SCHOOL OF LAW
CASE WESTERN RESERVE UNIVERSITY

Canada-United States Law Journal

Volume 36 | Issue 2 Article 9

January 2012

From Blackout to Shock and Awe: Renewable Energy and the Shared Canada-United States Electricity Grid

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FROM BLACKOUT TO SHOCK AND AWE: RENEWABLE ENERGY AND THE SHARED CANADA-UNITED STATES ELECTRICITY GRID

Session Chair - Dianne Anderson
Speaker - Roger Salliant
Speaker - Carol Battershell
Speaker - Gene Ameduri
Speaker - David B. Raskin

INTRODUCTION

Dianne Anderson

MS. ANDERSON: Good afternoon. Thanks for joining this panel. I am Dianne Anderson,[1] Executive Director of Case Western Reserve University Great Lakes Energy Institute.[2]

Today the panel has an opportunity to address many aspects of bringing renewable energy, including the infrastructure, and the assets into an electricity utility marketplace. We have the opportunity to have views that align and some views that may not align, and I always think that it is good to represent both. As for the way we set it up, I almost utilize a walk, in essence, through the supply chain where like an analogue to a Hollywood film you have a writer, producer, director, actors and actresses, and critics.

Today I have the opportunity to introduce Roger Salliant.[3] Roger is the Executive Director of Case Western Reserve University's Fowler Center for Sustainable Value.[4] Roger will be able to set a bit of the stage for a course that may have some unacceptable outcomes for us.

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[1] *Dianne D. Anderson—Biography*, GREAT LAKES ENERGY INST., http://energy.case.edu/advisory-board/anderson (last visited Nov. 2, 2011).

[2] GREAT LAKES ENERGY INST., http://energy.case.edu/ (last visited Nov. 7, 2011).

[3] *Roger B. Salliant—Biography*, GREAT LAKES ENERGY INST., http://energy.case.edu/advisory-board/saillant (last visited Nov. 2, 2011).

[4] *The Fowler Center for Sustainable Value–About*, CASE W. RES. U. WEATHERHEAD SCH. OF MGMT., http://weatherhead.case.edu/centers/fowler/about/ (last visited Nov. 6, 2011).

I will then introduce Dave Raskin.[5] Dave is partner at Steptoe & Johnson and he will look at how energy right now is progressing in the United States, energy policy, and some of the regulatory regimes and what it is for.

Then I will actually represent a schematic from Dr. Ken Loparo[6] at Case Western Reserve University, who is currently working on energy research in the electricity grid and the connection to renewables. I will talk a bit about how Case Western Reserve University and its professors work. He is working to bring the cost of renewable energy down.[7]

We then will continue with Carol Battershell,[8] who is a leader in the Department of Energy ("DOE"),[9] discussing energy efficiency and a renewables energy department. Carol, in general, will be able to talk about the role of government and what role it plays in bringing the aspects, in this case renewable energy, to market and specifically about the United States Recovery Act.[10]

Next, Gene Ameduri,[11] who is managing partner of Great Lakes Wind Energy[12] and an investor in bringing wind to Lake Erie,[13] will talk about the Great Lakes project and, importantly, about what it is to be an investor in bringing renewables to marketplace.

It is just today that the DOE is asking everyone around the country to comment on their strategy mission and in that strategy mission they speak of three reasons to have policy in energy.[14] One reason is to enhance energy

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[5] *Dave B. Raskin—Biography*, STEPTOE & JOHNSON, http://www.steptoe.com/professionals-357.html (last visited Nov. 2, 2011).

[6] *Kenneth A. Loparo—Biography*, CASE W. RES. U., http://www.case.edu/med/bioinformatics/ken.html (last visited Nov. 2, 2011).

[7] *See generally* FRED M. DISCENZO, DUKKI CHUNG & KENNETH A. LOPARO, POWER SCAVENGING ENABLES MAINTENANCE-FREE WIRELESS SENSOR NODES, http://necsi.edu/events/iccs6/viewpaper.php?id=188 (discussing the use of wireless transmitters to decrease energy costs).

[8] *Carol Battershell—Biography*, U.S. DEP'T OF ENERGY, http://www1.eere.energy.gov/office_eere/bio_battershell.html (last visited Nov. 2, 2011).

[9] *Id.*

[10] *See generally* American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (codified in scattered sections of 6, 19, 26, 42, 47 U.S.C.) (referencing sections in the Act that promote and require the use of renewable energy sources).

[11] *Gene Ameduri—Biography*, GREAT LAKES WIND ENERGY, http://glwenergy.com/about/management/ (last visited Nov. 3, 2011).

[12] *Id.*

[13] *See e.g.*, Grace Wyler, *Company in Valley Takes Lead in $100M Wind Project*, THE VINDICATOR, Sept. 19, 2010, http://www.vindy.com/news/2010/sep/19/company-in-valley-takes-lead-in-100m-win/ (discussing Gene Ameduri's participation in contributing to the renewable energy endeavors in the Great Lakes Region).

[14] *See* Reducing Regulatory Burden, 76 Fed. Reg. 6123, 6124 (Dept' of Energy Feb. 3, 2011) (requesting information critiquing existing regulations); *see also* Availability of Dep't of Energy-Quadrennial Tech. Review Framing Document and Request for Public Comment,

and national security around it.[15] The second reason is to reduce the environmental impacts.[16] The third reason is to increase United States competitiveness.[17] All of these themes play a role in today's discussion.

When I think of being here and representing this Great Lakes region, both for Canada and for the United States, it is interesting that in the last twelve months Brookings has put out a report about the incredible assets this region holds.[18] The assets between these countries start with the science exchanged between the universities and national laboratories; these ideas are then cultivated through the region's manufacturing assets.[19] In addition, there are significant assets such as a large lake for wind, the largest solar energy company in the United States located in western Ohio, vast renewable energy storage sites, and an eighty to ninety year history between this region and the National Aeronautics and Space Administration in this region in bringing storage to market.[20]

With that, I look forward to a good afternoon, and again, thank you for joining us. Roger?

REMARKS OF ROGER SALLIANT

MR. SALLIANT: Thank you, Dianne. This is about Canadian and United States relationships, right? One of my sons-in-law is a Canadian and

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76 Fed. Reg. 13607, 13608, 13607, 13608 (Mar. 14, 2011) (extending the final date for commentary submissions until April 14, 2011).

[15] *See generally National Security & Safety*, DEP'T OF ENERGY, http://energy.gov/public-services/national-security-safety (last visited Nov. 4, 2011) (discussing the "enhanc[ing of] nuclear security through defense").

[16] *See generally Environmental Cleanup*, DEP'T OF ENERGY, http://energy.gov/environmental-cleanup-0 (last visited Nov. 4, 2011) (discussing the various ways the Department of Energy engages in energy waste cleanup to reduce environmental impacts).

[17] *See generally Innovation*, DEP'T OF ENERGY, http://energy.gov/science-innovation/innovation (last visited Nov. 4, 2011) (illustrating the past, current, and future ways the United States can compete on the international market through technological innovation).

[18] *See* JENNIFER S. VEY, JOHN C. AUSTIN, & JENNIFER BRADLEY, THE NEXT ECONOMY: ECONOMIC RECOVERY AND TRANSFORMATION IN THE GREAT LAKES REGION 4-5, 14-18, 23-28 (2010) (discussing the Great Lakes region's various assets that should be cultivated).

[19] *Id.* at 8, 41-43.

[20] *See id.* (providing a broad overview of the Great Lakes region's suitability for renewable energy and assets available for cultivation); *see also* FIRSTSOLAR, http://www.firstsolar.com/en/index.php (last visited Nov. 6, 2011) (noting one of the largest solar energy companies with a manufacturing plant in Ohio); *see also Glenn Research Center: Historical Timeline*, NAT'L AERONAUTICS AND SPACE ADMIN., http://www.nasa.gov/centers/glenn/about/history/timeline.html (last visited Nov. 6, 2011) (discussing the history of NASA Glenn Research Center, currently located at the Great Lakes Science Center in Cleveland, Ohio).

I can tell you that there is a lot of negotiating that goes on, especially during hockey season, so I have some experience in that.

I assume some of you are lawyers, and one of my daughters is a lawyer. So I have to be careful what I say because I have been trained to be exact, precise, short, brief, and so forth.

With that as the context, I would like to speak to you as a businessperson and to try to remind or suggest to you that as I practiced business in the past, people would spend a lot of time arguing. In fact, they found many hills to die on just looking at X and Y. I used to feel like all you needed to do was to get the quadrant right, and eventually you could converge on the X and the Y. I think when we talk about renewables and fossil fuels, we talk about policies, and I would really like to see us converging on the right quadrant. This talk today is about that and in order to converge on that quadrant, I am going to give you a relatively straightforward simplistic view of some activities that we need consider when we look at making choices, particularly with regard to technologies and specifically about energy. I am also going to look, just briefly, at comparing coal, natural gas, and wind in kind of a pew diagram sense.

There is a lot happening today that indicates it is a tension-filled time.[21] This is not new to us. We have had tension filled times in the past.[22] Business people should be asking themselves, "How do I make money during this tension-filled time, and how can I drive my business to be successful?" A back question to that is, "how do I do well by doing good?" And then a back question to that is, "what does 'good' mean?" I am going to try to frame some questions today and present a quadrant definition of what moving to "good" or "better" is like and how to make these choices.

But first, I should tell you, as a member of the Fowler Center for Sustainable Value,[23] what sustainable value really does mean. I am going to be careful because I want to be a little legalistic about this. Sustainable value is the dynamic state that occurs when a company creates ongoing value for its shareholders and stakeholders.[24] The addition of stakeholders is very

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[21] *See, e.g.*, Daniel Gross, *Why It's Worse Than You Think*, NEWSWEEK, June 7, 2008, http://www.thedailybeast.com/newsweek/2008/06/07/why-it-s-worse-than-you-think.html, *and* David Goldman, *Worst Year for Jobs Since '45*, CNN MONEY, Jan. 9, 2009, http://money.cnn.com/2009/01/09/news/economy/jobs_december/index.htm.

[22] *See generally* 6 Jerry W. Markham, *A Financial History of the United States: From Subprime Crisis to the Great Recession (2006-2009)* (M.E. Sharpe 2011) (discussing the prelude to, effects during, and attempts to quell domestic and global financial crises and the 2009 recession).

[23] *See The Fowler Center for Sustainable Value*, *supra* note 4.

[24] *The Fowler Center for Sustainable Value: Core Concepts*, CASE W. RES. U. WEATHERHEAD SCH. OF MGMT., http://weatherhead.case.edu/centers/fowler/about/concepts (last visited Nov. 6, 2011).

important. By doing good for society, the environment, and the part of the stakeholder array, the company does even better for its customers and shareholders than it otherwise would.[25] I can go on and talk about the shift to shareholder value as opposed to sustainable value, but I do not think I need to do that here.

What I would like to do is to offer that humanity, for a long time, has embarked on taking actions to create human systems that eventually come back and have some consequences. We have created systems, whether they are energy systems, water systems, social systems, or economic systems.[26] And we have done it with the idea of moving forward, but there are consequences when you do that.[27] How do the consequences interfere with the natural systems that are often taken for granted, that are often transparent but actually support all living life support systems on the planet?

