals or responsibilities among these various agencies?

GE believes that developing a coordinated program of export advocacy, policy development, trade barrier elimination and use of all available financing mechanisms with a specific goal of promoting U.S. exports would be beneficial. We believe that, given its experience in conducting similar programs, the Department of Commerce should lead this effort. Congress should also request quantified reports of the program's results and should take and implement private sector recommendations.

5. Other countries are applying stronger safety standards and quality certifications to their green technology imports. Those requirements have made it difficult for green technology manufacturers in the U.S. to penetrate their domestic market.

a. Do you believe this the trade liberalization effort should be accompanied with a safety standard harmonization effort as well?

b. Do you believe the higher standards and certifications imposed by other countries could be an incentive for the U.S. to implement stricter regulations too?

c. Shouldn't our companies be able to meet those higher standards?

The response below pertains to Questions 5a, 5b and 5c

It is not our experience that foreign standards for safety or quality are more stringent than those found in the U.S. There are, however, many differences in these standards when comparing the U.S. with other nations. These varying standards can act as barriers to trade. It must be stressed that these standards should address legitimate safety and quality concerns, and not be masked trade barriers.

Responses to "Growing U.S. Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

6. The U.S. turned from being a net green technology exporter to becoming a net importer. We moved from a positive trade balance of \$14 billion in 1997 to a trade deficit of \$ 8.9 billion.

a. What should the Manufacturing and Services Unit within the Department of Commerce intend to do to reverse this trend? Do you think it has a comprehensive strategy?

b. In your opinion, which factor or set of factors has exacerbated this decline?

The response below pertains to Questions 6a and 6b

The U.S. was unable to maintain a robust domestic cleaner energy industry because of policy inconsistencies. When these technologies took off and became more viable, we did not have the supply chain in place and thus had to import these goods. European nations had robust supply chains and the capacity for export. As we rebuild a domestic industry for these technologies, it will be important for the Manufacturing and Services Unit to identify trade barriers and develop strategies to remove and overcome these barriers. This includes both tariffs and non-tariff barriers. GE supports a trade agreement eliminating barriers to trade in cleaner energy goods and services.

7. In his testimony before the Senate, Commerce Secretary Gary Locke, said that "the U.S. will become leader in addressing climate change or will fall behind." In other words, we need an aggressive policy that includes an export promotion component that will allow our industry to lead the green economy.

a. What policy does the Commerce Department need in order to assist with the active participation of our industries in the global green technology market?

In addition to identifying and eliminating barriers to trade, the Commerce Department should offer policy advice to other nations and develop additional trade missions to market and promote American goods.

b. What active role do you believe the private sector plays within the global green technology market?

The private sector plays a critical role, making investment, research, manufacturing and sales decisions within the policy framework that the public sector establishes.

8. Throughout our history, innovation has been one of our nation's greatest characteristics. It has been said that "strong intellectual property rights are the underlying force driving innovation." In fact, most of our companies rely on IP rights to keep their businesses afloat internationally, especially in the green technology industry. However, many developing countries oppose IP rights and

Responses to "Growing U.S. Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

instead use a system known as compulsory licensing, which is used to circumvent and undermine IP rights. The use of compulsory licensing is viewed by developed countries as a major impediment to the future export of green technologies from industrialized to developing countries.

a. What can the U.S. do to ensure the protection of intellectual property rights for domestic green technology manufacturers?

The WTO Trade-Related Aspects of Intellectual Property Rights Agreement (TRIPS) provides the correct framework for IPR protection in all technology domains including green technologies. TRIPS provides specific instances in which compulsory licensing is permitted. However, the U.S. must make clear in the UNFCCC negotiations that revisiting these disciplines is unacceptable. For this reason we believe it is inappropriate for any Copenhagen outcome to delve in to IPR matters that are essentially trade matters committed to the expertise and competence of the WTO. Thus, there should be no IPR provisions or language in a Copenhagen agreement.

9. Some countries have promoted their renewable energy industries through their International Development programs. For instance, Denmark has offered direct grants and project development loans on favorable terms for use of Danish wind turbines. The German government also has aid programs to build wind farms in developing countries using German technology. Essentially, they are using foreign aid to open up new markets.

a. Which regions in the world present the most promising opportunities for the exportation of U.S. manufactured green technology?

In the current economic environment, the most promising regions for the export of U.S. cleaner energy goods are China, India and the Middle East. These regions have the greatest opportunity for expanding their power generation capabilities in the near-term, and China and India have both maintained positive economic growth rates despite the recessionary condition of the global economy.

b. What types of green technology are most suitable in these regions?

High-efficiency gas turbines that are capable of utilizing multiple fuels, and in some cases capable of providing combined heat and power, are the most suitable cleaner energy technology for these regions, and offer the greatest U.S. export opportunities.

10. Some emerging market governments have been outspoken about maintaining their ability to industrialize and grow their economies, and how that ability could be compromised by the adoption of effective climate and energy strategies. Some even go on to make the claim that developed countries should tolerate their transitions into becoming market economies, which not only takes time but is the same path

Responses to "Growing U.S. Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

that nations with more mature market economies have to travel on their respective roads to sustainable development.

a. How do we deal with these tensions and these arguments from emerging market governments?

One option for synthesizing climate mitigation and economic development goals is to remove or reduce tariff and non-tariff barriers to green trade. For example, an Environmental Goods and Services Agreement (EGSA) would catalyze growth for economies at all stages, creating the market dynamics for lower cost development and deployment. Such policies also have the potential to enable "leapfrogging," as has occurred in the telecommunications arena. A shift to a lower carbon economy does not have to inhibit growth, and in fact can boost growth.

b. It is reasonable to assume that emerging markets may want to play a more active role in developing or constructing some of these green technologies and products if they are going to become significant importers of these products. Is that possible and how would that work?

Emerging economies must play a role in developing cleaner energy technologies. As noted above, the elimination or reduction of tariff and non-tariff barriers can facilitate an inclusive international environment. It is also important to note that high-technology industries are scale industries, and barriers to trade can hinder the development of scale. In the cleaner energy industries, such barriers can create situations where investors and consumers are unable to act out of cost concerns – a threat to both U.S. enterprises and the developing economies hoping to participate in cleaner energy industries.

11. The Chinese government is making significant investments in green technology. They are also currently importing products from the U.S. that are assembled in China and sold domestically. These are opportunities for partnership.

a. Mr. Richards, GE has operations on almost every continent. Where are your largest operations?

GE operates two heavy-duty gas turbine manufacturing plants in Greenville, SC and Belfort, France, and expects to produce the majority of the 138 units in 2009 at its domestic facility. Of the units produced in Greenville, approximately 81% are designated for export to overseas markets. Additionally, GE expects to produce 80 aero-derivative gas turbines in 2009 at its Houston, TX and Hungary facilities. Of the 66 units shipped from Houston, at least 56% were designated for export in 2009.

Our largest Renewable Energy operations are in the U.S., where we employ more than 2,000 people in our Wind and Solar businesses. These include wind turbine production and assembly jobs in Pensacola, Florida; Greenville, South Carolina; Salem, Virginia; Erie, Pennsylvania; and Tehachapi, California. They also include solar research and

Responses to "Growing U S Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

professional jobs in Golden, Colorado. And they further include professional jobs at our headquarters in Schenectady, New York, where since 2007 we have added over 300 jobs in Engineering, Project Management, and Services to support our Wind and Solar businesses.

b. Do you have joint venture agreement with foreign companies, especially in China?

GE has licensing agreements with two Chinese companies for its gas turbine and aero-derivatives business: Harbin and Nanjing Turbine Company.

c. Do these partnerships constitute an important factor for your success?

The aforementioned partnerships are a part of the GE Energy business plan and as such are part of our success.

d. Given the fact we are in a global economy, what kinds of incentives are needed to encourage transnational corporations to invest in the U.S.?

GE and many other companies are investing in the U.S. to develop and deploy cleaner energy technologies. A clear and sustained policy environment is the most important factor in attracting additional investment, as it would demonstrate long-term opportunities to businesses.

The Honorable George Radanovich

1. Will GE businesses benefit economically if the House-passed Cap and Trade legislation is enacted?

High-technology industries, like cleaner energy, demand scale for growth; and national and international policies establish the market dynamics to support this scale. Today, Europe and China are world leaders in policy support for domestic clean energy industries. In the U.S., policies that support a market price for carbon and other greenhouse gas emissions will stimulate research, development, and the deployment of lower-emitting and lower-cost technologies – and GE is one of the many diversified American technology, infrastructure and energy companies that will benefit. With a portfolio of electricity generation solutions including wind, solar, high-efficiency gas turbines, nuclear, cleaner coal and biomass, GE has invested more than \$850 million in renewable energy technologies in the last seven years alone. We are committed to growing American industry and creating American jobs in the cleaner energy arena.

2. Which, if any, GE businesses currently need or rely on government regulations or subsidies to create a market for its products?

All GE businesses thrive in a competitive, free marketplace; this is how GE has flourished for more than 130 years. However, production tax credits, guarantees and other incentives do exist in some growing markets where GE does business -- wind and solar energy, for example. We believe these markets would further grow in the U.S. with the extension or expansion of such productive public programs and investment.

3. GE manufactures both traditional incandescent light bulbs and newer, mercury-based compact fluorescent light (CFL) bulbs. In August, GE announced it will close its Oakville, Ontario factory that manufactures incandescent and fluorescent light bulbs and phase out the 160 jobs located there. The announcement said it was due in part to "waning demand" for incandescent light bulbs.

a. Where does GE manufacture CFL bulbs?

GE Consumer & Industrial obtains CFLs sold in the U.S. market from China through a joint venture, in which GE is a 40% minority shareowner, and from two unrelated suppliers. The Oakville plant manufactures linear fluorescent lamps (LFL), not CFLs, and some incandescent lamp products. GE has announced that it plans to transfer Oakville's LFL production to Bucyrus, Ohio to create a Center of Excellence for the manufacture of such products. The incandescent products at Oakville will be produced somewhere else or sourced.

Responses to "Growing U.S. Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

b. How much does a CFL cost GE to manufacture compared to an incandescent light bulb? How much more does a CFL cost a consumer?

Manufacturing cost information is confidential and proprietary. We can report, however, that a CFL light bulb costs approximately six times more to manufacture than an incandescent light bulb. GE does not set retail prices but available market data indicates that on average consumers pay approximately four times more for a CFL light bulb versus an incandescent light bulb. For that, the consumer gets a product that lasts about ten times longer than an incandescent light bulb and reduces their energy consumption by 75%.

c. What is the net gain or loss in U.S. jobs within GE's light bulb business since it began manufacturing CFL bulbs? How many factories have been closed and how many factory positions have been eliminated?

GE is phasing out incandescent bulb production due to changes in consumer demand, utility rebate programs, the Department of Energy ENERGY STAR Program and federal legislation. As a result, while GE had 11 factories and 1,250 employees making incandescent lamp products (bulb assembly or manufacture of components) in 2005, U.S. employment tied to incandescent production will be less than 500 by 2010.

d. Can this job loss be characterized as what occurs when resources are shifted arbitrarily from one technology to another – that there is no "gain" in employments but rather just a shift of existing resources?

No. GE, as the leading U.S. manufacturer of incandescent lamps, has always supported both product categories. The above described employment losses are the result of the shift in consumer preferences driven by many factors, including consumer interest in reducing energy costs by installing more energy efficient products, utility rebate programs that support such purchases, the Department of Energy's ENERGY STAR Program and the Energy Independence and Security Act of 2007. That statute imposes a ban on the manufacture of incandescent lamps beginning in January 2012; by January 2014 the ban will be complete.

4. In your testimony you indicate the first priority for renewable energy development in the U.S. is to restore domestic demand. You also highlight the 8.5 gigawatts of wind production installed in 2008. Can you say with certainty that artificially spurring domestic demand through government policy can ensure grid reliability? How much baseload capacity will need to be brought online to backup new additional intermittent wind capacity?

Baseload power generation equipment is continuously generating power with relative constant output. Wind power is inherently an intermittent power source due to its dependence on a variable wind resource. Wind power would have to be combined with

Responses to "Growing U.S. Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

some form of energy storage to provide reliable baseload power. Various concepts including pump storage systems and battery energy storage systems have been identified, but these currently cannot compete with conventional baseload plants (e.g. nuclear plants) in terms of cost or reliability.

From an economic perspective, the combination of a wind plant with conventional peak load power generation equipment, such as gas turbines, appears to be more attractive than adding additional baseload capacity. However, peak load power generation equipment requires at least 15 - 30 minutes before the generation capacity becomes available to the grid. Wind forecasting techniques and special wind plant controls are being developed, but additional low-cost, utility-scale energy storage systems would still be needed to provide reliable baseload generation under all conditions. The total (peak and wind, combined) system cost would have to be competitive with conventional baseload equipment.

In considering how to "firm up" wind resources, a higher penetration of geographically dispersed wind plant installations in an interconnected grid tends to reduce the intermittent nature of wind power generation. However, delivering these resources requires adequate transmission capacity, which is a challenge for many areas. Wind resources are often remotely located in areas that lack a robust transmission infrastructure.