If you look at the nine boundaries of nature, which have been really defined pretty well by the Resiliency Institute at Stockholm and published in 2009 by *Nature*,[28] they basically found that in the last 25,000 years humanity has thrived because the planet has operated between norms that can basically be described as the nine boundaries of nature.[29] There are not a hundred; there are just nine.[30]

If you are interested, there is, just by Googling "nine boundaries of nature," a video you can get of people with very impressive foreign accents explaining to you why this is true.[31] The nine boundaries include climate

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[25] *Id.*

[26] *See generally* U.N. DEV. PROGRAMME, WORLD ENERGY ASSESSMENT: ENERGY AND THE CHALLENGE OF SUSTAINABILITY 31-32, 261 (World Energy Council Sept. 2000) [hereinafter WORLD ENERGY ASSESSMENT] (advocating for changes in global green energy production and implementation in both developed and developing nations); *see also* BERNARD H. DUSSART ET AL., MAN-MADE LAKES AS MODIFIED ECOSYSTEMS 11-21 (Int'l Council of Scientific Unions 1972) (analyzing human intervention in the natural water system through man-made lakes); *see* Barry G. Silverman, *System Social Science: A Design Inquiry Approach for Stabilization and Reconstruction of Social Systems*, 4 INTELLIGENT DECISION TECH. J. 51, 55 (2010) (discussing how social systems, which are man-made, affect social dilemmas); *see, e.g.*, STEVEN ROSEFIELDE, COMPARATIVE ECONOMIC SYSTEMS: CULTURE, WEALTH, AND POWER IN THE 21ST CENTURY 8-15 (Blackwell Publishers 2002) (analyzing and comparing the various economic systems, all of which are man-made, that have emerged globally).

[27] *See* WORLD ENERGY ASSESSMENT, *supra* note 26, at 5, 11, 24, 35, and 41 (providing the consequences of energy shortages caused by ineffective and inefficient energy systems); *see also* DUSSART, *supra* note 26, at 50-64 (discussing the observed effects of man-made lakes on biological systems). *See generally* ROSEFIELDE, *supra* note 26, at 77-191, 197-207 (providing comparisons between different international economic systems and their domestic and global implications).

[28] *See* Johan Rockström et al., *A Safe Operating Space for Humanity*, 461 NATURE 472, 472 (2009).

[29] *Id.*

[30] *Id.* at 473.

[31] Stockholm Resilience Centre, *Planetary Boundaries*, YOUTUBE (Sept. 23, 2009),

change,[32] which we are all familiar with or have some feeling for it. Climate change is governed, of course, primarily by carbon dioxide, methane, other greenhouse gases, and ozone depletion, which has been going up and going down.[33] At the moment, it is relatively steady, but it is affected by carbon dioxide and methane.[34] Another boundary is ocean acidification, which is primarily affected by carbon dioxide and the formation of carbonic acid.[35] Biodiversity loss is a third boundary of nature, which is the rate of species loss.[36] Fourth is fresh water usage, which is getting a lot more conversation today.[37] Both the nitrogen and phosphorous cycles and chemical contamination, which have not been measured yet, either specifically or quantitatively, are also boundaries of nature.[38] Additionally, land system change, or in other words, how much land we are using and the size of the footprint, and what is changing in terms of densification and aerosol loading, are the final two and have yet to be dimensioned.[39]

From a businessperson's or policymaker's perspective, you need to be thinking about these boundaries so you do not end up having an unanticipated consequence. This criteria is useful. If you take a look at the state of the world today, you can see that in climate change, biodiversity loss, and the nitrogen cycle, we have begun to exceed the boundaries that have been set up for the last twenty-five thousand years, and that is why they are colored in red.[40]

It would seem to me that if you are going to analyze a process or product design that you should be very weary about aggregating those particular areas and you can see in other areas where we are approaching the problem.[41] So how would I apply this in a simplistic way knowing that what I want to do is to get it right? From a sustainability perspective, if you have a product, say this pen, you should be concerned about where it came from. In other

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http://www.youtube.com/watch?v=8dCU6jd-S9Y.

[32] *See* Rockström et al., *supra* note 28, at 473.

[33] *See generally* U.S. ENVTL. PROT. AGENCY, CLIMATE CHANGE SCIENCE FACTS, 1-2 (Office of Air & Radiation Apr. 2010) (discussing the causes and factors involved in climate change).

[34] *See id.*

[35] *See* Rockström et al., *supra* note 28, at 472.

[36] *Id.* at 473.

[37] *Id.*

[38] *Id.* at 472-473.

[39] *Id.* at 472.

[40] *Id.*, *and* Roger Salliant, Presentation: Henry T. King, Jr. Annual Conference on Canada-United States Relations, Can.-U.S. L. Inst., at 5 (Apr. 15, 2011), *available at* http://cusli.org/conferences/annual/annual_2011/documents/Saillant%20-%20Friday%20-%20Session%203%20-%2020110415.pdf.

[41] Rockström et al., *supra* note 28, at 473-474.

words, it is an extractive source.[42] How is it used? How am I using it in daily practice? How is it going to be disposed of? Where is it going to go? If you think about it and then take a look at the nine boundaries and begin to compare it, it results in sort of a plus, plus, plus. I did not use pluses or minuses in a standard pew kind of diagram; I just simply decided it was tougher to read minuses than it was to read pluses. I just used pluses and the absence of pluses to sort of show the difference in comparison.

Also, I threw in social justice, which I think is intertwined with what it means to "do well by doing good," and its implications, particularly at the bottom of the pyramid. This is done as tough as it might be from a sustainability guide; this is done by just sitting down, taking a look, and thinking about life cycle analyses for coal, natural gas, and wind. It turns out that if you just simply lay them together, you can begin to see that there are a lot of ways that, for example, coal and natural gas affect climate change.[43] I have to tell you, just as an internal principle, I gave natural gas an extra plus sign because of a recent report released by Cornell that talks about fracking and its implication in terms of greenhouse gas effects.[44] Now, whether this implication is true or not, that is the only questionable piece of data in the report. I do not know yet where it is going to go but, just to give you an example, if you look at coal from an extraction perspective, you even see that wind gets a plus. The reason that wind would get a plus is? Where do we get the carbon fibers? How are they produced? Where do we get the metallic parts? Where do we get the lubricants and so forth, and where do we get the precious metals that might be in the magnetic if you are using magnetic coupling?

In its use, coal is still generating a lot of carbon dioxide and ash and so forth.[45] Natural gas, of course, releases its own carbon dioxide but it is about forty percent less than coal.[46] If you take a look at wind, of course, when it is blowing and when you are generating, then it is actually not creating a carbon footprint.[47]

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[42] *See* Anne Gambling, *Stakeholder Engagement: The Experience of Holcim, in* MANAGEMENT MODELS FOR CORPORATE RESPONSIBILITY, 157, 158 (Jan Jonker & Marko de Witte eds., 2006) (defining raw material as the extractive source for a product).

[43] Saillant, *supra* note 40, at 7.

[44] *See also* Robert W. Howarth, Renee Santoro & Anthony Ingraffea, *Methane and the Greenhouse-Gas Footprint of Natural Gas from Shale Formations*, 106 CLIMATIC CHANGE 679-690, 681-686 (May 2011).

[45] *See Natural Gas and the Environment*, NATURAL GAS, http://www.naturalgas.org/environment/naturalgas.asp (last visited Dec. 1, 2011) (describing combustion emissions from a variety of energy sources).

[46] *Id.*

[47] *See generally* THE WIND FACT SHEET, NEW S. WALES DEP'T OF ENV'T, CLIMATE CHANGE & WATER 12 (2010) (illustrating wind power's advantages and minimizing its unfavorable effects such as noise pollution).

On disposal, things sort of change; you end up with fly ash from coal.[48] Natural gas has, in a sense, a disposal issue because it is also being used as a utility.[49] What happens with that concrete asset? I should not have said "concrete asset." I should have said the asset you use to convert your natural gas into energy at the end of life. There is an end of life issue that is associated with wind.[50] And, until that is worked out, you cannot really give wind power a zero. So, if you go through and take a look at what is happening here, if you look at the totals, it basically says that to get the quadrant right, you have to get a total of forty-eight for coal, a twenty-six for natural gas, and a twelve for wind.[51] This basically says that even if we are talking about wind from the most idealistic and purest way, we still have plenty of work to do.

Now, this is not meant to be frightening. It is actually very opportunistic because knowing where we are headed and knowing the way to measure the criteria creates incredible opportunities for businesses to see where it can "do well by doing good." Also, it gives you an opportunity to see how to combine shareholder value and stakeholder value and lets you know the potential.

This is a many decade problem.[52] It is not sustainable for a business or an organization to operate in a way that results in unsatisfied customers and no profit.[53] And in my belief, when you really think about sustainable value, it means that you know where you are going, you have an idea how you are going to get there, and you know you can never go so fast as to bankrupt yourself.[54]

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[48] *See* NATURAL GAS, *supra* note 45.

[49] *See generally* Joe Romm, *NY Times on Natural Gas Fracking: "The Dangers to the Environment and Health are Greater than Previously Understood,"* THINK PROGRESS (Feb. 27, 2011, 4:50 PM), http://thinkprogress.org/romm/2011/02/27/207596/natural-gas-fracking-dangers-environment-health/ (noting that regardless of movement towards wastewater recycling of natural gas drilling, disposal is still and will remain a major concern).

[50] Jan Weinzettel et al., *Life Cycle Assessment of a Floating Offshore Wind Turbine*, 34 RENEWABLE ENERGY 742, 742-747 (2008) (providing a life cycle assessment for offshore wind turbines and the issues related to their disposal upon their end of life).

[51] *Salliant*, *supra* note 40, at 8.

[52] *See generally* Stuart L. Hart & Mark B. Milstein, *Creating Sustainable Value*, 17 ACAD. OF MGMT. EXECUTIVE 57 (2003), *available at* http://e4sw.org/papers/Hart_Milstein.pdf.

[53] *See generally id.* (providing examples of businesses attempting to incorporate sustainability concepts and the effect on their success).

[54] *See generally id.* at 57-60 (describing the dimensions of shareholder value and a related framework for sustainable value).

REMARKS OF DAVID B. RASKIN

MR. RASKIN: One difference between Roger's presentation and mine, I am a lawyer so words, only words, that is all you get, and I hope most of you feel at home with that.

I want to talk about the electricity industry. I have spent thirty years representing it. I have been involved in some of the major cases in which public policy towards the industry has changed and I think we are in a very interesting and uncertain time.[55] I want to tell you about it.

The first thing I want to say is I want to make sure everybody in this room understands something that is rarely talked about but it is very important. We do not have a single energy issue in this country.[56] There are two: we have an issue involving the use of foreign oil and we have another issue involving electricity.[57] The issue involving the use of foreign oil raises very serious national security concerns and it raises very serious economic concerns.[58] We all know what they are. We have heard about them. While they are very serious, people need to understand that that has very little to do with the electric industry because we only get approximately one percent of our electricity from oil and we could take that number down to zero fairly easily in a short period.[59] The issues on the electric side of the energy equation do not involve foreign oil.[60]

I am sure all of you have watched commercials. Say you are watching TV and someone comes on to say that a terrorist in the Middle East has blown something up and, as a result, there will be a great oil supply disruption. If you are watching MSNBC, it will then segue to, therefore, we need more renewable energy. But, if you are watching Fox, it will segue to, therefore, we need more nuclear power. Whichever station you are

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[55] *See* SUSAN TIERNEY, ALLOCATING INVESTMENT RISK IN TODAY'S UNCERTAIN ELECTRIC INDUSTRY: A GUIDE TO COMPETITION AND REGULATORY POLICY DURING "INTERESTING TIMES" 1 (2009), *available at* http://www.epsa.org/documents/Tierney_-_EPSA_-_Allocating_Investment_Risk_-_September_2009_FINAL.pdf (explaining how the current economic crisis in the United States will impact investment in the electric industry).

[56] *See* THE WHITE HOUSE, BLUEPRINT FOR A SECURE ENERGY FUTURE 3-4 (2011), *available at* http://www.whitehouse.gov/sites/default/files/blueprint_secure_energy_future.pdf (discussing various energy issues facing the United States).

[57] *See id.*

[58] *See* INDEPENDENT TASK FORCE, COUNCIL ON FOREIGN RELATIONS, NATIONAL SECURITY CONSEQUENCES OF U.S. OIL DEPENDENCY 3-12 (2006) (arguing that the United States' dependence on foreign oil impacts the United States' foreign policy with volatile countries and forces the United States to compete with other powerful countries on the world market).

[59] *See* NUCLEAR ENERGY INST., NUCLEAR ENERGY AND THE ENVIRONMENT 1 (2011) ("Oil generates less than 1 percent and nuclear produces 20 percent of U.S. electricity. The move by electric utilities to shift a significant portion of electricity generation from oil to nuclear energy reduced emissions and the nation's dependence on foreign oil.").

[60] *See id.*

watching, it is all wrong. The two have very little to do with each other and you need to keep that in mind when listening to people talk about what our energy policy should entail.[61] The fact of the matter is that on the electricity side we have numerous options.[62] We have, some would say, an embarrassment of riches;[63] we have a substantial supply of domestic coal[64] and plenty of natural gas through fracking.[65] We even have substantial nuclear power;[66] twenty percent of our electricity comes from this source.[67] Moreover, there are several companies who, with government support, would like to build more nuclear plants.[68] We have substantial hydro-electric capability.[69] We have tremendous wind potential, which is being developed.[70] We have an emerging solar industry whose prices are coming

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[61] *See Green Power Market*, ENVTL. PROT. AGENCY, http://www.epa.gov/greenpower/gpmarket/index.htm (last updated June 2, 2011) (explaining that renewable energy differs from conventional power, which includes nuclear power).

[62] U.S. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2011 WITH PROJECTIONS TO 2035 74-76 (2011), *available at* http://www.eia.gov/forecasts/aeo/pdf/0383(2011).pdf [hereinafter ENERGY OUTLOOK] (describing and forecasting United States electricity generation from a number of sources).

[63] Brian Palmer, *U.S. is Energy-Rich, but Most of that Wealth Lies in Potentially Toxic Coal*, WASH. POST, Oct. 3, 2011, http://www.washingtonpost.com/national/health-science/us-is-energy-rich-but-most-of-that-wealth-lies-in-potentially-toxic-coal/2011/09/26/gIQABi72IL_story.html ("The United States has an embarrassment of energy riches.").

[64] *See id.* ("[The United States has] so much coal, in fact, that [the United States] could continue [its] current consumption for 250 years before [it] would exhaust [its] known, economically extractable reserves.").

[65] *See generally Hydraulic Fracturing*, ENVTL. PROT. AGENCY, http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/index.cfm (last updated Nov. 9, 2011) (providing an overview of fracking).

[66] *See* NUCLEAR ENERGY INST., *supra* note 59, at 1 (explaining the increase of electricity produced by nuclear energy).

[67] *Id.*

[68] *See* U.S. ENERGY INFO. ADMIN., *supra* note 62, at 51 ("All new nuclear plants are built as a result of public polices such as PTCs and the loan guarantee programs.").

[69] *See Hydropower Explained,* U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energyexplained/index.cfm?page=hydropower_home#tab1 (last updated July 5, 2011) ("Hydropower is the renewable energy source that produces the most electricity in the United States."); *see also How Much of Our Electricity is Generated from Renewable Sources?*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energy_in_brief/renewable_energy.cfm (last updated Sept. 1, 2010) [hereinafter *Renewable Sources*] (describing the projected increase in hydroelectric power).

[70] *See How Much of the World's Electricity Supply is Generated from Wind and Who are the Leading Generators?*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/energy_in_brief/wind_power.cfm (last updated Aug. 30, 2011) [hereinafter *How Much Wind Generated*] ("Maintaining its position for two years in a row, the United States led all other countries in wind power generation in 2009 . . . [W]ind power is expected to continue to grow worldwide because of favorable government policies.").

down very quickly,[71] and we have imports from Canada.[72] I had to throw the last one in.

The fact of the matter is that there is a lot of surplus energy, particularly in Québec,[73] and I think a lot of that, which is surplus hydro, is going to find its way down to the United States fairly shortly if we can get the transmission built for it.[74] The problem on the electricity side is that we cannot agree on a policy. The primary reason for this disagreement is that we cannot agree on how dangerous global warming, or should I say global climate change, is.[75]

I have admitted to Roger a little while ago that I am a skeptic, not about whether this is happening, but whether it is significant. He is already working on trying to rock my world and perhaps he will be successful. But the fact of the matter is that without some further agreement on that issue, it is very hard for us to move forward[76] and that creates a really big problem because our electric system is getting very old.[77] Most of what you will read about our existing nuclear fleet, for example, is about extending the life of very old plants.[78] Our coal fleet is very old and, an area that I am particularly

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[71] Vasilis M. Fthenakis et al., *The Technical, Geographical, and Economic Feasibility for Solar Energy to Supply the Energy Needs of the US*, 37 ENERGY POL'Y 387, 387 (2009) ("[R]ecent drastic cost reductions in the production of photovoltaics (PV) pave the way for enabling [solar energy] to become cost competitive with fossil fuel energy generation.").

[72] *See Canada*, U.S. ENERGY INFO. ADMIN., http://www.eia.gov/countries/cab.cfm?fips=CA (last updated Apr., 2011) ("Canada is the most significant source for U.S. energy imports, providing the highest foreign volumes of primary energy and electricity.")

[73] *See id.* ("Québec's La Grande plant is one of the world's largest hydroelectric facilities...").

[74] *See Hydro-Quebec to Decide on U.S. Power Link This Year, Chief Vandal Says*, BLOOMBERG, Apr. 9, 2010, http://www.bloomberg.com/news/2010-04-09/hydro-quebec-to-decide-on-u-s-power-link-this-year-chief-vandal-says.html (discussing potential construction of a transmission line from Québec to the United States).

[75] *See* DIANNE RAHM, CLIMATE CHANGE POLICY IN THE UNITED STATES: THE SCIENCE, THE POLITICS AND THE PROSPECTS FOR CHANGE 14, 41, 69-70 (2010) (describing disagreement in global warming theories and variation of climate change policies since the George H. W. Bush administration).

[76] *See id.*

[77] Jeff Brady, *An Aged Electric Grid Looks to a Brighter Future*, NPR (Apr. 27, 2009), http://www.npr.org/templates/story/story.php?storyId=103327321 (stating "[t]he nation's electricity grid is facing some huge challenges – it's outdated and unprepared for increasing demand and a future that includes more renewable sources of energy . . . when it comes to electricity, not much has changed since Thomas Edison fired up the first commercial power grid in lower Manhattan on Sept. 4, 1882.").

[78] *See, e.g.*, Rebecca Smith, *Nuclear Backlash Energizes Old Plants*, WALL ST. J., Sept. 8, 2011, http://online.wsj.com/article/SB10001424053111903366504576488553640956660.html (stating "Japan's Fukushima Daiichi disaster is having an unanticipated effect: It is forcing the world to become more reliant than ever on aging nuclear plants, and if utilities have their way, those plants will run decades longer than envisioned.").

interested in, our transmission grid is undersized and very old technology.[79] It was not built for an interstate electric system where power is traded and moved long distances; this is a serious problem.[80]

The default choice will be natural gas if we go forward with fracking.[81] However, there are a number of environmental organizations gearing up to fight fracturing shale for natural gas.[82] Roger mentioned a Cornell study that came out just a few days ago, which suggested that the carbon emissions associated with natural gas from fracking exceed that from burning coal to produce electricity.[83]

So, we have a battle underway in that area as well. I do not think we will fail to exploit that resource; it is too valuable to us.[84] I think the debate will end with some additional regulation but not an end to fracking.

That being said, we can create a crisis. The one way we can create a crisis is if we say no more coal because of carbon dioxide emissions and global warming, no more nuclear because it is too expensive and too dangerous, and we just obviously had an event which has got people rethinking that,[85] and no more natural gas because the environmental consequences of fracking are too great.[86] If we say no to those three things

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[79] *See Brady, supra* note 77.

[80] *See* Tom Doggett, *U.S. Electric Grid Needs Major Overhaul: Utility*, REUTERS (July 23, 2009, 10:29 PM), http://www.reuters.com/article/2009/07/24/us-usa-electricity-grid-idUSTRE56N0HQ20090724 (stating "[t]he electricity infrastructure delivering power from a variety of generating sources to our homes, businesses and communities is not suitable for today's needs . . . [t]he challenges that face our nation's energy future simply cannot be met by our aging electric grid."); *see also* PAUL KOMOR, PEW CENTER ON GLOBAL CLIMATE CHANGE, WIND AND SOLAR ELECTRICITY: CHALLENGES AND OPPORTUNITIES 13 (2009) (explaining that centrally located power plants are not built for "longer-distance and interstate movements of electricity").

[81] *See* Spencer Hunt, *'Fracking' Future: Controversial Method of Extracting Fuel from Shale Expanding in Ohio*, COLUMBUS DISPATCH, Sept. 25, 2011, http://www.dispatch.com/content/stories/local/2011/09/25/fracking-future.html (explaining the energy supply potential from natural gas and fracking).

[82] *See id.*

[83] ROBERT W. HOWARTH ET AL., METHANE AND THE GREENHOUSE-GAS FOOTPRINT OF NATURAL GAS FROM SHALE FORMATIONS: A LETTER 1 (2011), *available at* http://www.sustainablefuture.cornell.edu/news/attachments/Howarth-EtAl-2011.pdf (stating "[c]ompared to coal, the footprint of shale gas is at least 20% greater and perhaps more than twice as great on the 20-year horizon and is comparable when compared over100 years.").

[84] *See* Hunt, *supra* note 81 (noting that shale drilling could "produc[e] a cheap, 'clean' energy supply that could last for generations").