Conventional power generation equipment is designed to help control and stabilize both grid voltage and grid frequency. During normal operation, GE's wind turbines are controlled in a similar way and support both grid voltage and grid frequency stability. GE's wind turbines also contribute to grid voltage regulation even if no wind is present through our WindFree Var technology.

Recent grid integration technologies have also focused on making wind power plants more robust during grid failures. Similar to conventional power generation equipment, modern wind plants stay connected to the utility grid and help the grid recover from short-term disturbances in a controlled manner ("Low/Zero Voltage Ride Thru" technology).

Despite its variability, there are examples of wind power being treated as a potential substitute for baseload generation. In 2007, the Minnesota Public Utility Commission suspended Xcel Energy's plan to acquire 375 megawatts (MW) of baseload, recognizing that the increase in demand-side management and wind resulting from the state's recently-strengthened Renewable Portfolio Standard would supplant this baseload need.

5. You testified that the policies of Denmark, Spain, and Germany are examples of good government policy to manufacture demand for wind and solar energy. A "feed-in tariff" occurs when a government sets the price of alternative power sources and requires power companies to purchase that power. If the price is set high, a boom in those sources—such as solar panel or wind production—is spurred. If the price is later lowered, surpluses occur and objectives are not achieved. All

Responses to "Growing U.S. Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

along, consumers' electricity bills increase. Is GE's formal position in favor of a national "feed-in tariff?"

GE supports a federal renewable energy standard (RES). GE believes that in the U.S., the most appropriate form of incentive for renewable energy is a federal RES as opposed to a feed-in tariff.

6. How many years would you estimate it will be before GE can be profitable in the wind industry without taxpayer subsidies?

GE currently operates a highly competitive wind turbines business for which we do not receive direct government subsidies. Tax credits and other incentives are available to our customers, and GE competes to supply goods and services to these customers.

7. Would you consider heavy domestic subsidies by foreign governments a barrier to entry for U.S. firms attempting to compete in foreign markets?

If foreign governments engaged in subsidy programs that are inconsistent with WTO provisions, then GE would consider such programs to be trade barriers to entry. However, incentives that lead to investment in cleaner energy projects are not themselves trade barriers.

8. In your testimony, you advocated for a Federal Renewable Energy Standard. Do you believe nuclear power should be included in such a standard, considering that it's the only carbon neutral energy source that can provide wide-scale baseload power generation?

GE believes that new nuclear energy sources should be included in a federal RES, as nuclear technologies are capable of serving as near zero-carbon emitting sources of reliable baseload power. Furthermore, coal gasification technologies with at least a 65% carbon capture and sequestration capability (CCS) and other cleaner coal technologies can provide low-carbon baseload power.

Responses to "Growing U.S. Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

The Honorable Tim Murphy

1. What percentage of windmills does General Electric actually manufacture and produce in the United States?

GE operates three wind turbine assembly facilities in the U.S. in Greenville, South Carolina; Pensacola, Florida; and Tehachapi, California. Upwards of 80% of GE's company-wide wind turbine assembly is occurring in the three U.S. facilities in 2009. GE is the leading wind turbine supplier in North America, and nearly half of the wind turbines installed in the U.S. are GE turbines. According to the American Wind Energy Association, GE wind turbines accounted for 43% of the 8.4 GW, and over 48% of the 5,000 turbines, installed in 2008.

2. What is the percentage of parts and percentage value of parts that are manufactured in the U.S. for a General Electric Windmill sold in the U.S.? What percent of U.S. made steel is used in each GE Wind Turbine?

For overall American content in GE wind turbines, nearly 46% of the 2009 spend was on U.S. components, including in-bound logistics to our factories. We anticipate this figure to increase to approximately 53% in 2010. In addition, there are hundreds of millions of dollars spent annually on outbound logistics from our factories to our customer sites, creating many U.S. jobs as well.

The vast majority of wind turbine towers made for GE projects in North America utilize domestic steel. A full 72% of towers used in our U.S. projects were manufactured in the U.S. with domestic steel in 2009, and we expect this proportion to increase to 79% in 2010. Additionally, 94% of all wind turbine towers used in North America are made with U.S. steel and are manufactured in North America.

3. How many U.S. General Electric workers who produced incandescent light bulbs have been laid off or lost their jobs? How many U.S. workers at General Electric currently produce incandescent light bulbs? If General Electric currently has U.S. employees making light bulbs, what are their future plans?

GE is phasing out incandescent light bulb production due to changes in consumer demand, utility rebate programs, the Department of Energy ENERGY STAR Program and federal legislation. As a result, while GE had 11 factories and 1,250 employees making incandescent light bulb products (bulb assembly or manufacture of components) in 2005, U.S. employment tied to incandescent production will be less than 500 by 2010.

Responses to "Growing U S Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

4. How many workers does General Electric currently employ in China to produce compact fluorescent light bulbs? What are General Electrics plan for expansion in China?

The joint venture CFL-manufacturing company of which GE is a minority shareowner employs approximately 5,000 workers. Information about future plans is confidential and proprietary.

5. Does General Electric plan to manufacture any compact fluorescent light bulbs in the United States?

At this time, GE does not have any plans to manufacture CFL light bulbs in the U.S.

6. Some companies such as General Electric have moved operations overseas or outsourced production. Companies such as these have said they have reduced carbon emissions, however, what is taken into consideration when determining carbon emissions from a company that moves operations and production overseas?

GE measures the greenhouse gas emissions (GHG) over which it has operational control on a global basis. GE does not seek to reduce its internal GHG emissions by outsourcing to third-parties and, in any event, moving emissions overseas does not reduce GE's total *global* emissions, which are measured and voluntarily reported in our annual eco report: http://ge.ecomagination.com/files/downloads/reports/ge_2008_ecomagination_report.pdf

7. How do you measure your carbon emissions? Do you take into account the electricity used at your offices and plants and what kind of generation it comes from? How do you take into consideration the outsourcing and/or "offshoring" of production or services to developing countries using electricity generated without the same pollution controls as in the U.S.?

GE has been measuring GHG emissions from sources over which it has operational control on a global basis for five years. We count not only carbon emissions, but also emissions of all GHGs from both direct (on-site emissions) and indirect emissions (purchased electricity, for example). We account for our direct and indirect GHG emissions based on the requirements and guidance of the GHG Protocol developed by the World Resources Institute and the World Business Council for Sustainable Development (WRI/WBCSD). This process is described in detail at: http://www.ge.com/citizenship/performance_areas/environment_health_safety_inv.jsp.

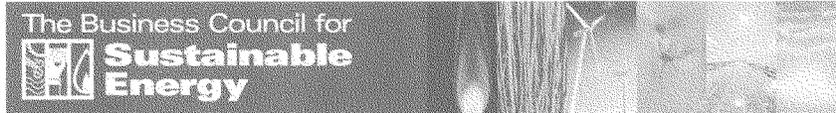
Responses to "Growing U.S. Trade in Green Technology" Hearing on October 7, 2009
House Subcommittee on Commerce, Trade & Consumer Protection
Tim Richards – Managing Director of International Energy Policy, General Electric Company

8. What are General Electrics plans to purchase Chinese made components for locomotives instead of U.S. made components?

GE buys locomotive components from many countries, including the U.S. and China. GE uses a Total Cost of Ownership methodology (delivered cost) to make these sourcing decisions. Approximately 7% of total spend for GE Transportation comes from China.

9. What percent of U.S. made steel is used in GE locomotives?

While GE procures material for our locomotives globally, the raw plate steel is produced in the U.S. Approximately 90% of the sheet steel used in GE locomotive production is from the U.S. Electrical steel is produced in the U.S., Europe and Taiwan, with the largest portion sourced from the U.S. It's difficult to answer where steel scrap used in our castings comes from, as foundries buy scrap from all over the world.



November 10, 2009

The Honorable Bobby L. Rush
Chairman
Subcommittee on Commerce, Trade, and
Consumer Protection
U.S. House of Representatives
2125 Rayburn House Office Building
Washington, DC 20515-6115

The Honorable George Radanovich
Ranking Member
Subcommittee on Commerce, Trade, and
Consumer Protection
U.S. House of Representatives
2125 Rayburn House Office Building
Washington, DC 20515-6115

Dear Chairman Rush and Ranking Member Radanovich:

I want to thank you both again for the opportunity to testify before the Subcommittee on Wednesday, October 8, 2009 on the important issue of "Growing U.S. Trade in Green Technology." Thank you also for the thoughtful questions you have asked me to answer as follow up to my testimony. I appreciate the opportunity to share with you the Council's views on such important matters.

My responses have benefitted from the expertise of many of the Council's members and from conversations with others involved in the field of international competitiveness.

Please do not hesitate to contact me again if I can be of further assistance.

Sincerely,

A handwritten signature in cursive script that reads 'Lisa Jacobson'.

Lisa Jacobson
President

Enclosures

Business Council for Sustainable Energy
 Response to Questions from Chairman Rush and Ranking Member Radanovich
 November 10, 2009

The Honorable Bobby Rush

1. *The American Recovery and Reinvestment Act of 2009 allocated 36.7 billion dollars in funding to the Department of Energy. Of that, 16.8 billion dollars was distributed to the Office of Energy Efficiency and Renewable Energy for various green technology programs. An additional 4 billion dollars was allotted to the DOE's Loan Guarantee Program. To date, of the total allocated funds for the DOE, several billion dollars are still available and have yet to be awarded or spent.*
 - a. *What is your evaluation of the DOE's management of the Recovery Act's funds so far?*
 - b. *Do you have any suggestions as to how the Department of Energy can best award and spend the remaining funds?*

The Department of Energy is managing well the task given to it by Congress through the American Recovery and Reinvestment Act. Tasked with evaluating hundreds of financially and technically-complex applications and managing scores of projects from new and existing directives from a wide variety of fields and industries, the Department has executed its expanded responsibilities in a professional, transparent, and timely manner. Delay inherently exists in the lag times between application deadlines, award announcements, and the delivery of awards. In managing these delays the Department is adequately balancing expedience and prudence. Communication between the Department and the applicants for ARRA funding has also been sound. We fully expect the bulk of projects funded through the Department's ARRA programs to begin moving and breaking ground in earnest in 2010.

Because the legislation directed the Department of Energy to allocate certain amounts of funds to specific projects, there may be only limited opportunities at this point in the process to direct or influence how DOE will distribute its ARRA awards. Nonetheless, the Council would emphasize to the Department and to Congress that existing clean energy technologies—including natural gas, wind, solar, geothermal and hydropower, combined heat and power, Smart Grid and demand response, insulation, and fuel cells—represent the best ways to promote national energy security, pollution-reduction, and economic growth. The deployment of existing clean energy technologies must be a priority to contain long-term greenhouse gas abatement costs, establish the United States as an industry leader, and begin the process of securing our national energy infrastructure.

Attached to this document is a set of recommendations from the Council and its members to the House leadership regarding potential further investments in clean energy technologies through additional appropriations to ARRA, technical corrections to existing legislation, and improved tailoring of various tax incentives. These recommendations may be of use to you in evaluating how the Department of Energy can continue to support clean energy technologies.

Business Council for Sustainable Energy
 Response to Questions from Chairman Rush and Ranking Member Radanovich
 November 10, 2009

The Council would in particular draw your attention to funding related to industrial energy efficiency. This is an area of extreme national importance that has nonetheless been largely neglected by the Department of Energy and the U.S. Congress. Of the \$16.8 billion dollars distributed to the Office of Energy Efficiency and Renewable Energy for various green technology programs, only \$155 million (less than one percent) went for industrial energy efficiency, even though the industrial sector uses more than 30 percent of U.S. energy and is responsible for nearly 30 percent of U.S. carbon emissions. The Department rejected in November almost \$9 billion worth of shovel-ready industrial energy efficiency projects. These represent some of the least-expensive and most-rapidly-deployable applications of clean energy technology; if provided a small amount of government stimulus, the rejected applications would have stimulated \$38.3 billion of private industry investment.

2. *As you stated in your testimony, the American Clean Energy and Security Act of 2009 is an essential piece of legislation for the future exporting of green technology. We reported this bill out of the Committee on Energy and Commerce on June 6, and it was passed by the House of Representatives on June 26. It is now placed on the Senate Legislative Calendar.*

In the house version, the American Clean Energy and Security Act supplies key support for domestic clean energy manufacturing, such as energy-efficient appliances and electric plug-in vehicles, in order to significantly reduce U.S. emissions of greenhouse gases. It also promotes U.S. exports of green technology to assist developing countries with limiting their greenhouse gas emissions.

- a. In your opinion, what are the most crucial provisions of the American Clean Energy and Security Act, in regards to the development and export of clean energy?*
- b. What are the potential benefits to the green technology industry from the American Clean Energy and Security Act?*

The strength of the American Clean Energy and Security Act (H.R.2454) is its comprehensive approach to moving the nation towards a clean energy economy and addressing climate change through a set of mutually-supportive complementary policies.

The centerpiece of the legislation, the cap and trade program detailed in Title III of the bill, provides the foundation for the development and export of clean energy technologies by using transparent market forces to put an appropriate and predictable price on greenhouse gas emissions. This reliable market signal will drive investments to the most efficient technologies, those with the highest carbon reduction return on investment (CROI). The strength and predictability of the long term domestic carbon reduction program will spur growth in the American clean energy technology industries. A strong domestic market will in turn drive America's international competitiveness in the production and development of clean energy technologies, leading to strong export potentials.

Business Council for Sustainable Energy
 Response to Questions from Chairman Rush and Ranking Member Radanovich
 November 10, 2009

The combined energy efficiency and renewable electricity standard (as established by Title I, Subtitle A of the Act) will similarly drive the development of energy efficiency and renewable energy technologies.

The Clean Energy Deployment Administration (CEDA) (as established by Section 186) will provide key funding for businesses facing “the valley of death,” that gap in private sector funding between venture capital and traditional investors, a phenomenon common to emerging technologies that can significantly retard development. By investing in existing technologies, CEDA will forward their transition from small scale deployment to full market diffusion, thus lowering production costs by achieving markets of scale. Such a step forward is the absolute crucial next step for many clean energy technologies as businesses worldwide race to achieve production maturity and market share.

It is crucial for both environmental and competitive economic reasons that American companies win this race to market diffusion. H.R.2454, through programs like CEDA and especially through the stable, long term price on greenhouse gas emissions, will help ensure that American companies are in the lead globally at this crucial early stage of the clean energy technology revolution.

3. *Regarding Small Businesses, today, America's entrepreneurship can be observed through the many small businesses participating in all sectors of our economy. Many green jobs are generated by small businesses and small businesses are essential to our economy. We are dependent on them to remain competitive in a globalized economy.*
 - a. *For small businesses who want to compete internationally, how important is it for them to have a sustainable domestic market for green technology?*
 - b. *How can federal government intensify its role in creating more green jobs?*
 - c. *Should we be revisiting how we award federal contracts to small businesses for green technology advancements?*
 - d. *What is needed in order to create the demand in the domestic market so that small businesses can then have the ability to export in the near future?*

As stated above, it is absolutely crucial for American clean energy technology businesses to have a sustainable domestic market if these companies (both big and small) can hope to compete in the global marketplace in the coming decades. Passage of comprehensive energy and climate change legislation (like H.R.2454) is the single most important step towards the rapid growth in clean energy business and clean energy jobs. A price on greenhouse gas emissions, mandatory efficiency and renewable electricity standards, long term market predictability and market signals—all these components of clean energy legislation will enable American ingenuity and growth in domestic jobs.

Far-sighted policy, technical innovation, high-quality manufacturing capabilities, and sound business administration will work together to give American businesses the upper hand in the clean energy technology industries.

Business Council for Sustainable Energy
 Response to Questions from Chairman Rush and Ranking Member Radanovich
 November 10, 2009

The Council does not have a consensus position on how the Federal government awards contracts to small businesses.

4. *The Department of Commerce's International Trade Administration is one of the government agencies charged with promoting U.S. exports of green technology. They advise the federal government on environmental trade issues and publish guides assisting U.S. businesses in international markets. However, several other government agencies are active in this field, including the Export-Import Bank, the Overseas Private Investment Corporation, the Department of Energy and the Trade and Development Agency.*
- a. *Do you find that the International Trade Administration is able to work effectively with these other government agencies charged with promoting U.S. exports of green technologies?*
 - b. *Do you believe there is a problematic overlap of goals or responsibilities among these various agencies?*

The promotion of U.S. exports extends beyond the work of trade delegations; setting the right policies to bring companies to the point of being able to export is the first crucial step in advancing U.S. exports of clean energy technologies. The Council views the questions of domestic energy policy to be hand-in-hand with trade promotion.

To that end, the BCSE, relying on the expertise of the Council on Competitiveness, suggests that the communication between the myriad government agencies tasked with providing support to U.S. clean energy businesses be improved. Especially for small and medium sized businesses lacking in robust legal departments and government affairs divisions, the process of hunting support programs from across the federal departments and agencies is an extremely difficult task. A central cleaning house of information on existing federal support programs for clean technology exports—from Department of Energy loan guarantee programs to Export-Import Bank funding for initial manufacturing facilities for promising technologies to International Trade Administrations trade delegations—would vastly improve the utilization of existing incentive programs.

A systemic, holistic approach to clean energy export promotion from technology development to long term trade contracts is essential. The simplest and most effective solution would be improved communication between the various government entities and a centralized source of information accessible to U.S. businesses. A next step could well be the appointment of a single agency, office, or coordinator to oversee and coordinate all the relevant programs.

I invite you to contact Susan Rochford, Vice President of the Council on Competitiveness, for further conversation on this topic and others relating specifically to federal government trade promotion programs.

Business Council for Sustainable Energy
 Response to Questions from Chairman Rush and Ranking Member Radanovich
 November 10, 2009

5. *Other countries are applying stronger safety standards and quality certifications to their green technology imports. Those requirements have made it difficult for green technology manufacturers in the U.S. to penetrate their domestic market.*
- a. *Do you believe this the trade liberalization effort should be accompanied with a safety standard harmonization effort as well?*
 - b. *Do you believe the higher standards and certifications imposed by other countries could be an incentive for the U.S. to implement stricter regulations too?*
 - c. *Shouldn't our companies be able to meet those higher standards?*

The Council does not have a consensus opinion on either the harmonization of safety standards or on to what standards U.S. companies could or should be held.

6. *The U.S. turned from being a net green technology exporter to becoming a net importer. We moved from a positive trade balance of \$14 billion in 1997 to a trade deficit of \$ 8.9 billion.*
- a. *What should the Manufacturing and Services Unit within the Department of Commerce intend to do to reverse this trend? Do you think it has a comprehensive strategy?*
 - b. *In your opinion, which factor or set of factors has exacerbated this decline?*

The lack of a consistent national clean energy policy is responsible for the switch from being a net exporter to a net importer of clean energy technology products. While Europe set long term, achievable goals and fostered growth and innovation in its industries, the U.S., until 2005, lacked a coherent domestic program supporting its clean energy industries. Though government entities like the Manufacturing and Services Unit are strong tools for the development of America's clean energy industries, the lack of long term policy guidance from Congress prevents private investment from entering and fueling the clean energy markets. A long term price on carbon and tax incentives allocated for decades (not years) will drive long term investments, just as has occurred in Europe.

7. *In his testimony before the Senate, Commerce Secretary Gary Locke, said that "the U.S. will become leader in addressing climate change or will fall behind." In other words, we need an aggressive policy that includes an export promotion component that will allow our industry to lead the green economy.*
- a. *What policy does the Commerce Department need in order to assist with the active participation of our industries in the global green technology market?*
 - b. *What active role do you believe the private sector plays within the global green technology market?*

The private sector is and will necessarily continue to be the prime force in the development of the American clean energy technology industries. It is the government's

Business Council for Sustainable Energy
 Response to Questions from Chairman Rush and Ranking Member Radanovich
 November 10, 2009

role to provide long term regulatory certainty and to set the appropriate market signals through appropriate prices on pollution; these crucial steps will allow U.S. businesses to adapt, innovate, and grow.

It is estimated that trillions of dollars in private capital will be required to reduce global greenhouse gas emissions on a scale required to meet the Intergovernmental Panel on Climate Change's scenarios to avert serious climate change. As such, private companies need to have a role in the design and execution of new possible financing initiatives aimed and technology deployment directed at developing nations and emerging economies.

The Commerce Department, in cooperation with other government agencies and programs, must assist the active participation of U.S. industries in the global clean energy technology market.

8. Throughout our history, innovation has been one of our nation's greatest characteristics. It has been said that "strong intellectual property rights are the underlying force driving innovation." In fact, most of our companies rely on IP rights to keep their businesses afloat internationally, especially in the green technology industry. However, many developing countries oppose IP rights and instead use a system known as compulsory licensing, which is used to circumvent and undermine IP rights. The use of compulsory licensing is viewed by developed countries as a major impediment to the future export of green technologies from industrialized to developing countries.

a. What can the U.S. do to ensure the protection of intellectual property rights for domestic green technology manufacturers?

The Council supports initiatives to protect intellectual property and recognizes its crucial role in private sector innovation. In their efforts to create an effective successor to the Kyoto Protocol through the United Nations Framework Convention on Climate Change (UNFCCC) and to re-launch the Doha Round of trade talks through the World Trade Organization, the Secretary of State, U.S. Trade Representative, and other government officials should insist on strong international property rights protection for all clean energy technologies. As the question notes, strong intellectual property rights protections reward innovation and spur investment. They are crucial to the development of technologies domestically and the sustainability of a clean energy marketplace globally.

9. Some countries have promoted their renewable energy industries through their International Development programs. For instance, Denmark has offered direct grants and project development loans on favorable terms for use of Danish wind turbines. The German government also has aid programs to build wind farms in developing countries using German technology. Essentially, they are using foreign aid to open up new markets.

a. Which regions in the world present the most promising opportunities for the exportation of U.S. manufactured green technology?

Business Council for Sustainable Energy
 Response to Questions from Chairman Rush and Ranking Member Radanovich
 November 10, 2009

b. What types of green technology are most suitable in these regions?

The Council does not possess a comprehensive region-by-region, technology-specific analysis of global exports. It is fair to say however, that, in general, U.S.-manufactured clean energy technologies can find markets across the world.

Large emitting developing nations and emerging economies including, China, India, Brazil, Mexico and Korea are leading clean energy market opportunities for U.S. firms. An assessment of the specific technology deployment opportunities in various regions of the world can be found in a December 2008 National Renewable Energy Laboratory paper, [Strengthening U.S. Leadership of International Clean Energy Cooperation, Appendix C.](#)

10. Some emerging market governments have been outspoken about maintaining their ability to industrialize and grow their economies, and how that ability could be compromised by the adoption of effective climate and energy strategies. Some even go on to make the claim that developed countries should tolerate their transitions into becoming market economies, which not only takes time but is the same path that nations with more mature market economies have to travel on their respective roads to sustainable development.

- a. How do we deal with these tensions and these arguments from emerging market governments?*
- b. It is reasonable to assume that emerging markets may want to play a more active role in developing or constructing some of these green technologies and products if they are going to become significant importers of these products. Is that possible and how would that work?*

The U.S. has supported capacity-building and international development initiatives that assist developing and emerging economies establish markets for clean energy products and services. The Council supports such efforts and encourages them to focus on existing technology options.

A key to the success of these initiatives is that they open markets for U.S. firms and that they create enduring markets for clean energy technologies on the local level. The growth of low-carbon technology markets in developing countries and emerging economies is underway, the challenge for the U.S. is will U.S. technology and firms serve these markets, and will these new markets protect intellectual property rights, among other safeguards for U.S. industry.

Business Council for Sustainable Energy
 Response to Questions from Chairman Rush and Ranking Member Radanovich
 November 10, 2009

The Honorable George Radanovich

1. *In your testimony, you referenced a statistic from the American Wind Energy Association that wind turbines installed here in the U.S. now consist of 50 percent domestically produced parts, an increase from 30 percent in 2005. What spurred this increase: was it market demand or the result of a policy initiative?*

Both the increased demand for wind power as a source of cheap, reliable energy and the creation of appropriate policies on the federal and state levels led to the increase in the percentage of domestically produced components in U.S.-installed wind turbines. The American Wind Energy Association (AWEA) touted this increase in domestic production in an August 14, 2009 [press release](#) touting the job-creating benefits of the manufacturing tax credit provided by ARRA.

American turbine-component manufacturers benefitted from the regulatory certainty of state-level renewable electricity standards, renewable portfolio standards, and other market-based government incentives that direct investment into renewable energy. Given certainty about the near-term condition of the U.S. wind energy market, domestic manufacturers were able to secure the investments needed to develop U.S.-based manufacturing facilities.

2. *You testified the U.S. should improve incentives for solar panel installation in order to maintain a strong and healthy solar energy market.*

- a. *Does this mean subsidies are necessary to keep the solar energy market afloat?*
- b. *If so, for how long should the government sustain those subsidies?*
- c. *If subsidies are necessary now, how do we encourage innovation in these products to make them affordable and cost effective so that subsidies are no longer necessary?*

Long term profitability is a key component of sustainability. To be profitable, mature industries require less government support than do relatively youthful industries. In this country's history, all major energy industries have received significant government support to accelerate their development to both technical and financial viability. As government support forwarded the development of fossil fuels in the nineteenth and twentieth centuries (and the country reaped large benefits as result), so too can government support of emerging energy technologies drive them to large-scale feasibility and profitability.

The Council believes that the best incentive programs are ones that lend regulatory certainty to energy technology markets while exerting downward pressure on costs and prices. Incentives that are short term in nature or that require constant renewal from Congress will not support a sustainable market for any emerging technologies. In the specific case of solar energy, an example of a good incentive program is the California Performance Based Incentive Program; the incentive declines as megawatt targets for

Business Council for Sustainable Energy
 Response to Questions from Chairman Rush and Ranking Member Radanovich
 November 10, 2009

installations are met, providing consistent up-front cost assistance while preserving the long term competitive forces necessary for the growth to full maturity.