[85] *See* Smith, *supra* note 78 ("[a] batch of new reactors had been planned for the U.S. and other nations, but the backlash against nuclear power triggered by the [Fukushima Daiichi] disaster has dimmed prospects for a 'nuclear renaissance.'"); *see also* Steven Syre, *Nuclear Power: Just too Expensive*, BOSTON (Mar. 18, 2011), http://articles.boston.com/2011-03-18/business/29350681_1_new-nuclear-plants-watts-bar-nuclear-power.

[86] *See* JEFF GOODELL, BIG COAL: THE DIRTY SECRET BEHIND AMERICA'S ENERGY FUTURE

and just rely on renewables, we will end up with an electricity crisis because renewables alone cannot get the job done.[87]

What is standing in the way of renewable power? We now get about two percent of our electricity from wind and less than one percent of our electricity from solar.[88] So, what is standing in the way? The first thing is price.[89] The demand for wind and solar is created by portfolio requirement laws which require utility companies to get a certain percentage of their electricity output from renewable sources, and that creates demand, regardless of price.[90] The fact is that the delivered price of renewables is still higher, and in many cases significantly higher, than the alternatives.[91] Therefore, just allowing the market to work will not work.[92]

What I do not say here, and it is also very important, is that the renewable industry relies on production and investment tax credits and loan guarantees to drive down cost.[93] Those are going away for wind power;[94] unless there is new law, wind power subsidies will be gone by the end of the year. For solar, I think there is another five or six years but with what is going on in Washington with the budget, there is no certainty that those subsidies will exist either.[95]

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175 (2006) (describing the impact a crackdown on CO_2 emissions and global warming would have on coal industry).

[87] *See* TED TRAINER, RENEWABLE ENERGY CANNOT SUSTAIN A CONSUMER SOCIETY 2 (2007) (arguing that the "very high levels . . . of energy use that we have in today's consumer-capitalist society cannot be sustained by renewable sources of energy").

[88] *See How Much Wind Generated*, *supra* note 70 (documenting that 1.8% of the total United States electricity generation, in 2009, is from wind).

[89] *See Renewable Sources*, *supra* note 69 (stating "[r]enewable energy power plants are generally more expensive to build and to operate than coal and natural gas plants.").

[90] *Id.*

[91] *See* KOMOR, *supra* note 80, at 12 (stating "[t]he greatest single barrier to significant market penetration for solar PV and CSP is their high costs.").

[92] *See id.*

[93] *See* Katherine Ling, *DOE Makes $30B Available to Jumpstart Renewable Energy, 'Smart Grid' Projects*, N.Y. TIMES, July 30, 2009, http://www.nytimes.com/gwire/2009/07/30/30greenwire-doe-makes-30b-available-to-jumpstart-renewable-16564.html (discussing loan guarantees and tax credits for renewable energy projects).

[94] *See Production Tax Credit for Renewable Energy*, UNION OF CONCERNED SCIENTISTS, http://www.ucsusa.org/clean_energy/solutions/big_picture_solutions/production-tax-credit-for.html (last updated Sept. 13, 2011) (stating "[t]he production tax credit for wind expires at the end of 2012.").

[95] *See* Steve Hargreaves, *Wind Energy, Solar Power Face Cloudy Future*, CNN MONEY, Nov. 19, 2010, http://money.cnn.com/2010/11/18/news/economy/renewable_energy_tax_credit/index.htm (commenting that the economic downturn in the United States may lead to the elimination of subsidies for renewable energy projects).

Perhaps the biggest physical problem is that the transmission grid is unable to support much more interconnection of wind,[96] particularly inland wind, which is much cheaper than offshore wind.[97] Unless we reach agreement on a policy to build out our transmission grid, which I fervently believe we need to do, it is going to be very hard to get much more renewable power on to the grid.[98]

The next problem with renewables is that they are not a source of base load power.[99] You need energy: you turn it on and it is there all the time. We have a base amount of energy that we need almost everyday, almost twenty-four hours a day, and we need power plants that can provide that energy.[100] We cannot rely on solar and wind to be there.[101] They are what is known as intermittent or variable resources.[102] For that reason, they are less valuable from the standpoint of a system operator who is trying to run an electric system that is designed to make sure that the demand is satisfied.[103]

Finally, one of the issues that is really bothering me is state parochialism. The examples are legion where states are approving projects that are much higher cost than they need to be, but they are in-state projects.[104] States look at integrating wind from a single state perspective: they will have the utility in the state, which Massachusetts recently did with a national grid, but pay twenty cents a kilowatt per hour for wind from a project offshore when there is much less expensive wind available in Northern New England.[105] I think there is a real problem here. We have to start thinking about electricity as a

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[96] *See* AM. WIND ENERGY ASS'N & SOLAR ENERGY INDUS. ASS'N, GREEN POWER SUPERHIGHWAYS: BUILDING A PATH TO AMERICA'S CLEAN ENERGY FUTURE (2009), *available at* http://www.awea.org/issues/transmission/index.cfm (stating "[c]urrently, almost 300,000 MW of wind projects, more than enough to meet 20 percent of our electricity needs, are waiting in line to connect to the grid because there is inadequate transmission capacity to carry the electricity they would produce.").

[97] *See also* THE EUR. WIND ENERGY ASS'N, WIND ENERGY – THE FACTS: A GUIDE TO THE TECHNOLOGY, ECONOMICS AND FUTURE OF WIND POWER 212 (2009) (stating "[o]ffshore wind is still around 50 per cent more expensive than onshore wind.").

[98] *See id.*

[99] *See* STEVEN FERREY, UNLOCKING THE GLOBAL WARMING TOOLBOX: KEY CHOICES FOR CARBON RESTRICTION AND SEQUESTRATION 150-52 (2010) (stating "[i]ntermittent renewable resources cannot supply reliable baseload power.").

[100] *See id.*

[101] *See id.*

[102] *See id.*

[103] *See id.*

[104] *See, e.g.*, Bill Trotter, *UMaine Professor: Offshore Wind can be Cost Competitive*, BANGOR DAILY NEWS, Jan. 25, 2011, http://bangordailynews.com/2011/01/25/news/umaine-professor-offshore-wind-can-be-cost-competitive/ (discussing cost and energy potential from the Gulf of Maine versus the Massachusetts Cape Wind project and Rhode Island Deepwater Wind project).

[105] *Id.*

regional and national business and not a local business if we want to get where we need to go.[106]

On transmission grid expansion, this is what I have been spending a good bit of my time on the last few years. We have a system where no one is responsible for planning the national transmission system.[107] The Federal Energy Regulatory Commission ("FERC") is trying to fix that.[108] I am not sure if it has legislative authority, but it is doing its best.[109] There are no agreements on the planning assumptions.[110] How much renewables you include in the mix and their location, offshore or onshore, has a lot to do with what transmission facilities you are going to build.[111] So there needs to be agreement on what the electric system is going to look like.

There are huge fights over cost responsibility.[112] When President Eisenhower built the National Highway System, he did not go out and say people on the East Coast will not pay for Interstate 80 from Denver to Albuquerque because they get no benefit from it.[113] It was treated as a social good and we all paid for it through our taxes.[114] But we have not gotten there with respect to electric transmission.[115] Anytime someone proposes a major transmission line, the first big fight is over cost responsibility.[116] We have some people who want to look at every single line that gets built, perform sophisticated analyses about who benefits in relative amounts, and try to

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[106] *See generally The Answer, My Friend? Can the Windy Great Plains be a New Power Source, or is that Just Bluster?*, ECONOMIST (Oct. 26, 2006), http://www.economist.com/node/8089386 (discussing the problem of parochialism in regard towards wind energy).

[107] *See* David Clarke, *FERC's Wellinghoff Urges Systematic Planning of U.S. 'Backbone' Grid*, ENERGY WASHINGTON (Nov. 26, 2008), http://www.ferc.gov/about/com-mem/wellinghoff/11-26-08-energy-washington.pdf (discussing the United States' need for a systemic plan for a national grid).

[108] *See id.*

[109] *See id.*

[110] *See id.*

[111] *See id.*

[112] *See* STAN MARK KAPLAN & ADAM VANN, CONG. RESEARCH SERV., R41193, ELECTRICITY TRANSMISSION COST ALLOCATION 2 (2010) (stating "[p]erhaps the most contentious electricity transmission financing issue is cost allocation for new interstate transmission lines – that is, deciding which electricity customers pay how much of the cost of building and operating a new transmission line that crosses several states.").

[113] *See Dwight D. Eisenhower National System of Interstate and Defense Highways*, U.S. DEP'T OF TRANSP. FED. HIGHWAY ADMIN., http://www.fhwa.dot.gov/programadmin/interstate.cfm#interstate_funding (last updated Apr. 7, 2011) (stating "[r]evenue from the Federal gas and other motor-vehicle user taxes was credited to the Highway Trust Fund to pay the Federal share of Interstate and all other Federal-aid highway projects.").

[114] *See id.*

[115] *See* KAPLAN & VANN, *supra* note 112.

[116] *See id.* at 1 (stating the "DOE's Electricity Advisory Committee concluded that 'cost allocation is the single largest impediment to any transmission development'").

allocate the costs to customers based on those beneficiaries to pay principals. That is probably good fundamental economics.[117] But it basically stops the entire process in its tracks, and the FERC is trying to convince the industry, and Congress, that the right way to do this is simply to spread the cost broadly.[118] When all is said and done, everyone is getting a benefit from the stronger system that exists and, in fact, the reality is that until the new transmission facilities are built, people do not know how they are going to use it.[119]

The way the electric industry works is if a resource is in place, it can move power. They will start looking at buying power at the other end of that line. Trying to determine, in advance, who the beneficiaries are is kind of a fool's errand and does not even get you to the right answer.[120]

Finally, there is a question of siting.[121] Unlike the natural gas industry, we site all electric transmission facilities at the state level, except for a small amount on federal land where the Bureau of Land Management generally stands in the way and says no.[122] As a result, it is virtually, that is an overstatement, it is very difficult to site a large interstate transmission line.[123]

And the way to describe it is to think about a transmission line that starts in South Dakota with a collector system for South Dakota wind and runs through Iowa. I do not know my Midwest geography well enough but the line runs through the Midwest to Chicago to deliver power to Chicago. Folks in Chicago, folks in the intervening states, and folks in North Dakota all look at that line differently.[124] They each have a different view as to whether they are benefiting from the existence of that line,[125] and so under the current rules, we are going to have a big fat fight over cost responsibility. Then we

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[117] *See id.* at 5-13 (discussing current and developing cost allocation policies).

[118] *See id.* at 13-16 (commenting on FERC's approach to cost allocation).

[119] *See Id.* at 11 (explaining FERC's argument in the *Illinois Commerce Commission v. FERC* case "that every member of the [transmission project] would benefit from the new transmission facilities because the reliability of the entire network would improve").

[120] *See id.* at 10-16 (providing comments on the complexity of figuring out who the beneficiaries are; for example, "the benefits from a new transmission project may accrue over many years and therefore may not be presently 'measurable.'").

[121] *See* ADAM VANN, CONG. RESEARCH SERV., R40657, THE FEDERAL GOVERNMENT'S ROLE IN ELECTRIC TRANSMISSION FACILITY SITING (2010), *available at* http://www.fas.org/sgp/crs/misc/R40657.pdf.