For more information on the comparative government support of energy technologies, please consult *Estimating U.S. Government Subsidies to Energy Sources: 2002—2008*, a September 2009 study by the Environmental Law Institute. An online version of the report is available at http://www.elistore.org/Data/products/d19_07.pdf. For more information on the California Performance Based Incentive Program, please visit the Go Solar California website at <http://www.gosolarcalifornia.org/csi/rebates.html>. Go Solar California is an information resource provided by California's Public Utilities Commission and Energy Commission.

3. *How do U.S. tariffs for green technology imports compare to tariff levels imposed by other countries for similar products and technology?*

“Green technology” is a broad, loosely defined term, and it is therefore difficult to cite tariff levels for numerous countries for what amounts to multiple industries’ worth of products and components. For specific, country-by-country, product-by-product figures, please consult the World Trade Organization’s tariff database, available online at <http://tariffdata.wto.org/default.aspx>. As Tim Richards of GE reported in his written testimony, tariffs for wind turbines were as follows:

Table 1 – Wind Turbine Tariffs

Wind Turbine Tariffs	
Brazil	14.0%
Mexico	10.0%
China	8.0%
S. Korea	8.0%
India	7.5%
Russia	5.0%
U.A.E.	5.0%
E.U.	2.7%
U.S.	1.3%

Source: World Trade Organization, “Tariff Download Facility,” HS Code: 850231. Accessed online, 24 September 2009. Brazil rate based on recent tariff rate change in Brazil.

Because tariff levels vary from product to product, it is difficult to draw an overarching conclusion on the state of green technology trade barriers and disadvantages.

4. *Do you see any downward trends in the trade barriers you discussed in your testimony—high tariffs, domestic content requirements, etc.?*

The Council does not have a consensus position on the larger trends in global tariffs and trade barriers. We again direct you to the World Trade Organization for detailed information.

Business Council for Sustainable Energy
 Response to Questions from Chairman Rush and Ranking Member Radanovich
 November 10, 2009

5. You testified that "U.S. companies need to be able to match the export promotion support that other governments provide." How does U.S. export promotion compare to that of foreign markets?

When viewing export promotion as the sum of supporting activities from product development to loans to manufacturing to trade missions, it becomes clear that the U.S. government has not been as aggressive as its European, Chinese, Korean, and Japanese counterparts. Consistent, supportive domestic policy is the foundation for clean energy technology exports.

In relation to specific efforts by trade missions and others, the U.S. would benefit from an increase in the organization, transparency, and communication of government-directed trade promotion programs. To generalize, in Europe and Asia, export development is more centralized, organized, and consistent than it is in the U.S., where multiple agencies have fractured, uncoordinated programs and priorities.

6. You spoke of the need to improve demand-side incentives in the U.S. to a level that is on par with incentives offered in other countries. Would this result in our government subsidies competing with those of other governments rather than our industry competing with foreign industry? Which is better policy for the U.S. taxpayer in your opinion: encouraging foreign governments to lower or eliminate national subsidies, fostering private competition; or competing government subsidies?

The Council believes that to ensure an equal playing field in the international clean energy technology markets, the U.S. should pursue sensible trade policies that, in concert with international trade organizations, promote private competition while minimizing government-induced barriers to trade. Such rules are of extreme importance to guarantee the long term viability of the international market.

As stated above, it is also of crucial importance to properly incentivize the domestic production and consumption of energy produced by clean technologies. Such incentives would not only properly incorporate the negative externalities related to pollution produced by traditional technology sources into the domestic cost of energy, but would also lead to the growth of domestic industries and possible exports.

7. According to your testimony, roughly \$67 billion dollars has been invested this year in the clean energy sector. Given the size of that figure, is it wise or necessary for the U.S. government, which incurred a \$1.6 trillion deficit this year alone, to grant more taxpayer dollars to this sector?

The Council does not have a consensus position on the prudence of deficit spending or on the larger issue of the federal budget. Rather, in my testimony, I hoped to communicate how government support could:

Business Council for Sustainable Energy
Response to Questions from Chairman Rush and Ranking Member Radanovich
November 10, 2009

- thrust the U.S. into leadership of the clean energy technology industries, a 21st century economic sector for which the international lead is still up for grabs;
- promote domestic energy security;
- provide significant pollution reduction;
- move the economy towards long term sustainability;
- drive long term economic growth.

As stated in the Council's response to question three, all energy industries have received substantial government support in their development periods, and mature energy sources (such as coal, oil, and other traditional fuels) continue to benefit from significant federal subsidies and other incentives. The wisdom, vigor, and organization of the American clean energy sector over the next decade will largely decide our nation's competitive position in the global marketplace. Farsighted investments will deliver long term economic growth, a renewal in domestic manufacturing, a reverse in trade deficits, and a host of economic benefits resulting from sound environmental stewardship. These benefits, the Council believes, will more than offset the initial outlays in subsidies, tax incentives, and other long term support mechanisms.

Preface to Response to questions from Representative Rush and Representative Radanovich**Professor Andrea Larson****Contact: 434-989-7039 (cell) larsona@arden.virginia.edu**

In the interests of offering the most useful content possible and avoiding topics on which I'm not qualified to comment, this response is prefaced by broad discussion of clean commerce (which includes greentech), progress toward which any policy decision, current and future, can be assessed. This discussion is followed by responses to the individual questions received from the Subcommittee. As introduction, after I worked for the Consumer Product Safety Commission in the 1970s, Massachusetts' Executive Office of Environmental Affairs in the 1980s, and for community organizations (NGOs) on energy and environmental issues (1970s & 1980s), and then received my PhD from Harvard Business School in 1988, I have conducted research and taught MBA students at the Darden Business School (University of Virginia) for over 20 years. My research and teaching focuses on innovation in large and small firms through entrepreneurial initiative. For the last 15 years my work has been exclusively on innovative companies and entrepreneurs at the intersection of business and sustainability (greentech).

Many of the detailed questions I received from the Subcommittee about tax dollar investment allocations – for example, your questions on whether money has been well spent and how federal policy and resources can best be utilized going forward – can be more easily approached by understanding where we are headed. Whether this agency or that agency is making appropriate program decisions can be determined by their consistency with a unified national strategy against which progress can be measured.

Clean Commerce is the Present and the Future Clean commerce (clean energy and clean materials innovation) – also called sustainability, and referred to by the Subcommittee as “greentech” - is the future. Worldwide. Period. As global population and economic growth continue to collide with the viability and regenerative capacities of natural systems (their ability to provide us with drinking water, clean air, healthy food, and stable nitrogen and carbon cycles, for example), a new model of capitalist economic development has emerged of which greentech is a core component.

The question is whether the US will lead or follow in defining and implementing this new model in the next few decades. Will we create jobs domestically or will jobs be exported elsewhere as this inevitable wave of innovation and growth expands. Some sources quote that 10 million jobs will be created in clean commerce and sustainability by 2015, but the question is where. Capital rich countries (China) and those that have priced energy and gasoline to encourage investments in renewable alternatives and have regulated toxics and hazardous materials (the European Union, Japan) already have a significant lead on the US. For example, in 2009 there will be more wind, solar, and battery technology generated

in China than in the US. Wind technology, now at cost-parity with fossil fuel electricity generation, will be dominated by the EU and China given current trends. With US leadership absent for the past decade, much ground has been lost. Businesses and capital follow the money and right now there are more growth opportunities in greentech and clean commerce outside the US than inside. It is futile to ask American firms to invest in the US when returns are much higher overseas. US policy has to change this picture if the country wants to lead. If the US domestic market is not an economically attractive place to invest capital to cultivate dramatic efficiency improvements and generate greentech and cleantech innovation (essentially lead in the creation of clean commerce), then US competitiveness will continue to erode. We have been standing still relative to other countries and their corporations; given the explosion of innovation and investment in clean commerce alternatives worldwide in the last two decades, our passivity betrays our future.

A New Apollo Project Getting to the moon seemed an impossible goal at the time yet it was achieved as resources were turned and aligned behind that national goal. Under the banner of restoring jobs, prosperity, and control over our quality of life why not make clean commerce the new national commitment. We could see US leadership restored and countless ancillary benefits accrue just as we did from the Apollo Project.

The Test of Green for Exports and Domestic Markets Greentech encompasses both energy and material choices. Today, there is an emphasis on energy topics to the neglect of material choices. Examined from a larger systems view, a view urgently required in any discussion of greentech, we must talk about providing prosperity and an improved standard of living by working with the two fundamental building blocks of nature and the economy: energy and materials. Decisions about energy technology, uses, production, and management require materials decisions to implement. Thus these two areas – energy and materials - must be understood as inextricably intertwined. We need to implement an energy policy and a restoration of growth and jobs on green material terms. Energy understandably has been the focus of public policy discussion and corporate concern due to volatile prices, oil in the hands of unstable political regimes, and science tying fossil fuel use to climate disruption, respiratory illnesses, and cancer. But funneling federal money into renewable energy and more efficient technologies makes no sense if we continue to use toxic and hazardous materials in the products themselves and the processes throughout supply chains used to make them. The best way to encourage export competitiveness is to have available innovative, cheaper products that perform and deliver on prosperity. That is, they need to be better than existing options AND have no hidden hazards or toxicity that emerges over time or at end of life that undermines human health and ecosystem viability.

As you consider funding for specific programs, incorporate mandates to move toward clean materials. Material choices power the economy as much as energy and fuel choices. So to talk about greentech energy as a cleaner alternative while allowing hazardous and cancer-causing materials in the processes and components of your selected energy technology is tragically short sighted.

Plus, by ignoring the opportunity for innovation and leadership in benign materials design you miss an enormous opportunity for US leadership. If materials choices are not guided by green screens, they

simply create new pollution problems. Pollution = waste = inefficiency. Every energy system choice means materials choices. At the nano and molecular level materials are selected and combined into constituent parts, into components, and combined ultimately into new products and equipment across supply chains. Thus energy and materials choices are not separate. If the US wants to lead the transition to the next generation of capitalism, a clean commerce form of capitalism, then the design requirements for all energy technologies and all material selections will need to be driven by benign life cycle performance goals. Benign means the energy production and material choices cause no damage to natural systems and life forms. Life cycle performance refers to the social and ecological impacts of an energy or material choice from resource extraction or molecular and nano material design, through processing, production/manufacturing, logistics, purchase, use, and disposal (or reuse/remanufacturing). Policies that encourage more efficient energy technologies that, due to inherent design flaws also create toxic molecular waste at the end of their useful life represent neither leadership nor progress.

The disease for which we are trying to find a cure is not the temporary economic crisis. It is not unemployment. Fortunately the deeper cure we seek will address both of those short term urgent problems. The problem, the disease if you will, lies with the design of current economic growth. We are functioning under an outdated system of commerce and an education system that continues to support that outdated commercial design. Our energy and material choices since WWII, combined with population growth, a rapidly rising global middle class, and instant global information transfer cannot be sustained at current growth trajectories. Simply put, under the dominant energy systems and mainstream material design assumptions, we lack the physical resources, political stability, and regenerative capacity of our bodies and ecosystems to meet the demands of 9 billion people aspiring to live as most Americans live. Climate change and energy decisions are only the tip of the iceberg. Leadership will be gained by those countries most astute at translating these realities into practical solutions in everyday life, such that the accumulative effect of all of the energy and material decisions made result in healthier societies.

Non-technical Innovation Government policies discussed in the Subcommittee hearings tended to focus on technology solutions. Non-technical innovations are as important. Innovative financing mechanisms, educational approaches, incentive strategies for accelerating community investment in energy efficiency, all of these are non-technical innovations.

The price of oil US politicians may rhetorically reject regulation and subsidies, but if energy and gasoline prices are not raised to reflect their true cost, this country is stuck in terms of investment in alternatives. We will continue to follow other countries that long ago taxed oil and gasoline to fund development of their domestic renewable energy and cleantech industries. We will buy their technology to solve our oil dependency, energy security, and pollution problems. It's our choice. The faster we implement cap and trade or a carbon tax, and we join the international community to create global standards to provide the playing field that encourages a race to the top to solve energy and environmental challenges, the better for our economic recovery and future leadership.

The Arrogance of Leadership Like any established leader whose position has been reinforced with size, financial power and the status earned by past actions, we have become complacent and self-satisfied, convinced of our superiority and unquestioning on our assumptions and world view. But the rest of the world has not stood still on the subject of how 6.8 billion people will grow to 9 billion by mid-century without overwhelming natural systems. Other countries have and are building outstanding research capacities, superior global corporate competitors, and excellent universities that now compete head to head with US institutions – and they are investing in the knowledge creation and innovation needed to accommodate population density, reconcile the resulting waste and pollution streams, and deliver goods and services to the aspiring billions of people who want what western culture’s affluent citizens have in terms of material wealth. In contrast, the US keeps thinking its model of capitalist growth is the future. We are wrong. Clean commerce capitalism is the future.

The Need to Think Strategically Just as a company would, the US must now think strategically about its strengths and capabilities. It must invest where it can be strong for the indefinite future. It must think not about where the soccer ball or hockey puck is at this moment, but where it will be in the future, and must move to that open space to be positioned for the next play, positioned for future leadership. We are a high tech, knowledge-creation society. Students still come from all over the world to study at our institutions. We must use the stimulus and any energy legislation that is passed this year or next to build that existing competitive advantage so that it remains unparalleled in the world – unparalleled around the design and rapid commercialization of the most advanced solutions possible to the ecological and environmental health problems that are the central challenge of global economic growth for this century. This means radical increases and strategically targeted investments in top universities and research labs, secondary school education and technical training on clean commerce thinking and skill sets, and investment in the already-in-process work on innovative solutions, their design, and their rapid ramp up to mass production levels using state of the art technology and automation. Finally, guiding this strategic orientation should be a focus on viable cities, urban quality of life, and prosperity of all those living in and continuing to move to cities. If the US can lead in these areas, it will lead indefinitely as we head toward mid-century. This is where the soccer ball or hockey puck (depending on your sport) will be. In the past few years we passed the 50% mark in the number of human beings worldwide living in cities - European cities have a jump on us in creative solutions to urban density and green solutions; our cities deserve far more attention. But if we can move quickly to generate creative equitable systems solutions to urban economic development, we will provide knowledge and models for the hundreds of cities that have already grown to over a million in population in the emerging countries. It is Congress’s choice whether the country will be positioned for this future, or will continue to lag behind other countries that have been more willing to step up to these challenges.

Education and Technical Training With respect to the programs now funded under the stimulus legislation, realize that every dollar spent on skills/training, technology and education for the clean commerce future world solves today’s recovery problem and builds US capacity and competitiveness. We need these training and education investment right now to implement the efficiency and renewable energy technology implementation already funded in 2009. Indeed, investment in education and training may be the most important focus for federal funding. Given the US is a knowledge and

Andrea Larson (larsona@darden.virginia.edu) November 2009

advanced technology creation society, this is where our strengths lie and our existing capacities can be more highly leveraged for leadership going forward. Neglecting education will put our educational system as a whole at a competitive disadvantage, a potential disaster for US competitiveness.

Build Domestic Markets Through Innovation Investments There are two levels of innovation investment possible. We should be accelerating both. First you can investment in innovation at the front end by funding programs in universities and research labs. You can funnel debt and equity capital to venture capital and early stage private equity investors to accelerate systems platforms development and technology innovations. This keeps the innovation pipeline filled. Second, you can make what already exists and is proven more accessible and reliable. In other words, stimulate markets where technology is promising and known to deliver results, but has not yet reached a wide audience. Use tax dollars to accelerate companies' movement down learning curves when retail prices delivered through economies of scale is the key to widespread adoption. The government can invest in the that next phase of innovation: the rapid commercialization and mass production (later stage private equity) needed to deliver solutions more quickly to the US domestic marketplace so that jobs are created and the economy feels the positive effects right away (the next 3-5 years) from reduced energy consumption, lower pollution, declining oil dependency, and loosening of credit markets which continues to put the brakes on growth.

Why not use cap and trade allowance revenues to fund innovation at both stages discussed in the paragraph above. Or combine an energy price floor that triggers collection of a tax that funds innovation. Impose a \$1 gasoline tax and direct all resulting federal revenues into accelerating commercialization of already existing, ready-to-go distributed electric and heating/cooling solar, small-scale wind, geothermal power, and clean materials and energy efficiency measures for product designs and buildings. Loosen the grip of our reliance on oil for plastics by accelerating innovation around the creation and adoption of bio-based alternatives. Don't put remaining funds (already allocated but not dispersed) into only brand new ideas. Plow it quickly into commercial scale demonstrations of known and proven projects that avoid fossil fuel use. Work with private equity firms to design appropriately lower risk public investments at later stages of US-based product demonstration and commercialization. The point is to devise market-shaping mechanisms that create enduring demand for clean commerce products and services. Obviously exit strategies (sunset clauses) for the government are required but leave incentives in place for 10-12 years minimum to allow investment capital to move into these national priority arenas for long enough to realize rewards. Companies need clear price signals on fuels and carbon to drive the recovery you seek. Linger uncertainty on the prices for oil, gasoline, and carbon keeps capital stuck. But clear price signals and clear, consistent regulatory incentives always stimulate innovation.

In summary, the US will regain world leadership status if it can lead through innovation, intellectual creativity, design excellence, and demonstration in domestic markets. Do not be overly focused on technology. Non-technical innovation is at least as important. But **US leadership in clean commerce depends on accelerated multi- and meta-disciplinary research and education that builds US research**

and applied excellence in clean commerce innovation – this means support for domestic market growth in clean/green materials, clean/green energy delivery, and transformation of cities into clean commerce models of prosperity. Themes such as “prosperity” and “controlling our future” and NOT “efficiency” or “greentech” should guide the message for the public.

Support Green Chemistry: Use Current Knowledge to Design out Future Problems Certain ideas are more foundational than others to achieving this vision of excellence. For example the goal of designing green materials in ways compatible with human health and ecosystem viability seems pretty basic, yet no one is talking about this in the context of stimulus and energy policy decisions. There has been a focus on energy to the exclusion of materials. This is a major omission given US leadership in green chemistry and green engineering concepts. Why are we not capitalizing on this leadership position? What is the point of creating new technology for clean energy with a focus only on the relative carbon emissions, ignoring the hazardous and toxic materials in the equipment’s construction. Trying to create improved outcomes with materials known to be problematic (cancer-causing, mutagenic, endocrine disrupting) is strategically stupid, and from an economic standpoint, undermines the entire process which is designed to save money that can be freed up for other uses in society. When you fail to take green chemistry design into account at the outset you are consciously imposing extensive and expensive externalities on individuals, government, and society going forward. The toxins inherent in the molecular design of materials are (albeit often unintentionally) distributed into water, air and people during the manufacturing process and will go on to pollute natural systems on which public health and future economic growth depends at the end of the equipment’s life cycle. Cradle to cradle design – that incorporates clean energy AND clean materials selection and considers the entire life cycle of products and services - must become a foundation of education and training of people across disciplines. Education of MBA students and executives on why and how to design companies on these new premises is also desperately needed.

To repeat and summarize, because the points are critically important, it is important to design society’s energy platforms to deliver pollution free power for electricity, transportation, heating and cooling. But it should be kept in mind that materials choices are inherent in energy technology platforms. This means that if we are to truly lead the world in greentech and clean commerce, the design of materials incorporated into products and materials used for electricity generation and efficient product manufacturing processing must advance quickly toward benign and clean life cycle performance. This life cycle view tracks inputs from materials design and sourcing to ultimate disposal of the product at the end of its useful life – this is where we must invest whether we are talking about greentech energy or any other kind of goods and services required by advanced and advancing economies.

Invest In and Support a New Model of Growth Fortunately, new ideas to guide and shape clean commerce have been gestating for three decades or more. Yet these ideas have been marginalized inside established institutions (corporations and universities) because they were ahead of their time. Typical of innovative ideas, they challenged dominant theoretical paradigms and the people who controlled mainstream institutions, people whose successful professional careers were built on ideas

better suited to a prior historic era, the immediate post World War II timeframe when resources were viewed as cheap and limitless, and pollution a negligible concern offset by the tremendous progress of economic development. This generation of leaders still views environmental issues as problems not opportunities; and they do not understand the advances across multiple fields in the last 20 years that tell us toxins are building in our bloodstreams and other pollutants now contaminate our bodies because of their ubiquity in our air, water and soil (food). They are either not informed in sufficient detail or unaware completely of the systems interrelationships across water shortages and water quality crises in communities worldwide, deforestation, environmental refugees, coastal dead zones, climate change acceleration, the local food movement, the Pacific Garbage Patch, fine particulate pollution driving the urban asthma epidemic and reducing children's lung capacities in schools next to highways, and industrial toxins that travel from a mother's body through the umbilical cord into the fetus and from the mother to the infant through breast milk. These are the challenges of our times that must be met with innovative alternative models of economic development. Academics and corporate executives trained for solving problems in a prior more simple and slow-moving era now stand in the way of our ability to rapidly adapt and evolve our domestic economy toward clean commerce. Put resource behind academic research, curriculum development, and companies that work to help solve these interlinked problems.

Drive Rapid Change in Educational Institutions As I am sure the reader knows, the initial marginalization of pioneering views and innovative thinking is a familiar pattern that repeats itself through human history. It is understandable from a sociological perspective. We know why institutions and individuals resist change. But this problem is particularly salient to understand in 2009 given the forces converging to demand rapid change toward clean commerce goals. Technology advances, knowledge advances, population growth, material throughput in the global economy, pollution streams – all of these are accelerating at a pace that staggers the imagination of a generation raised in a more slow-moving time. Professors and administrators educated in an earlier era remain trapped in inappropriately polarizing and antiquated notions about leftist environmentalists and health and safety issues as regulatory problems, not business opportunities. My MBA students, average age 28, have lived all their lives with awareness of environmental concerns, and rapid change in technology punctuated with dramatic and disruptive world events. They “get it” about clean commerce. Their senior professors, whether in business (my profession), chemistry or engineering, or their senior administrative officers in educational institutions (with some notable exceptions), do not understand the train has left the station and the US education system at all levels must now jump onto the moving train and figure out how to make a path to the conductor's location.

The focus on “green” topics in the media over the past few years has shifted public perception and Obama's win has changed public policy emphasis. But Congress must understand that the kind of economic transformation needed requires an accelerated effort to mainstream the still relatively marginalized ideas about “green” inside educational institutions and corporations. The question is how to leverage federal power to accelerate change.

First and foremost, the US should lead in research and education. This means investing federal resources in ways that build the educational building blocks that allow for US leadership going forward. Critically important are investments that accelerate the breakdown of conventional silos in academia and business. Sustainability innovation in green/clean materials and energy design require a long term commitment to cross-disciplinary efforts and integration of the work of pioneers in areas such as sustainability and entrepreneurial innovation for business, green chemistry, green engineering, industrial ecology, earth systems management, and sustainability science --- these are the previously marginalized fragments that together offer a redesign of commerce for a future in which dramatically expanding human activity must be aligned with prosperity *through* adherence with the laws of nature. Relying on traditional discipline approaches appropriate for a time in which resources seemed unlimited and pollution only a mild irritant guarantees perpetuation of the status quo.

The good news is that US capacity to lead is there -- but consistent support and investment is required. Some of this is happening through the Obama administration's efforts (comments on which are provided below). Much more can be done however, to cultivate the underlying foundation on which US innovation leadership will be based.

Key Ideas: Immediately below I reiterate and expand on key messages from my testimony on October 7, 2009 before the House Subcommittee on Commerce, Trade and Consumer Protection:

- Greentech, and the wave of **clean commerce** (also called sustainability) innovation of which it is a part, is **the new frontier of economic development for the next 50 years**
- **It is not a fad**; it is the essential path forward to meet converging and increasingly urgent pressures from:
 - world population growth
 - national security
 - energy and material price volatility and supply uncertainty
 - material demands of a rising global middle class
 - historically unprecedented scope and scale of visible and molecular pollution that undercuts human health
 - accelerating degradation of ecosystem services that provide clean air, water and food
 - accelerated promulgation of materials and energy regulations worldwide (to address pollution, health and oil dependency)
 - and, for US competitiveness, the challenge to our leadership from countries already implementing national green strategies that stimulate innovation and build competitive industries

Andrea Larson (larsona@darden.virginia.edu) November 2009

- When appropriately framed and executed, clean commerce as a **competitive strategy can address domestic and international economic revitalization, environmental health protection, ecological system preservation, national energy self-reliance and resilience, and US leadership in world markets for decades to come**
- To limit yourself – as this hearings process has done thus far - to only energy and greentech neglects core clean commerce arenas such as green materials – this is short-sighted and ignores significant opportunities to grow US leadership in world markets around benign materials – the US already has established leadership in green chemistry, for example - so **focus on BOTH materials (green chemistry and engineering) and energy efficiency/innovation**
- National policy leadership can restore US leadership across the clean commerce spectrum but given the significant head start of other countries, **it will take a dramatic step up in consistent, targeted investments that stimulate and accelerate change**
- **Create and expand US domestic markets** for clean commerce knowledge, services, and products – or other countries will do it for us
- **Collaborate with international partners on R&D** to enhance US global leadership and lift the quality and accelerate the pace of innovation and rapid deployment – be seen as leading in this international collaboration – this is true leadership

The Honorable Bobby Rush
Responses to Questions

1. The American Recovery and Reinvestment Act of 2009 allocated 36.7 billion dollars in funding to the Department of Energy. Of that, 16.8 billion dollars was distributed to the Office of Energy Efficiency and Renewable Energy for various green technology programs. An additional 4 billion dollars was allotted to the DOE's Loan Guarantee Program. To date, of the total allocated funds for the DOE, several billion dollars are still available and have yet to be awarded or spent.
 - a. What is your evaluation of the DOE's management of the Recovery Act's funds so far?