[122] *See id.* at 1 (stating that "[a]lthough the federal government has recently increased its authority over transmission reliability, it has, for the most part, left transmission siting decisions in the hands of the states").

[123] *See id.* (explaining that there are "concerns over loss of local and regional input and control that [would] accompany an expansion of federal power into [transmission siting decisions that are] traditionally reserved for the states").

[124] *See* KAPLAN & VANN, *supra* note 112, at 6, 10-13 (discussing the debate surrounding allocation of transmission project costs and measurable benefits in different localized areas).

[125] *See id.*

are going to have a big fight over siting because someone is made responsible for the cost of transmission and they do not want to pay in their state.[126] That is an invitation for the local state authorities to disapprove it or make it so expensive that it cannot get built.

In 2005, Congress passed a law which gave the FERC federal backstop siting authority within what were known as national interest electric transmission corridors.[127] The process was supposed to work as follows: Department of Energy goes out and does studies and determines where we have differences in cost and need more transmission.[128] In any event, that law did not work and we have to go back to the drawing board.[129]

REMARKS OF DIANNE ANDERSON

MS. ANDERSON: Thank you. I am going to show just one slide and represent at this point the type of research that is going on to lower the cost. The cost of renewables is too high.[130] It has to come down.[131] We recognize that and it is the reason in academia that we have those researchers that spend years in specific areas.[132]

There are several academics right now working directly in the area of renewables, a couple to tie directly to Dave's comment.[133] One comment Dave made was regarding the intermittent nature of solar and wind. Both of them are now in the new Energy Information Administration results that have been released in terms of renewable energy cost and both are now getting closer.[134]

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[126] *See id.* at 6 (stating "[t]he states, which have primary transmission siting authority, may be reluctant to site regional transmission projects if they believe the costs are not being allocated fairly.").

[127] VANN, *supra* note 121, at 2.

[128] *Id.* at 8 (stating "[the Energy Policy Act of 2005] directed the Secretary of Energy to 'conduct a study of electric transmission and congestion' and subsequently 'issue a report, based on the study, which may designate any geographic area experiencing electric energy transmission capacity constraints or congestion that adversely affects consumers as a national interest electric transmission corridor.'")

[129] *See id.* at 8-14 (explaining the controversy over the federal role in transmission siting from the Energy Policy Act of 2005).

[130] *See Renewable Sources*, *supra* note 69 (stating "[r]enewable energy power plants are generally more expensive to build and to operate than coal and natural gas plants.").

[131] *See id.* ("The U.S. Energy Information Administration (EIA) projects that renewable-generated electricity will account for 17% of total U.S. electricity generation in 2035, up from 9% in 2008 . . . [f]rom a global perspective, EIA projects that renewable energy will be the fastest-growing source of electricity generation through the forecast period to 2035.").

[132] *See id.*

[133] *See, e.g.*, FERREY, *supra* note 99, at 150-52.

[134] *See* ENERGY OUTLOOK, *supra* note 62, at 21, 76-78 (suggesting that supply, State RPS programs, and federal incentives are making renewable energy more competitive with other

They are in the eight to nine cent range of competing with, or I should say wind is in the eight to nine cent range of competing, solar higher of that, of competing with coal-based electricity.[135] Yet, obviously, they bring an additional issue with intermittency.[136]

A couple things are going on in that area. The one in the top right-hand box is storage. We are operating around a thousand dollars a kilowatt per hour right now, and the cost of storage and those numbers are being requested in Department of Energy and Advanced Research Projects Agency-Energy proposals at the level of a hundred dollars.[137]

So at ten percent of the cost, we recently at Case Western Reserve University have just won a $2.2 million award for a less than hundred dollar cost of a storage system.[138] It happens to be in a capacitor.[139] We have just won an award from Sandia National Lab to also develop a system that costs less than one hundred thousand dollars.[140]

So one key element, storage, is still costing something in order to bring it to market. Moreover, storage costs more than the cost of solar or wind, which would help reduce the intermittency of that type of energy.[141]

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sources).

[135] *See Wind Power Costs on the Rise? Not Nearly as Much as Coal, Gas and Nukes*, NW ENERGY COAL. (July 22, 2008), http://www.nwenergy.org/resources-publications/updates/energy-matters-update-july-22-2008/ (explaining that "[c]onventional (dirtiest) coal's small price advantage – about eight-tenths of a cent per kilowatt-hour – will soon be erased by regional and/or federal regulations on climate-polluting greenhouse-gas emissions" and that "solar . . . will become cost-competitive in time."); *see also* Matthew L. Wald, *Cost Works Against Alternative and Renewable Energy Sources in Time of Recession*, N.Y. TIMES, Mar. 28, 2009, http://www.nytimes.com/2009/03/29/business/energy-environment/29renew.html?_r=1&ref=us (comparing a modern coal plant that produces at 7.8 cents a kilowatt-hour with a wind plant that produces at a little over 12 cents a kilowatt-hour).

[136] *See* FERREY, *supra* note 99, at 150-52.

[137] *See* FUNDING – GRIDS, ADVANCED RESEARCH PROJECTS AGENCY – ENERGY, http://arpa-e.energy.gov/About/FAQs/FundingGRIDS.aspx (last visited Dec. 9, 2011) (discussing the $100/kWh cost target).

[138] *See Energize – Impermeable Film Delivers an Efficient Power Surge*, CASE W. RES. U. – SCH. OF ENGINEERING, http://engineering.case.edu/annualreport/energize.html (last visited Dec. 9, 2011) (commenting on the $2.2 million grant from the U.S. Department of Energy's Advanced Research Projects Agency-Energy).

[139] *See id.*

[140] *But see* Kevin Mayhood, *From the Rustbelt: an Iron-Based Flow Battery – DOE Funds Work at Case Western Reserve University*, THINK BLOG (May 27, 2011, 3:59 PM), http://blog.case.edu/think/2011/05/27/from_the_rustbelt_an_ironbased_flow_battery (stating the DOE, through Sandia National Lab, is funding research with a six hundred thousand dollar grant).

[140] *See generally* PAUL DENHOLM ET AL., NAT'L RENEWABLE ENERGY LABORATORY, THE ROLE OF ENERGY STORAGE WITH RENEWABLE ELECTRICITY GENERATION (2010), *available at* http://www.nrel.gov/docs/fy10osti/47187.pdf.

[141] *See Grid-Scale Rampable Intermittent Dispatchable Storage (GRIDS)–Program Description*, ADVANCED RES. PROJECTS AGENCY – ENERGY,

However, the substantial reduction in that cost is nearing and we are currently participating directly in that area.[142]

The second point that Dave made was on the transmission grid expansion and it will be intriguing as Gene talks as well about what it is to bring a real project to bear. Recently, I believe in the New York project, the New York Power Authority has published figures presuming costs to total something greater than $400 million for the cost of the transmission and distribution system associated with bringing wind into that region.[143]

That is not for this Lake Erie project but it is the one that New York is talking about.[144] So, some of the novel ideas that are being looked at to change the game, to take away the typical grid transmission and distribution concept and think of what it would mean to bring wind to shore, being that the demand centers, at least for these Great Lakes regions, are very close to that shoreline are not only novel but greatly reduce the need to build heavy and expensive infrastructure.

Those are a couple of the things directly related to attempting to bring that cost of wind and transmission distribution down. With that, Carol Battershell.

REMARKS OF CAROL BATTERSHELL

MS. BATTERSHELL: I am an engineer,[145] but I have just words and not even any slides, so you just have to listen to me.

I am happy to be here. I am a Cleveland native, although I have not lived here for a bit. I am also a Case Western Reserve University alumni, although that has been a bit ago as well.[146] I had a long career in Ohio and then with British Petroleum, about ten years overseas.[147] Around two years ago, I joined the government.[148]

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http://arpa-e.energy.gov/ProgramsProjects/GRIDS.aspx (last visited Dec. 9, 2011) (stating "[t]he 12 projects that make up the GRIDS program seek to develop new energy storage technologies that are comparable in reliability and cost to pumped hydropower, and additionally, that are modular and can be deployed in any location in the country.").

[142] *See id.*

[143] *See Frequently Asked Questions*, LONG ISLAND – N.Y.C. OFFSHORE WIND PROJECT, http://www.linycoffshorewind.com/faq.html (last visited Dec. 9, 2011) (discussing the elements and aspects of the Long Island – New York City Offshore Wind Project and its projected costs).

[144] *See id.* (explaining the Great Lakes Offshore Wind (GLOW) Project).

[145] *Carol Battershell—Biography*, U.S. DEP'T OF ENERGY, http://www1.eere.energy.gov/office_eere/bio_battershell.html (last updated Nov. 22, 2011).

[146] *Id.*

[147] *Id.*

[148] *About the Office of EERE*, U.S. DEP'T OF ENERGY, http://www1.eere.energy.gov/office_eere/ (last updated Dec. 16, 2011).

As Dianne mentioned, I am going to talk a little about the government's role in energy efficiency and renewable energy, how the government supports technology innovation, development, and deployment, and in particular I want to cover what investment was in the American Recovery and Reinvestment Act ("ARRA") which added some impressive funding into this area.[149]

First, I will talk about the ARRA itself and then a little bit about what I saw the Recovery Act doing inside the government. There was transformation there just from enacting ARRA. The ARRA was really a very large scale and meaningful down payment on the nation's energy and environment future.[150]

The energy components of the Recovery Act represent the largest single investment in clean energy in American history with the investments of about $80 billion dollars for clean energy across the federal government.[151] If you add in the cost share amount, that adds up to about $150 billion.[152] That really is substantial funding. This was through a combination of grants, but also loans and tax incentives, and the Department of Energy ("DOE"), where I recently joined, played a central role.[153]

This $150 billion plus costs, with the government plus private capital, helps catalyze a transformation in four areas.[154] The first is increasing energy efficiency.[155] The second is doubling our renewable energy generation.[156] Third is a restructuring of the transport system and fourth is work on the grid infrastructure, which we have mentioned already in the last couple of presentations.[157]

On energy efficiency, again, DOE is making the largest single investment ever in buildings' energy efficiency in the United States.[158] The Recovery Act expanded tax credits substantially for doing energy efficiency improvements in homes.[159] At the same time, five billion dollars was put into the Weatherization Assistance Program, which provides energy audits in low-income homes and then does the improvements in the homes.[160] So, you

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149 American Recovery and Reinvestment Act of 2009, *supra* note 10.

150 Steven Chu, Sec'y, U.S. Dep't of Energy, Statement Before the Senate Committee on Appropriations Subcommittee on Energy and Water Development (Apr. 28, 2010).

151 Memorandum from U.S. Vice President on a Progress Report: The Transformation to a Clean Energy Economy to the U.S. President (Dec. 15, 2009).