Although program evaluation lies outside my expertise, the three-prongs of DOE's approach that seem to make sense are using the state block grants 1) to invest in conservation and efficiency to reduce waste now and free money for other investments and 2) promote the installation of renewable energy sources to increase electricity generating capacity and stimulate the market, while using investments in science and ARPA-E 3) to lay the groundwork for future innovation. Meanwhile, improving the electrical grid can further improve efficiency and seamlessly incorporate renewable energy sources into the grid.¹

Of course, all these activities must be matched with a sustained commitment to increasing clean technology. Overhauling the electrical grid should be combined with feed-in tariffs for electricity producers. State and federal energy codes should set high standards for efficiency that significantly cut energy use in the long-term. Support for renewable energy cannot become a one-shot enterprise, as it has been in previous decades, that later pulls the rug from beneath those markets as soon as it becomes politically feasible to ignore again the dangers of fossil fuels reliance. Renewable energy portfolio standards and continued investments in clean commerce research and infrastructure can help sustain progress and give venture capitalists and private equity a stable horizon for their investments.

Investing the second-highest amount of funding, \$5 billion, into Department of Defense clean-ups may be laudable, but is unlikely to further clean commerce unless the DOD consciously seeks innovative methods and materials. Digging up contaminated soil and burying it elsewhere is not innovation; eradicating the contaminants is. Here, too, the DOE should take a long-range, systems view: it can pair immediate spending on better methods with long-term standards that shift the economy and military toward chemicals safe for both humans and the environment. Taking some of those funds to support green chemistry research and application would be an intelligent use of tax dollars.

¹ "Budget Accounts, Department of Energy," http://www.recovery.gov/transparency/agency/reporting/agency_reporting3.aspx?agency_code=89&dt=10/16/2009.

Finally, spending on carbon capture and sequestration sends a mixed signal because it relies on an outdated model: produce wastes and then seek to store those wastes somewhere. Our technology investments should primarily emphasize solutions for which designing waste out of the process is present from the very beginning.

- b. Do you have any suggestions as to how the Department of Energy can best award and spend the remaining funds?

DOE should apply principles to guide its decisions. First, it should set clear, realistic, yet challenging standards for clean energy and clean materials in projects it supports. Those standards should be gradually amended to become stricter as we meet them. Such clear and stable standards, with well-defined schedules for feedback loops and learning updates, do two things. They allow the private sector to make the investments to rise most efficiently to those standards without forcing DOE to guess which technologies will ultimately prove the best. Instead of dictating particular technologies be used as solutions, the DOE should dictate the parameters of an acceptable answer.

Clear and stable standards also prevent the U.S. from becoming a dumping ground for dirtier, more dangerous products that countries with stricter standards refuse to allow. The U.S. should lead the world, not become its destination market for products and energy of the lowest quality. Second, DOE should always keep the systems perspective in mind to consider net benefits to society over time, and this perspective realizes the demands of the world require new frameworks for action. DOE would be rash to direct money toward projects that continue the old habit of making waste as part of business as usual. DOE should encourage projects that optimize solutions across multiple systems and prevent the need for waste from the outset.

One pragmatic instantiation of these principals may be to collaborate with the Department of Education around training and education. The stimulus package has already protected hundreds of thousands of jobs in education, while at the same time it has tried to assist community colleges as the recession drives up enrollments and shrinks state budgets. By educating more educators and workers not just in the skills of manufacturing wind turbines and other clean energy products, but also in the principles and benefits of clean commerce (teaching about cradle to cradle design, design for environment, reverse logistics, green chemistry and engineering, etc.), and teaching installation skills for clean commerce remedies, DOE could facilitate future innovation in practices and products, upgrade the country's skills, and enlarge the workforce and consumer market for those practices and products.

I encourage the use of remaining funds to support educating the educators. We have underequipped educational institutions. For example, senior faculty in business, chemistry, engineering – the key disciplines that must lead the transition to clean commerce – resist new ideas and are not updating their curricula sufficiently quickly to reflect the new realities and imperatives. That means college and graduate students are not receiving the education they need to contribute to innovative change. Use a portion

of the funds, with or without collaboration with the Department of Education, to support educating the educators as well as developing and driving rapid distribution (with continuous updating) through the web of teaching materials to accelerate diffusion of the approaches essential to a clean commerce transition.

It is not just higher education that needs additional support. Trade school training programs are needed that upgrade existing tradespeople (who want to return to school for retooling) and train high school and college age craftsmen to contribute to cleantech/greentech and energy efficiency. This need is particularly important for the widespread investments now underway in building efficiency upgrades and installation of decentralized solar electric and thermal heating technologies.

2. In Ms. Jacobson's testimony, she referred to the American Clean Energy and Security Act of 2009 is an essential piece of legislation for the future exporting of green technology. We reported this bill out of the Committee on Energy and Commerce on June 6, and it was passed by the House of Representatives on June 26. It is now placed on the Senate Legislative Calendar.

In the house version, the American Clean Energy and Security Act supplies key support for domestic clean energy manufacturing, such as energy-efficient appliances and electric plug-in vehicles, in order to significantly reduce U.S. emissions of greenhouse gases. It also promotes U.S. exports of green technology to assist developing countries with limiting their greenhouse gas emissions.

- a. In your opinion, what are the most crucial provisions of the American Clean Energy and Security Act, in regards to the development and export of clean energy?

If the U.S. wants to become serious about leading the world in clean technology exports, it must become serious about leading in the standards for clean energy (and clean materials – please keep in mind my recommendation that green materials be supported given our existing leadership in this area – unlike energy, where we are playing catch up, we can lead in the more fundamental molecular level of clean materials design; clean materials ultimately can constitute any energy system selected for use and the US can dominate world markets in its research and design of clean materials). I recommend more ambitious goal setting for the US more generally and strong support for states that have set ambitious efficiency and renewable energy goals. Reward those states because they are providing more support for US competitiveness in world markets than the federal government has in the last 2 decades.

Any program that ends within five years is not helpful. A 7- to 12-year timeframe at minimum (preferably 15 years) allows venture capitalists and other private equity investors to develop target lists, invest, assist with growing the businesses, sell, and get

out with a profit than can then be invested in further innovation. This positive cycle of innovation investment has to be supported by whatever legislation is eventually passed.

Any serious development of technology also requires an investment in educating consumers about that technology and developing commercial capacity for it. Therefore, useful programs set standards about 10 years into the future that will require new investments to attain those standards and assure that markets will exist. In this sense, federal renewable energy standards and provisions that allow states and tribes to set their own RES (Title I, Subtitle A of ACESA) will help expand clean technology, and that expansion, in turn, can allow companies to export their products. Provisions to allow net metering at federal facilities (Title I, Subtitle F) will stimulate market demand for alternative electricity production and conservation, although not nearly as much as net metering from any facility. Similar logic holds for efficiency standards (Title II) as well as for the titles of the act that reduce greenhouse gas emissions (Title III), although these provisions may also shunt investments to nuclear and other options that attempt to squeeze more out of the current infrastructure rather than fundamentally move toward clean commerce. Offshore carbon offsets in particular may retard development and export of clean energy, as companies invest money in offsets outside the U.S. to cover pollution rather than invest in domestic industries and technologies that are inherently cleaner. Offsets can also be notoriously difficult to verify. Other provisions, in contrast, develop the necessary capacity to develop and export clean energy, such as by training workers. The provision for carbon product disclosure also allows people to understand how their purchases affect the environment and then demand improvements.

The question of effective provisions bears one final note. If the U.S. sets standards that nonetheless remain far below those of other countries, we may continue to import technology from those countries, whose increasingly strict standards drive continuous innovation and render technologies obsolete for their markets yet acceptable in the U.S. For instance, the current HR 2454 calls for 20% of *federal* electricity consumption to come from renewable sources by 2021. That standard remains flat at 20% through at least 2039. In contrast, Germany, as I mentioned in my testimony, will require 30% of *all* domestic electricity consumption to come from renewable sources in 2020 and aims to derive fully half of all energy, not just electricity, from renewable sources by 2050. Even China plans to acquire 15% of all energy from renewable sources by 2020, and expects the number to be closer to 18% or 20%.² Granted, some individual U.S. states have set ambitious targets for renewable energy generation, but others have not.³ If that is politically not possible, then provide financial support for states that are aggressively pursuing clean energy goals that advance innovation, commercialization, and skill development in the workforce. Reward states that create breakthroughs. If our country can't lead internationally, then at least drive positive change by supporting states

² "China eyes 20% renewable energy by 2020," *China Daily*, June 10, 2009, http://www.chinadaily.com.cn/china/2009-06/10/content_8268871.htm.

³ DOE/EERE, "States with Renewable Portfolio Standards," June 16, 2009, http://apps1.eere.energy.gov/states/maps/renewable_portfolio_states.cfm.

that commit to strengthening domestic markets and building a more skilled and informed workforce.

b. What are the potential benefits to the green technology industry from the American Clean Energy and Security Act?

EPA and EIA have both estimated the impact of the ACESA, and those analyses show the Act would increase the share of electricity from renewable energy in the U.S., which in turn should dramatically spur the domestic clean technology industry.

EPA states bluntly: “H.R. 2454 transforms the structure of energy production and consumption. . . .

–The share of low- or zero-carbon primary energy (including nuclear, renewables, and CCS) rises substantially under the policy to 18% of primary energy by 2020, 26% by 2030, and to 38% by 2050, whereas without the policy the share would remain steady at 14%. Increased energy efficiency and reduced energy demand simultaneously reduces primary energy needs by 7% in 2020, 10% in 2030, and 12% in 2050.

–Electric power supply and use, and offsets represent the largest sources of emissions abatement.”⁴

Later, EPA specifies that renewable energy alone (nuclear and CCS subtracted) would rise from 6% of electrical generation in 2015 to 10% in 2020 without the bill, while it would rise from 8% in 2015 to 20% in 2020. However, EPA’s reference scenario does not include the stimulus package. In fact, EPA suggests that the stimulus package will boost renewable energy production more than HR 2454 would because the latter has a greater emphasis on carbon capture and sequestration and biomass co-fired coal plants.⁵

EIA’s analysis, meanwhile, already includes the stimulus package in its base case. With HR 2454, renewable energies would account for about 15% of total energy consumption by 2030, versus 10% only for the base case. The share of renewable energy sources would increase to roughly 18% if no or few international offsets were available in 2030.⁶

Both analyses suggest three things about the ACESA. First, energy efficiency provisions are key to keep prices down, partly by reducing waste and partly by reducing the total generating capacity needed. (In other words, efficiency saves money because you don’t need to build new power plants.) This conservation also frees money to invest elsewhere. Second, limiting greenhouse gas emissions will increase demands for renewable electricity generation, thereby helping the clean technology industry. Finally, however,

⁴ EPA, “EPA Analysis of the American Clean Energy and Security Act of 2009 H.R. 2454 in the 111th Congress,” June 23, 2009, p. 3, http://www.epa.gov/climatechange/economics/pdfs/HR2454_Analysis.pdf.

⁵ EPA, “EPA Analysis,” 17, 26-27.

⁶ EIA, “Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009,” Aug. 4, 2009, <http://www.eia.doe.gov/oiaf/servicerpt/hr2454/execsummary.html>.

greenhouse gas emissions standards alone may not boost clean technology as much as emissions standards coupled with renewable energy standards. Otherwise, offsets, nuclear power, and possibly dubious carbon capture scenarios may allow business as usual to proceed at the expense of truly clean energy.

3. Regarding Small Businesses, today, America's entrepreneurship can be observed through the many small businesses participating in all sectors of our economy. Many green jobs are generated by small businesses and small businesses are essential to our economy. We are dependent on them to remain competitive in a globalized economy.
 - a. For small businesses who want to compete internationally, how important is it for them to have a sustainable domestic market for green technology?

It is critically important. We MUST build domestic markets for clean commerce innovation and commercialization. In today's economy, many small businesses are global the moment they open their doors. It is essential, nevertheless, that small businesses have domestic markets for clean technology because the familiar laws, culture, etc. make the domestic market the easiest place to begin selling a product. Proximity, language, piloting, prototype testing, early stage commercialization, learning and adaptation, and ultimately larger scale production in domestic markets is easier. Plus, capital stays in the US, people are employed, know-how builds across skill categories, and new products, processes, and technologies are able to be refined into outstanding export candidates.

- b. How can federal government intensify its role in creating more green jobs?

Green jobs and demand in the domestic market (question part (d)) go hand in hand. They both require a desire for and commitment to clean technology—clean energy and environmentally safe materials (the latter through green chemistry and engineering). This demand has been growing as people recognize the dangers of persistent, low-level contamination of their bodies and their surroundings. The government can help states train workers who can provide those products, but it also needs to train people to think in ways that allow them to see the multiple, systematic benefits of such products and the dangers of failing to reform. These people can then devise, design and install/sell new clean technology products as well as demand them. The government can also set the parameters for human exposure and environmental safety and preservation that encourages the private sector to invest people and money in finding solutions. Private-public partnerships, such as innovation hubs, can then focus early efforts,⁷ while other programs can help bring the products to market.

⁷ André Andonian, Christoph Loos, and Luiz Pires, "Building an innovation nation," Feb. 26, 2009, <http://whatmatters.mckinseydigital.com/innovation/building-an-innovation-nation>; Center for American Progress, "Spurring Innovation to Lift the Economy," Jan. 13, 2009, http://www.americanprogress.org/issues/2009/01/innovation_panel.html.

Probably the fastest way to generate jobs is to support, not just new ideas, but moving existing already proven processes and technologies to commercial scale. For example, we know how to build solar PV and solar heating and cooling systems. The US should be leading in the advancement, demonstration, and commercialization of solar technology, especially decentralized applications. These technologies and applications can reduce baseload demand, put control over energy use back under the control of homes and businesses, and provide skill development since the units have to be installed on homes and commercial buildings.

- c. Should we be revisiting how we award federal contracts to small businesses for green technology advancements?

The federal government already plays a large role in opening the clean technology market for small businesses. The GSA, for instance, leases over 8,600 buildings and owns another 1,500. The military consumes more energy than any other single U.S. organization. Largely for reasons of security, has made many of its facilities more energy efficient and plans to meet 25% of its energy needs from renewable sources by 2025. Policy analysis groups, such as the Renewable Energy Policy Project (REPP) or World Resources Institute (WRI), have recommendations that may speak more directly to necessary changes.⁸

- d. What is needed in order to create the demand in the domestic market so that small businesses can then have the ability to export in the near future?

Please refer to 1(b) and 3(b) above.

4. The Department of Commerce's International Trade Administration is one of the government agencies charged with promoting U.S. exports of green technology. They advise the federal government on environmental trade issues and publish guides assisting U.S. businesses in international markets. However, several other government agencies are active in this field, including the Export-Import Bank, the Overseas Private Investment Corporation, the Department of Energy and the Trade and Development Agency.
- a. Do you find that the International Trade Administration is able to work effectively with these other government agencies charged with promoting U.S. exports of green technologies?
- b. Do you believe there is a problematic overlap of goals or responsibilities among these various agencies?

Unfortunately, these questions are beyond my area of expertise.

⁸ REPP, http://www.repp.org/repp_pubs/articles/issuebr12/issuebr12e.html; WRI, "Harnessing Nature's Power: Deploying and Financing On-Site Renewable Energy," 2009, pdf.wri.org/harnessing_natures_power.pdf.

5. Other countries are applying stronger safety standards and quality certifications to their green technology imports. Those requirements have made it difficult for green technology manufacturers in the U.S. to penetrate their domestic market.

- a. Do you believe this the trade liberalization effort should be accompanied with a safety standard harmonization effort as well?

Definitely. The U.S. should rise to the safety and quality standards of the global leaders, since these standards already drive the top-end of product innovation and design. If the U.S. does not increase its own standards, it risks becoming a second-tier market where companies dump their second-tier products and reserve their cleanest technology for the top markets. Moreover, raising the U.S.'s own standards increases the domestic market for clean technology, further rewarding American companies that meet those standards.

- b. Do you believe the higher standards and certifications imposed by other countries could be an incentive for the U.S. to implement stricter regulations too?

Yes. See above.

- c. Shouldn't our companies be able to meet those higher standards?

Yes. American companies have often excelled in technical skill and innovation. There is no reason to believe that raising the bar for safety and quality would do anything other than reward America's innovators for rising to the challenge.

6. The U.S. turned from being a net green technology exporter to becoming a net importer. We moved from a positive trade balance of \$14 billion in 1997 to a trade deficit of \$ 8.9 billion.

- a. What should the Manufacturing and Services Unit within the Department of Commerce intend to do to reverse this trend? Do you think it has a comprehensive strategy?
- b. In your opinion, which factor or set of factors has exacerbated this decline?

The U.S. did not keep pace with other countries' aggressive environmental and health standards and did not adequately re-direct investments toward clean energy and clean materials as a result. In short, the U.S. did not commit to becoming the leader in clean technology. Other countries did and carved out their niches. Now the U.S. must catch up or continue to be content importing such technology. I am not able to comment adequately on the strategy of the Manufacturing and Services Unit, but the plan to catch up cannot be isolated in small pockets of the government. The government must look at the big picture for the interactions among systems and establish clear, high standards for clean energy and clean materials. The government should do what companies like General Electric and Wal-Mart are now doing: publicly set high standards and clear goals that can be expressed in quantitative terms, and meet them through new and

unprecedented collaborative efforts with stakeholders. Agencies must align behind clear metrics defining success and the White House needs to hold leaders in government accountable. Each agency and program should understand what it is doing that delivers on Obama's (and the sympathetic Congressional members') stated ambitious goals for a clean commerce transition.

7. In his testimony before the Senate, Commerce Secretary Gary Locke, said that "the U.S. will become a leader in addressing climate change or will fall behind." In other words, we need an aggressive policy that includes an export promotion component that will allow our industry to lead the green economy.

a. What policy does the Commerce Department need in order to assist with the active participation of our industries in the global green technology market?

I cannot speak to the detail of Commerce Department policies. But remember the reality that US products, processes and technologies will sell in global markets only if they offer better, cheaper, faster solutions that also deliver on sustainability design dimensions. That means that in addition to better, cheaper, faster you add "clean" - our exports must be oriented toward solving the problem of toxic emissions and embedded hazardous materials that poison people and ecosystems over the product life cycle. When US companies can offer this superior package in their export portfolios, they will ultimately come to dominate global markets. Everything the Commerce Department does should explicitly support this objective.

b. What active role do you believe the private sector plays within the global green technology market?

The private sector creates the solution. The private sector plays the central role in the global market for clean technology. It makes the investments and supports the innovations, and achieves scale commercialization, that enable us to meet the demands of buyers. Of course the game rules are still set by governments. That is why our failure to engage with the new green game in global markets has put us so far behind.

8. Throughout our history, innovation has been one of our nation's greatest characteristics. It has been said that "strong intellectual property rights are the underlying force driving innovation." In fact, most of our companies rely on IP rights to keep their businesses afloat internationally, especially in the green technology industry. However, many developing countries oppose IP rights and instead use a system known as compulsory licensing, which is used to circumvent and undermine IP rights. The use of compulsory licensing is viewed by developed countries as a major impediment to the future export of green technologies from industrialized to developing countries.

a. What can the U.S. do to ensure the protection of intellectual property rights for domestic green technology manufacturers?

US competitiveness will succeed based on how fast we can learn and adapt, not on enforcement of patent protection laws.

I am not able to comment adequately on the best way to ensure intellectual property rights in emerging economies. My only comment would be that IP protection is temporally limited, so even if patent protection is enforced, it only buys a short period of time. You have to keep innovating to stay ahead regardless of IP laws.

I personally am more concerned with the speed at which innovation continues in this country (or fails to occur) and the fact that we are playing a catch up game vis a vis other countries. The goal for US policy should be to accelerate US learning to stay on top of changing knowledge and to thereby design and produce the best cleantech solutions to meet human needs. The country that wins consistently over time is the country that learns most effectively how to learn, how to adapt, and how to evolve quickly.

Bad news is accelerating about natural systems' capacities to withstand global materials throughput and pollution. Pressure is exponentially mounting on governments to deliver clean water, clean air, healthy food, safe housing and personal security to rapidly urbanizing populations. Civil wars and ongoing conflict will only grow as resources become scarcer and demand escalates. We are in a race now to learn just as fast as we can how to live prosperously on a full planet.

9. Some countries have promoted their renewable energy industries through their International Development programs. For instance, Denmark has offered direct grants and project development loans on favorable terms for use of Danish wind turbines. The German government also has aid programs to build wind farms in developing countries using German technology. Essentially, they are using foreign aid to open up new markets.
 - a. Which regions in the world present the most promising opportunities for the exportation of U.S. manufactured green technology?
 - b. What types of green technology are most suitable in these regions?

Perhaps the best people to ask these two questions would be the venture capitalists themselves, who are actively scouting new markets and new products to put their money behind.⁹

⁹ To name but a few, the CleanTech Group LLC, <http://cleantech.com/>; GE's Energy Financial Services, <http://www.geenergyfinancialservices.com/>; or Khosla Ventures, <http://www.khoslaventures.com/> and Kleiner Perkins www.kpcb.com and Al Gore's Generation Investment Management.

10. Some emerging market governments have been outspoken about maintaining their ability to industrialize and grow their economies, and how that ability could be compromised by the adoption of effective climate and energy strategies. Some even go on to make the claim that developed countries should tolerate their transitions into becoming market economies, which not only takes time but is the same path that nations with more mature market economies have to travel on their respective roads to sustainable development.

- a. How do we deal with these tensions and these arguments from emerging market governments?

My sense is that emerging market governments often reserve the right to follow the same path as industrialized countries, replete with the pitfalls of that path, but that they are smart enough to realize that they don't need to take that path. New technologies and new information are available to them. Why would they merely mimic developed countries, as if several centuries of history had not intervened?

The reality is not that other countries will emulate our path sector by sector, but rather, that they will leapfrog us. Indeed, distributed energy generation from renewable sources like solar thermal heaters, solar panels, and wind turbines is arguably more advanced in China, India, and parts of Africa than it is in the U.S., simply because those areas can solve their energy problems without investing first in a national electrical grid and massive, centralized power production. Whether cell phone-based microcredit financing or solar-powered cell phones, emerging markets have demonstrated already that we have much we can learn from them. Thus, we should learn from their successes and offer tools to help with their current problems in ways that benefit everyone and the environment. The rhetoric of emerging market governments emphasizes that they want to be heard, rather than ignored or told what to do.

- b. It is reasonable to assume that emerging markets may want to play a more active role in developing or constructing some of these green technologies and products if they are going to become significant importers of these products. Is that possible and how would that work?

It is reasonable, probably essential, to assume that other countries will play an active role in designing technologies. You cannot develop a successful product without knowing the needs of your market and your customer's preferences.

The Honorable George Radanovich

1. In your testimony you spoke about subsidies for fossil fuels as an explanation for “why green tech and clean commerce activities remain vulnerable and investment capital moves slowly.” However, if the numbers in the study you referenced are applied proportionally to the U.S. total energy supply, renewables are subsidized at almost 5 times the level of fossil fuels. Given the amount of these subsidies combined with the additional \$66 billion directed toward clean technology in the stimulus, should this not be enough aid if these industries are viable?

Your question of viability makes a key point: we want to invest in technologies and practices that will pay us back in the long run. Furthermore, those investments we make should be more effective—that is, have a better long-term return—than alternative uses of the same money. Precisely those two conditions—long-term viability and limited present resources—have driven corporations and countries to invest in clean technology as they comprehend that the present, fossil-based economy will struggle to meet the rising demands of populations within the constraints of Earth’s dwindling natural life-support systems.

Classically, individuals, companies, and countries do fall prey to the sunk cost syndrome, where they have already invested in one way of doing something or have made their fortune from a certain notion and fail to adapt when needed. But the actors who thrive over time have the foresight to recognize change and manage its impact early. Indeed, the U.S. was not necessarily wrong to invest heavily in fossil fuels; those investments allowed a historically unprecedented, rapid accumulation of wealth and skill. Similarly, the U.S. will not now be wrong to realize that change is already upon us and new alternatives available, and that the U.S. should attempt to move to the forefront of countries positioning themselves to benefit most from the transition, even contribute to the transition in ways that enable the US to recover from the current recession and be more competitive going forward.

Directing \$66 billion toward clean technology in one stimulus package may sound like a lot, especially if the Environmental Law Institute counted only \$72 billion in direct subsidies to fossil fuels over seven years total.¹ However, those \$72 billion include none of the many and major costs of fossil fuels, whether protecting our national security by protecting access to such fuels, cleaning up oil leaks and abandoned mines, or paying the health care costs associated with smog, particulate matter, and other pollutants. The fossil fuel economy has traditionally externalized these costs, making the true subsidy to fossil fuels all but exorbitantly incalculable. Please review the recently released “Hidden Costs of Energy: Unpriced Consequences of Energy Production and Use” from the National Research Council for calculations of externalized costs. Furthermore, the more we impair the environment and human health, the more we must pay to provide by ourselves what the environment historically provided for free—clean air, clean water, healthful food, and a stable climate. Of course, we may not be able to afford those services, or worse, be ignorant as to how to provide them ourselves, if ecosystems continue to collapse. This is not a Cassandra “the sky is falling” cry. We have already seen a growing number of large

¹ Environmental Law Institute, *Estimating U.S. Government Subsidies to Energy Sources: 2002-2008, 2009*, http://www.elistore.org/Data/products/d19_07.pdf.

scale failures in natural systems in the form of collapsing fisheries, vast dead zones in coastal areas due to nitrogen overloads, disappearance of water sources such as the Aral Sea, historically unprecedented ozone holes and CO₂ concentrations, and our US streams and river systems that can no longer regenerate clean water for downstream users.

The real question of viability, then, is the viability of sustainable—stable and predictable—conditions for economic activity that allow the best collective return on investments. In the largest, systemic sense, those conditions mean a healthy natural environment and healthy people. Without either societies falter, and the economy grinds to a halt or hemorrhages potential profits inexorably.