152 *Id.*

153 *Id.*

154 *Id.*

155 *Id.*

156 *Id.*

157 *Id.*

158 *Id.*

159 *Id.*

160 *Id.*

get both the benefit of improved energy efficiency in homes where people could not really afford to do that and also help low-income families lower their utility bills.[161] The Weatherization Program, as of April, 2011, under the ARRA, has already weatherized 300,000 low-income homes, and we are on track to weatherize a half million by the end of 2011.[162] And in addition, there have been dozens of United States manufacturers of energy efficiency products and energy efficiency appliances and some opening of new facilities or expanding existing operations that were funded by tax credits under the ARRA.[163] Those are just some examples of the work in energy efficiency.

For renewable energy, the investments in renewable generation and advanced energy manufacturing included things like loan guarantees, manufacturing tax credits and grants in lieu of tax credits, which was a program called 1603, and someone referred to it earlier, that is expiring at the end of 2011.[164] The 1603 Program is noteworthy because the government converted tax credits into grants when the economy was having problems, when businesses had revenue challenges they did not have large enough tax bills to take advantage of a tax credit, but grants were valuable.[165] That program was converted into a grant and I think it did a lot of good in spurring installation of renewables generation.[166] Over 1,800 private companies nationwide have received these tax cuts or cash assistance for clean energy manufacturing or production.[167]

On transportation, seven private companies and researchers in over thirty states have received grants to help build the American advanced battery and electric vehicle manufacturing industry really from the ground up.[168] There

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[161] *See id.*

[162] Alice Gaston, *Secretary Chu Announces Major New Recovery Act Milestone: 300,000 Homes Weatherized*, WEATHER ASSISTANCE PROGRAM TECHNICAL ASSISTANCE CTR. (Jan. 20, 2011, 10:36 AM), http://www.waptac.org/blog/?catid=32.

[163] *See generally 100 Recovery Act Projects That Are Changing America*, THE WHITE HOUSE (Sept. 2010), http://www.whitehouse.gov/sites/default/files/100-Recovery-Act-Projects-Changing-America-Report.pdf (providing examples of projects spurred by Recovery Act tax credits).

[164] Lon Huber, *The Importance of Extending the 1603 Treasury Grant Program*, AMERICANS FOR ENERGY LEADERSHIP (Dec. 09, 2010), http://leadenergy.org/2010/12/the-importance-of-extending-the-1603-treasury-grant-program/.

[165] *See id.*

[166] *See id.*

[167] *Cf.* Steve Isakowitz, Chief Fin. Officer, U.S. Dep't of Energy, Statement before the Subcommittee on Oversight and Investigations, Committee on Energy and Commerce, U.S. H. of Rep. (Mar. 17, 2011) (stating that over seven thousand private companies nationwide have now received tax cuts or cash for clean energy manufacturing and production).

[168] *See generally* THE WHITE HOUSE, THE RECOVERY ACT: TRANSFORMING THE AMERICAN ECONOMY THROUGH INNOVATION 9 (2011), *available at* http://www.whitehouse.gov/sites/default/files/uploads/Recovery_Act_Innovation.pdf (detailing the $2.4 billion investment in advanced battery and electric component

are thirty new advanced battery and electric vehicle component plants opening across the country because of these investments.[169] All of the recipients, and this is notable so I will talk about it again later, of this money matched the government investment at least dollar for dollar.[170] Before the ARRA, the United States produced just two percent of the world's advanced batteries but because of the ARRA, we will have the capacity to produce twenty percent in 2012 and up to forty percent by 2015.[171] Before the ARRA, the hundred-mile range electric vehicle battery cost was thirty-three thousand dollars.[172] Because of the high volume manufacturing that the ARRA is spurring, that will be cut in half with the batteries costing about sixteen thousand dollars by the end of 2013 and just ten thousand dollars by the end of 2015.[173] Before the ARRA, there were less than five hundred electric vehicle charging stations in the nation and, because of the ARRA, there will be over twenty thousand by 2012.[174]

On to the grid, the DOE is making the largest investment in grid modernization in history.[175] That is another one of those, in case I am not making it clear, largest investments in this area in the United States history.[176] Four billion dollars in ARRA funds have been invested in smart grid projects across forty-six states to help build a more stable, secure nationwide electrical grid, which clearly has issues as we talked about in the last couple of presentations.[177]

There are already more than 2.5 million smart meters that have been installed in homes and businesses nationwide to help consumers reduce their

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manufacturing, as well as transportation electrification funding).

[169] *See id.* at 9-10.

[170] Isakowitz, *supra* note 167.

[171] *The Recovery Act: Transforming the American Economy Through Innovation*, *supra* note 168.

[172] THE WHITE HOUSE, THE RECOVERY ACT: TRANSFORMING AMERICA'S TRANSPORTATION SECTOR BATTERIES AND ELECTRIC VEHICLE (July 14, 2010), *available at* http://www.whitehouse.gov/files/documents/Battery-and-Electric-Vehicle-Report-FINAL.pdf.

[173] *Id.*

[174] *Department of Energy Releases New Report on Economic Impact of Recovery Act Advanced Vehicle Investments*, U.S. DEP'T OF ENERGY (July 15, 2010), http://apps1.eere.energy.gov/news/progress_alerts.cfm/pa_id=368.

[175] White House Press Sec'y, *President Obama Announces $3.4 Billion Investment to Spur Transition to Smart Energy Grid*, THE WHITE HOUSE (Oct. 27, 2009), http://www.whitehouse.gov/the-press-office/president-obama-announces-34-billion-investment-spur-transition-smart-energy-grid.

[176] *Id.*

[177] *Obama Administration Announces Nearly $100 Million for Smart Grid Workforce Training and Development*, U.S. DEP'T OF ENERGY (Apr. 8, 2010), http://energy.gov/articles/obama-administration-announces-nearly-100-million-smart-grid-workforce-training-and.

energy use.[178] We are on track for eighteen million total meters being installed through the ARRA.[179] The deployment also includes hundreds of digital sensors, 200,000 smart transformers, and nearly seven hundred automated substations, which help the power companies replace units before they fail or at least to respond more effectively to restore service when bad weather knocks down power lines.[180]

I mentioned before the idea of leveraging private capital. In addition to the government funds injected into this sector, another important element is how the ARRA helped leverage private capital.[181] The ARRA has proven successful in drawing private capital off the sidelines to help fund the economic recovery and accelerate green job growth.[182]

Of the fourteen billion dollars in competitive grants under the ARRA, about ninety percent required some kind of cost share from a project sponsor and these requirements kind of show an appropriate role for the government.[183] It is not just investing in innovation but when the government takes this role it also brings in private capital off of the sidelines.[184]

I had mentioned I would also cover what we saw in the government in terms of the ARRA's ability to also help transform the government. As an organization, many agencies were able to put funds in the hands of businesses and citizens faster than they typically were able to do.[185] There was a big push and momentum to move quickly.[186] We have seen to date

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[178] Shaun Donovan, Sec'y, Dep't of H. and Urban Dev., Remarks at Greenbuild International Conference and Expo Closing Plenary (Nov. 19, 2010).

[179] *See generally id.*

[180] White House Press Sec'y, *supra* note 175.

[181] COUNCIL OF ECON. ADVISERS, RECOVERY ACT FOURTH QUARTERLY REPORT—PROVISIONS OF THE RECOVERY ACT THAT LEVERAGE OTHER SPENDING, http://www.whitehouse.gov/administration/eop/cea/factsheets-reports/economic-impact-arra-4th-quarterly-report/section-5.

[182] Steven Chu, Sec'y, U.S. Dep't of Energy, Statement before the Subcommittee on Energy and Power, the Subcommittee on Environment and the Economy, and the Committee on Energy and Commerce of the U.S. House of Representatives (Mar. 16, 2011).

[183] *See generally* Matt Rogers, Senior Advisor to the Sec'y of Energy, U.S. Dep't of Energy, Statement before the Committee on Energy and Natural Resources of the U.S. Senate (Mar. 4, 2010) (stating cost sharing, combined with other funds, supports more than one hundred billion dollars in projects).

[184] *See* William A. Galston, *A State of the Union Address to Bridge the Great U.S. Spending Divide*, THE BROOKINGS INSTITUTION (Jan. 26, 2011), http://www.brookings.edu/opinions/2011/0126_sotu_obama_galston.aspx (explaining that the government's role of appropriate spending in getting private capital off sidelines).

[185] Joe Biden, *New Way of Doing Business: How the Recovery Act is Leading the Way to 21st Century Government*, THE WHITE HOUSE (Feb. 2011), http://www.whitehouse.gov/sites/default/files/new_way_of_doing_business.pdf.

[186] *Id.*

pretty low levels of fraud and abuse through the transparency that was put into the system and, again, we worked to leverage the dollars with private sector contributions.[187]

Some of the lessons that we learned, and I will go quickly through an example of each where we saw how collaboration helps break through bureaucracy, how competition improves the results, and something about transparency and accountability and the vigilance of management.[188]

For collaboration, the Administration really could not have done this without making some real changes in how the government agencies worked with each other.[189] One example is a project on a manufacturing tax credit that Congress said should be done by the DOE and the Internal Revenue Service ("IRS") together.[190] It was challenging, but we just plowed through like it might be possible and turns out that, if you get enough like-minded people who are just going to figure out a way to get things done, you can move things through. It was not simple, but what we managed to demonstrate it was another type of funding vehicle, which is a competitive tax credit, which is not usual.[191] Program 1603, for example, was a tax credit that as long as you get in by the deadline, you get the tax credit.[192] This was a competitive tax credit and I thought the uniqueness of it was showing that you can use different agencies for their strength.[193] So the DOE did the accepting of grants and competitive analysis of them, which is what the DOE does.[194] Then the IRS did the administration of the money through a tax credit[195] and we worked jointly on what were our strengths.[196]

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[187] *Id.*

[188] *Id.*

[189] *See id.*

[190] Henry Kelly, Principal Deputy Assistant Sec'y, U.S. Dep't of Energy, Re-establishing U.S. Leadership in Clean Energy, High Technology Manufacturing (May 20, 2010).

[191] Press Release, White House Press Sec'y, Fact Sheet: $2.3 Billion in New Clean Energy Manufacturing Tax Credits (Jan. 8, 2010), *available at* http://www.whitehouse.gov/the-press-office/fact-sheet-23-billion-new-clean-energy-manufacturing-tax-credits.

[192] *See generally Recovery Act,* TREASURY.GOV, http://www.treasury.gov/initiatives/recovery/Pages/1603.aspx (last visited Nov. 22, 2011) (outlining the details of Program 1603).

[193] *See generally Payments for Specified Energy Property in Lieu of Tax Credits Under the American Recovery and Reinvestment Act of 2009: Frequently Asked Questions and Answers*, TREASURY.GOV, http://www.treasury.gov/initiatives/recovery/Documents/A%20FAQs0411%20-%20general.pdf (last visited Nov. 22, 2011) (providing links to agencies involved in Program 1603).

[194] *See generally Tax Credit, Rebates & Savings,* ENERGY, http://energy.gov/savings (last visited Nov. 22, 2011) (listing grant recipients).

[195] *See generally* Paul Dvorak, *IRS to Audit Section 1603 Treasury Grant Payments*, WINDPOWER ENGINEERING & DEVELOPMENT (Nov. 6, 2011), http://www.windpowerengineering.com/featured/business-news-projects/irs-to-audit-section-

On competition, I think it is worth noting out that the ARRA was not about earmarks.[197] The grants generally were about competition and finding the best project.[198] Most programs were oversubscribed, so the merit review was very important.[199] In the DOE, Secretary Chu sent a note to colleges, universities, and professional societies asking for experts to help with these reviews, and in total nearly three thousand independent experts contributed and completed about twenty-five thousand reviews of DOE applications.[200]

The other couple things that we saw during the ARRA were both an incentive created by the Administration to be transparent and also some requirements with the ARRA to put things online.[201] There were literally weekly reports on how each project was doing, which you can still see on recovery.gov,[202] and that kind of transparency, I think, was new in the government and allowed people to be held responsible for their particular goals.[203] If you cannot measure things, you cannot really see how people are doing.

In summary, I just wanted to recap that the ARRA was a huge investment of about $150 billion, including government and private matching funds, and the ARRA, in its scale and the urgency, also creates an environment for reform within the DOE and the government overall.[204] These ARRA reforms are now being embedded in the government to be enduring.[205] I think it is

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1603-treasury-grant-payments/ (stating that the IRS has jurisdiction over cash grant payments).

[196] *See Payments for Specified Energy Property in Lieu of Tax Credits Under the American Recovery and Reinvestment Act of 2009 Frequently Asked Questions and Answers*, *supra* note 193.

[197] *The Recovery Act*, THE WHITE HOUSE, http://www.whitehouse.gov/economy/jobs/recovery-act (last visited Nov. 22, 2011).

[198] *A New Way of Doing Business: How the Recovery Act is Leading the Way to 21st Century Government*, THE WHITE HOUSE, http://www.whitehouse.gov/sites/default/files/new_way_of_doing_business.pdf (last visited Oct. 29, 2011) [hereinafter *A New Way*].

[199] Michael Grunwald, *The Stimulus Turns Two: How Obama Quietly Changed Washington,* TIME MAG. (Feb. 17, 2011), http://www.time.com/time/politics/article/0,8599,2049816,00.html.

[200] *Id.*

[201] *A New Way of Doing Business*, *supra* note 198.

[202] *Track the Money*, RECOVERY, http://www.recovery.gov/Pages/default.aspx (last visited Nov. 22, 2011).

[203] Richard W. Walker, *Recovery.gov Shows the Power of Transparency in Tracking Federal Spending*, AOL GOVERNMENT (Aug. 23, 2011), http://gov.aol.com/2011/08/23/recovery-gov-shows-the-way-to-transparency-in-government-spendin/.

[204] Memorandum from U.S. Vice President on a Progress Report: The Transformation of A Clean Energy Economy to the U.S. President (Dec. 15, 2009).

[205] Tim Geithner, Remarks at The Macroprudential Toolkit: Measurement and Analysis Conference, U.S. Dep't of the Treasury (Dec. 1, 2011).

worth noting that President Obama put into the 2011 State of the Union address that we cannot win the future with a government of the past.[206] Thanks.

REMARKS OF GENE AMEDURI

MR. AMEDURI: I am Gene Ameduri, also a Case Western Reserve University alumni, [207] and my family, my daughter, son, and wife all went here as well.

I also want to especially thank all of you who came down here from Canada. I want you to know that I live in the eastern part of Ohio[208], and just to report to you if you have not been following the Stanley Cup, and I support this team, the Pittsburgh Penguins did win.[209] I am anticipating another win tonight and if any of you know whether Sidney Crosby will be back, we are hoping to have him in the second round.

Anyway, that kicked off one of the things I wanted to say. I am going to present this from the business side. We are working on a project in Lake Erie right now that other Canadian friends were really hot on moving forward.[210] This project involves the northern part of Lake Erie[211] and I know with all of the changes in the government's thinking, that it has been put on hold, but we have had a number of contacts from people in Canada just kind of following very closely what we are running into, and how we are progressing through all the issues associated with putting offshore wind in Lake Erie.

I will go through this fairly rapidly, but just so you understand, again, unlike what is going on in Europe, the offshore wind industry right now is really to support economic development.[212] These projects initially are not about energy; they are about job creation.[213] I think the thing that we want to get across to all of you and especially with the people on the panel with me, is that these initial projects, the first one that we are going to be building is about twenty-five to thirty megawatts, which is five to six turbines out in the

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[206] Barack Obama, President of the U.S., State of the Union Address (Jan. 25, 2011).

[207] *Management*, GREAT LAKES WIND ENERGY, http://glwenergy.com/about/management/ (last visited Nov. 22, 2011).

[208] *Id.*

[209] *Tampa Bay Lighting vs. Pittsburgh Penguins – Recap*, ESPN (Apr. 13, 2011, 7:00 PM), http://sports.espn.go.com/nhl/recap?gameId=310413016.

[210] Gene Ameduri, Building the Great Lakes' First Offshore Wind Farm, Can.-U.S. L. Inst. (Apr. 15, 2011), *available at* http://www.cusli.org/conferences/annual/annual_2011/docments/Building%20the%20Great%20Lakes%E2%80%99%20First%20Offshore%20Wind.pdf.

[211] *Id.*

[212] *Partners*, LEEDCO, http://www.leedco.org/partners (last visited Nov. 22, 2011).

[213] *Id.*

water.[214] The project is all the wrong size.[215] They are way too small.[216] They are not scalable.[217]

When you look at what we have to do from a regulatory standpoint, from all the other studies we have to do, environmental and what not, and whether we build a thousand megawatts or we build thirty megawatts, the price or the cost to do it would be about the same.[218]

To get this thing moving, what we have done is we have worked with a whole group of stakeholders, and some of these are on the screen right now.[219] You can see my alma mater is in the center there, especially on the research institutions, but we have got a whole lot of stakeholders in the State of Ohio as well as a couple of very, very large companies, General Electric and Bechtel, the largest construction companies in North America involved, and we are going to move this project forward.[220]

Now, one of the things that is critical to this, though, is the economic development.[221] The State of Ohio is very interested in what is going on from the standpoint of economic development and job creation, and I want to give you all a little bit of a history of what is going on in this project.[222]

Back in 2004, the Cleveland Foundation, which is a philanthropic group in Cleveland, provided a relatively large grant to get this study started and tried to identify whether there were any show-stoppers to put offshore wind in Lake Erie, off the shore of Cleveland.[223] The result of that study basically reported that we had a lot of things going for us.[224] We have a very shallow lake.[225] We are going to be putting these turbines in about seventy feet of water, or twenty-five meters.[226] We do not have hurricanes.[227] We do not

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[214] *Id.*

[215] *See generally* Kiley Kroh, *A Fresh(water) Look at Economic Renewal and Job Creation*, SCIENCE PROGRESS (July 26, 2011), http://scienceprogress.org/2011/07/a-freshwater-look-at-economic-renewal-and-job-creation/ (noting that LEEDCo has adopted the "start small" approach).

[216] *Id.*

[217] *Contra Freshwater Wind Wins Grant from the U.S. Department of Energy*, FRESHWATER WIND (Sept. 8, 2011), http://freshwaterwind.com/2011/09/doe-grant/ (stating that cost reduction will be driven by economies of scale).

[218] *See WindFuels Scale Up*, DOTY WINDFUELS, http://www.dotyenergy.com/Economics/Scalability.htm (last updated Dec. 20, 2010).

[219] Ameduri, *supra* note 210, at 9.

[220] *Partners*, *supra* note 212.

[221] *See generally* MARK COTICCHIA & ERIC COTTINGTON, CASE W. RES. U., THE VALUE OF RESEARCH 28 (2005), *available at* http://www.ohiowind.org/PDFs/Value%20of%20Research%2007-08%20select%20pages.pdf.

[222] *Id.*

[223] *Id.* at 28, 48.

[224] *Id.* at 28.

[225] *Id.*

[226] *See generally* DLZ, *Great Lakes Wind Energy Center Feasibility Study* 3 (Aug. 2008),

have lots of major storms.[228] We do have ice that they do not have in the Atlantic or up in the North Atlantic.[229] But the other key to this, and it was mentioned earlier, is that we are not very far from population, so our transmission lines are very, very short relative to bringing wind from South Dakota to Chicago, for example.[230] So we feel very good about some of those things.

We have been progressing through all of what you see on this screen, to the point where our firm is a partnership of a couple of companies and where we now have a lease option on square miles out in the lake to go ahead and put these turbines in.[231] We are now in the process of doing all the geotech, geophysical, the birds and bats, and the aquatic studies that will make the various environmental agencies come through the loop with what we are doing.[232]

Again, as I talked about, this is all about jobs.[233] These are ports that are not in the United States right now, but you will see kind of in the lower left hand a photograph over in Europe, and you see the size and the requirements of these ports for these kinds of facilities.[234] Remember the turbines that we are going to be putting in, unlike some of the ones you have seen on shore, the diameter of the blades are approaching 350 feet or a hundred meters.[235]

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available at http://www.ohgeosoc.org/presentations//200904/GeologicalStudy.pdf (2008) (stating that bathymetric data collected for the mid-lake airport feasibility study suggests that, over most of the study area, the water depth is between forty and seventy feet, or twelve to twenty-one meters deep).

[227] Patrick G. Mahoney, *Q&A: LEEDCo's Lorry Wagner on the Potential of Lake Erie Wind*, HI VELOCITY (May 19, 2011), http://www.hivelocitymedia.com/features/QAWagner5_19_11.aspx.

[228] *Wind Energy Can Create Jobs, Reduce Carbon Footprint*, THE FISCAL TIMES (Sept. 25, 2010), http://www.thefiscaltimes.com/Articles/2010/09/25/Wind-Energy-Can-Create-Jobs-Reduce-Carbon-Footprint.aspx#page2.

[229] *Great Lakes Wind Energy Center Final Feasibility Study - Fact Sheet Technical, Environmental and Economic Key Findings*, CUYAHOGA COUNTY, http://development.cuyahogacounty.us/pdf_development/en-US/FeasibilityFactSheet.pdf (last visited Nov. 23, 2011).

[230] *See generally* South Dakota Wind Facts, NATIONAL WIND, LLC, http://www.nationalwind.com/south_dakota_wind_facts (last visited Nov. 23, 2011) (discussing plans to upgrade transmission lines from South Dakota to Chicago).

[231] *LEEDCo and Freshwater Wind Sign Option to Lease Submerged Land in Lake Erie to Develop Wind Farm*, FRESHWATER WIND (Jan. 07, 2011), http://freshwaterwind.com/2011/01/leedco-freshwater-wind-sign-option-lease-submerged-land-lake-erie-develop-wind-farm/.

[232] John Funk, *In Last Official Act, Gov. Ted Strickland Eases Way for Lake Erie Wind Turbines*, THE PLAIN DEALER (Jan. 07, 2011, 5:09 PM), http://www.cleveland.com/business/index.ssf/2011/01/gov_ted_strickland_to_sign_lea.html.

[233] COTICCHIA & COTTINGTON, *supra* note 221.

[234] Ameduri, *supra* note 210, at 5.