In a narrower sense, investors need to see a minimum 7- to 12-year horizon for return on their investments. Technology takes time to emerge, be proven and commercialized, and penetrate the market. This gestation requires a predictable policy environment. Government can provide this context by setting clear standards that are stable for at least a decade and are gradually amended as needed. Such clear, long-term standards create a predictable operating environment that allows the private sector investors to rise to those standards in the most efficient and effective way possible. The EU has done precisely this in order to move toward a cleaner economy. For a domestic example, the 1990 amendment to the Clean Air Act that created the Acid Rain Program and NO_x Budget Trading Program created clear, long-term standards for the coal industry, allowing it to reduce emissions of acid-rain precursors far more cheaply than even it had anticipated. The industry could then sell abroad the control technology it had developed. We have a choice now, depending on the policies we select, to in the future be selling knowledge and technology on cleantech to other countries or having to import it and sending our dollars abroad for others to employ their citizens in perfecting these technology platforms.

The government, as an expression of the citizenry and responsible to it, sets priorities and signals values. Standards are the most obvious guidance, but the government can also shift investments toward clean energy and materials at a faster rate in order to encourage national competence in a market of global importance. We as a country are probably not actually subsidizing renewable energies at a higher rate than fossil fuels, but if we were, that would send exactly the right signal to the market as long as we send that signal long enough for the private sector to invest and reap its rewards, allowing society as a whole to benefit.

2. In your testimony, you praised Denmark for its leadership in green technologies, particularly its commitment to wind power. Yet Denmark finances its wind industry through subsidies that are in turn paid for by taxes that nearly double household electricity prices. Is this cost sustainable by the American taxpayers? Should a similar model be followed in the U.S.?

The European Commission's statistical database, Eurostat, shows Denmark did in fact have the highest implicit tax rate for energy in the EU in 2007. Denmark's implicit tax rate was about 1.3

times as high as the next highest country, the UK, and about 1.7 times the EU average.² This number, nevertheless, is neither particularly surprising nor particularly illuminating on its own.

First, Europe has traditionally used taxes on petroleum to drive down consumption and to generate revenue to invest in alternative energy, such as wind and solar, or conservation measures, such as mass transit. Indeed, these are the two levers any government will use to change behaviors: penalize negative activities and reward positive ones. Of course, the government should first clearly define expectations, through stable standards and other measures. Denmark, having no domestic sources of coal and declining oil and natural gas production,³ may be more pressed than other countries to conserve fossil fuels and foster renewable energy; hence, it may in fact want to tax energy at a higher rate.

Second, presenting a number like 286 Euros per metric kiloton of oil equivalent answers very little. The key question to ask is, What do the Danes get for that money? First, they achieve net energy independence. In 2007, the Danes produced more energy than they consumed, yielding net exports of energy equal to 25 percent of their consumption.⁴ Presumably, those exports bring back money into the Danish economy, offsetting taxes. Norway is the only other EU country to be a net energy exporter, and the next best country after Denmark, the UK, *imported* 20.1% of its energy in 2007. Second, the Danes' investment buys them less pollution. Denmark's total greenhouse gas emissions have fallen 3.9 percent from 1990 to 2007, at a time when most industrial countries' emissions rose, and emissions of sulfur dioxide and other pollutants have fallen even faster.⁵

Germany might provide a more useful comparison to the U.S., as it has a larger economy and coal reserves and has analyzed in detail the relationship between its renewable energy programs and prices. Germany found that its Renewable Energy Laws (EEG) increased the price of electricity for the average German household by about 1.1 cent (Euro) per kWh in 2008.⁶ That increase represents about 5 percent of the cost of electricity. Other taxes and fees make up another 35 percent of the cost, while the remaining 13 cents per kWh represent the costs to generate, transport, and distribute the energy, or what might be considered its pre-tax price. All

² Eurostat, "Implicit tax rate on energy,"

<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdcc360>.

³ Energy Information Administration, "Denmark Energy Profile," Oct. 13, 2009,

http://tonto.eia.doe.gov/country/country_energy_data.cfm?fips=DA.

⁴ Eurostat, "Energy dependency,"

<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdcc310>.

⁵ Eurostat, "Greenhouse gas emissions,"

<http://epp.eurostat.ec.europa.eu/tgm/table.do?tab=table&init=1&plugin=1&language=en&pcode=tsdcc100>; Danish Environment Ministry, "Air Pollutants,"

<http://www.dmu.dk/Luft/Emissioner/Air+pollutants/>.

⁶ Federal Ministry for the Environment, Nature Conservation and Nuclear Energy, "Renewable Energy Sources in Figures: National and international development," 2009, 33-36. The other numbers quoted in this section come from this source.

told, the EEG cost Germany 4.5 billion Euros in 2008. That looks expensive, especially if you as a consumer only see the additional 3 Euros to your monthly bill. But once again, what did Germans get for those 4.5 billion Euros that they invested? They avoided importing 2.7 billion Euros worth of hard coal and (mainly Russian) natural gas; they avoided a transfer of wealth outside their country freeing it for more productive uses; they avoided pollutants from fossil fuels whose cost is estimated at 2.9 billion Euros even after accounting for the production of PV panels and wind turbines; they led industrial nations in greenhouse gas reductions; and, based on results from 2006, they saved another 5 billion Euros by driving down wholesale electricity prices because renewable sources increased the total electrical generating capacity.

However the U.S. chooses to pay for increasing renewable energy, it should emphasize the net benefits that such an investment provides. Moreover, by taking a broad, systems-level, life-cycle view, the government should structure any program to reward such positive behaviors as net health and price benefits and shift revenue toward them, while penalizing negative behaviors, such as pollution and inefficiency.

3. Are heavy domestic subsidies of “green” energy sources by foreign governments a barrier to entry for U.S. firms attempting to compete in those foreign markets? How should foreign subsidies be addressed in the context of US trade policy?

As pollution and climate change know no boundaries, not even those of the human body, we can in some measure be glad other countries have established thriving industries to combat these problems. The U.S., unfortunately, would very likely waste its time trying to tear down protective trade barriers those countries established in the process. First, that gambit would not be easy or quick, and second, the industries that those barriers protected have now emerged and are penetrating other markets, including the U.S. China, for instance, has already been able to sell solar panels more cheaply than Germany or the U.S. Instead of focusing on foreign policy, the U.S. should focus on domestic policy to enhance the U.S. role in the global trade for clean technology. The U.S. has been a crucial source of ideas and patents, and the private sector should be stimulated to continue that leadership into clean technology. Moreover, the U.S. needs to avoid becoming a dumping ground for dirtier technology. As China, the EU, and other governments establish more stringent requirements for product safety and pollution, they effectively close their markets to older, dirtier, and more dangerous products, leaving the U.S. as the next best place to dump those unwanted goods. Becoming the world’s market of last resort would greatly hamper efforts to improve the health of our own population or the energy efficiency of our own industry.

4. In your testimony you spoke extensively about the need for an overhaul of America’s energy system and replace it with a system built on clean commerce and green technology. How does the current lack of a “renewable” baseload energy technology factor into your predictions?

The concept of baseload typically refers to the steady, sufficient supply of electricity from power plants to businesses and individual consumers. Since baseload reliability requires delivering electricity constantly, not just when the underlying energy source is available, it raises the further questions of energy conversion and energy storage. Without predictable, stable access to energy,

economic activity is imperiled. Hence, all sources of energy must solve the conversion and storage problems in order to become reliable baseload providers of electricity.

Industrialized countries have gone to great lengths to assure the baseload reliability of their coal-, oil-, and natural gas-fired power plants. (Of course, the same can be said for other endpoint uses of energy, such as cars, which have their own support infrastructure for reliable, predictable operation. We will leave those aside for now, however.) In the case of fossil fuel-fired plants, we store energy in the form of a refined fossil fuel until it is needed, at which point it is burned for energy. This solution to storage (tanks and coal piles) and conversion (combustion) appears rather simple. Nonetheless, it requires amassing the fossil fuel on site so that there is no interruption in the combustion and conversion of that fuel into thermal and then electric energy. This reliable burning itself obviously requires a massive infrastructure to extract oil, coal, and gas from mines and wells at a steady rate around the globe and deliver them across oceans and continents with minimal loss. This infrastructure to achieve reliable burning for baseload energy emerged over two centuries because it represented a valuable investment. Indeed, if countries had limited themselves to simply the coal they found lying on the ground or the oil that intermittently bubbled from nearby natural wells, they would probably have never achieved reliable baseload electricity generation from fossil fuel-fired plants. In a similar way, hydropower has addressed the question of baseload reliability by damming waterways, so that the kinetic energy of falling water would always be on hand for conversion into electrical energy. Nuclear power addresses the question of baseload reliability by mining, processing, and amassing sufficient quantities of uranium for sustained fission. Every conventional energy source has its supply chain infrastructure that has taken decades to develop.

Nuclear power's largest drawback to this point has been the lack of an adequate disposal infrastructure for radioactive material. And obviously plutonium conversion's close link to weapons production makes it a poor choice when benign and lower security risk options are available. Likewise, citizens have increasingly realized that fossil fuel plants, too, lack an adequate disposal infrastructure for the wastes they generate. In reaction to various events over the years, whether the lethal London fog (a.k.a. Great Smog) of 1952, the acid rain of the 1970s and 80s, or the global warming of the present, industrialized nations have struggled with limited success to cobble together a disposal infrastructure for the hazardous wastes of fossil fuel-fired plants. Developing an adequate, comprehensive disposal infrastructure for fossil fuel waste may prove prohibitively expensive and technologically impractical.

Renewable energies in combination with radical energy conservation, in contrast, avoid the need for a costly disposal infrastructure because they avoid producing wastes in the first place. On the other hand, just like nuclear power and fossil fuel-fired plants, wind, solar, and other renewable energies require an infrastructure to assure their baseload reliability. Yes, at times, renewable energies simply obviate the storage problem altogether: sunlight or wind is converted directly to electricity and consumed immediately. At other times, however, that energy needs to be stored, and for that reason, a storage infrastructure has been steadily emerging. For instance, battery-maker A123 Systems already provides megawatt-capacity batteries to power plants to stabilize power output to make those plants more efficient. Similar battery technology can be used to store energy from renewable sources. Nanotechnology will likely play a role in making such batteries more efficient, as is the case for Fluidic Energy, a spin-off from the University of Arizona which

hopes to commercialize zinc-air batteries for renewable energy storage by 2011. Other existing storage options include flywheels or ultracapacitors; the latter were pioneered in U.S. National Laboratories in the 1990s and are now sold by companies such as Maxwell Technologies to even out wind power generation. Research continues in order to expand ultracapacitors' storage further. Hydrogen fuel cells have been another option for energy storage, but large-scale cells may be further in the future than the storage devices available now. Water, molten salt, and special ceramics, meanwhile, are currently the preferred storage media for concentrating solar thermal plants, such as Spanish Acciona Solar Power's plant in Nevada. These plants use sunlight to heat the medium, and then the heat can be converted into electricity at night or on cloudy days.

Overall, the storage infrastructure for renewable energies is being created and predictable market conditions and incentives could accelerate its growth. Fortunately, the storage infrastructure needed for renewable energy will likely be less expansive than that needed for fossil fuels, as much of our wind and solar power can be produced domestically and will not need to absorb the cost of waste products, coal mine accidents, or oil spills. At the same time, the U.S. often has been, and should strive to remain, at the cutting-edge of such energy storage, from technical knowledge and ideas to patented designs and skills. The field of energy storage is particularly attractive because many emerging markets that lack reliable electrical grids, including most of Africa, are increasingly turning to distributed generation of electricity from wind turbines and solar panels coupled with on-site storage. For example, both Nokia Siemens and Ericsson have solar-powered cell phone charging stations for India and Africa, where tens of millions of new customers get cell phones each month but do not have reliable access to electricity.⁷

As the storage infrastructure continues to advance, concurrent radical improvements in conservation and efficiency could hold constant or even reduce the baseload electrical demand in the first place and save money. A more efficient delivery infrastructure for electricity from all sources could lower peak demand and thereby lower capacity necessary. Smart grid technology is already moving this direction. In the interim, entrepreneurs have also stepped into the breach with demand management innovations, allowing utilities and companies to coordinate their activities so that utilities pay companies to lower their electricity demand at peak times to avoid brownouts and blackouts. By increasing electricity produced from renewable energies, Germany has actually lowered wholesale electricity spot prices because ramping up electricity generation in peak times from conventional plants is quite expensive.⁸ A feed-in tariff in the U.S. could further assist conservation and efficiency by opening the market to more producers. With easy access to the grid, residences and companies could be producing electricity onsite and selling excess power to the grid, lowering baseload requirements. At the consuming end, more efficient appliances and products could further reduce both the baseload and peak demand. National efficiency requirements that drive innovative design solutions and reward utilities and states for creative peak demand reduction would accelerate the transition to a higher tech and far more

⁷ G. Pascal Zachary, "Giving Up on Grids," *Technology Review* September/October 2009, 96; Reuters, "Will solar speed up emerging cell phone revolution?" Oct. 23, 2009, <http://unite.nokiasiemensnetworks.com/adwords/article/view/id/192>.

⁸ Federal Ministry for the Environment, Nature Conservation and Nuclear Energy, "Renewable Energy Sources in Figures: National and international development," 2009, 36.

sophisticated system. Government policy has historically been able to help mobilize venture capital and private equity to find the best solutions to economic and environmental problems. The same can be done for efficiency and renewable energy.