[235] Wallace P. Erickson et al., *Avian Collisions with Wind Turbines: A Summary of Existing*

The blades themselves just cannot be moved around on conventional roads.[236] They are all going to be brought in, either manufactured close to the shore or brought in by ship.[237] Same thing with the turbines—they are very, very large.[238]

The initial group of turbines we are going to put in are four to five megawatts each, and this is how we are going to start driving the cost down.[239] As we continue to build larger and larger, scale will help us start driving the cost down.[240]

The initial project, though, the study that was commissioned by the non-profit Lake Erie Energy Development Company said that this initial phase was going to produce between four to six hundred jobs in Ohio.[241] And that is the whole supply chain, that is the construction of the foundations, that is the maritime, and all of those things associated with that. That does not include the turbines.

The turbines will not be manufactured in the United States.[242] Right now General Electric's plant for offshore turbines is in Norway and so they will be coming in during this initial phase.[243] As we build up, if we are successful

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Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States, NATIONAL WIND COORDINATING COMMITTEE 15, 18 (Aug. 2001), http://www.west-inc.com/reports/avian_collisions.pdf (stating turbines are reaching 250 to 350 feet in diameter).

[236] *See generally The Logistics of Transporting Wind Turbines: Reducing Inefficiencies, Costs and Community Impact by Streamlining the Supply Chain*, CN, (2009), http://www.cn.ca/documents/WhitePapers/Transporting-Wind-Turbines-White-Paper-en.pdf (detailing factors and considerations of wind turbine transport).

[237] *Id.* at 10.

[238] *Id.* at 3.

[239] *Cleveland Wind Project a Laboratory to Lower Price of Wind Power*, THE PLAIN DEALER (May 24, 2010), http://freshwaterwind.com/2010/05/cleveland-wind-project-laboratory-price-wind-power/.

[240] *The Recovery Act: Transforming the American Economy Through Innovation*, *supra* note 168.

[241] *Governor's Last Official Act in Office Advances Ohio Toward Construction of First Freshwater Wind Farm in the World, Offshore Wind Farm to Position Ohio, Cleveland as Global Renewable Energy Leaders*, PROGRESS OHIO (Jan. 7, 2011), http://www.progressohio.org/blog/2011/01/governors-last-official-act-in-office-advances-ohio-toward-construction-of-first-freshwater-wind-far.html.

[242] *See* Tom Breckenridge, *Installing Wind Turbines on Lake Erie Could Generate Thousands of Jobs, Study Says*, THE PLAIN DEALER (Aug. 5, 2010), http://www.cleveland.com/business/index.ssf/2010/08/wind_power_1.html (stating General Electric will supply turbines for project); *see also General Electric Expands Offshore Wind Power Activity in Norway*, MINISTRY OF PETROLEUM & ENERGY (Mar. 25, 2010), http://www.regjeringen.no/en/dep/oed/press-center/press-releases/2010/General-Electric-satser-pa-havvind-i-Norge.html?id=598970 (stating General Electric will produce its turbines in Norway).

[243] *General Electric Expands Offshore Wind Power Activity in Norway*, *supra* note 242.

with this, and if we can scale and get the price down, the hope, ultimately, is to build a manufacturing facility in Ohio.[244] But that remains to be seen.

Again, just to have a feel for how many jobs are actually being created in Europe, and I know some of these numbers are pretty hard to see, but basically the thing that I would say to you right now, this is a hundred billion-dollar industry between Great Britain and the continent.[245] They do have a very, very aggressive feed-in tariff, and that is what is driving this.[246] In the United States, what we are using to get the Power Purchase Agreement is basically legislation to take advantage of the energy credits, but this is a real industry in Europe.[247]

Right now there are over forty thousand people employed in this industry, and if you look at some of the numbers down on that last line, in the year 2030, it is expected to be almost 215,000 people employed in this industry, so it is real.[248] The thing that is scary to all of us here in the United States, and to you in Canada as well, is that the next big surge is going to be the Chinese.[249]

The Chinese are already designing turbines that are well over eight megawatts with a goal of ten megawatts per turbine.[250] They are going to be deploying the turbines substantially in Asia and that is one of the things that is certainly a concern.[251] I know we were talking about the Canadian content, and the United States is certainly concerned about that as well, and we are potentially going to have turbines manufactured in China brought into here.[252]

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[244] *See generally* Angela Beniwal, *Manufacturing Facilities in Ohio Benefit from the Wind Supply Chain*, NORTH AMERICAN WINDPOWER (Jan. 6, 2011), http://www.nawindpower.com/e107_plugins/content/content.php?content.7145 (explaining how the wind power supply chain benefits Ohio).

[245] Ameduri, *supra* 210, at 5.

[246] *General Additional Income with Small Wind Turbines,* GAIA-WIND, http://www.gaia-wind.com/is-it-right-for-me/feed-in-tariffs-uk/ (last visited Dec. 2, 2011).

[247] *Energy Purchase and Sales*, NORTHWEST COMMUNITY ENERGY, http://nwcommunityenergy.org/utility-considerations/intangible-benefits (last visited Dec. 2, 2011).

[248] Ameduri, *supra* note 210, at 5.

[249] Joe McDonald, *Power Surge in China's 'Clean Energy City,'* MSNBC, http://www.msnbc.msn.com/id/43497449/ns/world_news-world_environment/t/power-surge-chinas-clean-energy-city/#.TtoxC1avOAE (last updated June 22, 2011).

[250] Matthew Wald, *China's Galloping Wind Market*, N.Y. TIMES (Jan. 11, 2011, 10:23 AM), http://green.blogs.nytimes.com/2011/01/11/chinas-galloping-wind-market/.

[251] Keith Bradsher, *To Conquer Wind Power, China Writes the Rules*, N.Y. TIMES (Dec. 14, 2010), http://www.nytimes.com/2010/12/15/business/global/15chinawind.html?adxnnl=1&ref=windpower&adxnnlx=1322925086-fH/Zc8wHG87fVAfqqBrxSg.

[252] Rebecca Smith, *Chinese-Made Turbines to Fill U.S. Wind Farm*, WALL ST. J. (Oct. 30, 2009), http://online.wsj.com/article/SB125683832677216475.html.

Again, from an offshore standpoint, bringing the turbine from China or bringing a turbine from Europe, there is not a whole lot of difference there.[253] So what we really have got to do is advance the ball in the United States and Canada as rapidly as possible.[254] One of the things we would like to point to, because we are in a port here in Cleveland and there is one in Lorain which is a little west of here and one in Ashtabula which is east of here, is that all have substantial port facilities that are all pretty much dead.[255] There is nothing coming in and off of them in Cleveland.[256] I think it is eight freighters a month, which is not a lot, a little more than one a week.[257] But we are trying to take advantage of the existing port infrastructure; same thing over in Ashtabula and Lorain.[258]

These pictures here are actually Bremerhaven over in Germany, and this was a massive port from World War II that really just laid fallow for many, many years, and now because of the offshore industry in Europe, it is now a very, very thriving port.[259] This is what we are hoping to see here off of the shore of Cleveland.[260]

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[253] *See generally Supply Chain: The Race to Meet Demand*, ALT ENERGY STOCKS, 34 (Jan./Feb. 2007), http://www.altenergystocks.com/assets/Wind%20Directions.pdf (discussing the advantages and disadvantages of obtaining components from abroad).

[254] *E.g.*, *Federal Policy Initiatives*, PEMBINA INST., http://www.pembina.org/re/work/federal-policy (last visited Oct. 24, 2011) (discussing the need for Canada to make renewable energy and energy efficiency high priorities), *and* Sam Carana, *America Needs More Wind Turbines, Onshore and Offshore*, KNOL (Sept. 17, 2011), http://knol.google.com/k/sam-carana/america-needs-more-wind-turbines/7y50rvz9924j/83 (discussing the United States' need for more wind turbines).

[255] *See generally Latest Port Arrivals*, PORT ARRIVALS, http://www.portarrivals.com/list.asp?sec=Region&c=GLR&t=GREAT%20LAKES%20REGION (last visited Oct. 26, 2011) (discussing the latest port arrivals in the Great Lakes region); *see generally Port Of Lorain: Port Detail*, WORLD PORT SOURCE, http://www.worldportsource.com/ports/USA_OH_Port_of_Lorain_2943.php (last visited Oct. 24, 2011) (discussing the size and cargo capacity of the Port of Lorain).

[256] *Latest Port Arrivals*, *supra* note 255.

[257] *Id.*

[258] *See, e.g.*, CLEVELAND-CUYAHOGA COUNTY PORT AUTHORITY, POLICY REPORT & STRATEGIC ACTION PLAN 16-18 (Sept. 2011), http://www.portofcleveland.com/assets/attachments/file/Strategic%20Plan_Web(2).pdf [hereinafter PORT AUTHORITY] (discussing current and potential future projects that utilize the Port of Cleveland); *see USDA: More than 1200 jobs could be added in Ashtabula by 2014*, U.S. H. OF REP. STEVEN C. LATOURETTE (June 15, 2011), http://latourette.house.gov/news/press-releases/usda--more-than-1200-jobs-could-be-added-in-ashtabula-by-2014-.aspx (discussing projects that utilize the Port of Ashtabula); *see generally Local Assistance Grants: Lorain County 1998-2010*, ODNR OFFICE OF COASTAL MANAGEMENT, http://www.ohiodnr.com/LakeErie/Grants_RecipientsLorain/tabid/9330/Default.aspx (last visited Oct. 24, 2011) (discussing certain grants received by Lorain County that utilized and improved Port infrastructure).

[259] Ameduri, *supra* note 210, at 6. *See also* Elize de Vries, *Boomtown Bremerhaven: The*

Again, this is all about job creation initially.[261] As we put this first project in, we will demonstrate that we are not harming the environment, the industry does produce the jobs that we are talking about, and there is a path forward to getting costs down.[262] We anticipate this kind of activity being on the shore of Cleveland.[263]

The photograph on the left is a sample of the most likely kind of foundations we will be using. Those are called gravity foundations.[264] Each one of those weighs about 1,300 tons of concrete and steel.[265] They would be floated out into the lake and then sunk in the appropriate locations.[266] You can get a feel for the size of those because, it is kind of hard to tell, but the top of that main one in the center right at the very top there is a workman standing.[267] So it gives you a feel that it is almost seventy feet right there.[268]

Again, as we talked about earlier, I have been in the electricity industry a long time, but I think one of the things that I struggle with all the time is that offshore wind is very, very expensive.[269] Onshore wind is very expensive.[270] Additionally, solar is expensive relative to what is going on in a base coal or base nuclear and all that.[271]

Offshore Wind Industry Success Story, RENEWABLE ENERGY WORLD MAGAZINE, Mar. 13, 2009, *available at* http://www.renewableenergyworld.com/rea/news/article/2009/03/boomtown-bremerhaven-the-offshore-wind-industry-success-story (discussing the economic upturn of the Port of Bremerhaven).

[260] *Wind Energy,* CUYAHOGA COUNTY DEP'T OF DEV., http://development.cuyahogacounty.us/en-US/wind-energy.aspx (last visited Oct. 30, 2011).

[261] *See* PORT AUTHORITY, *supra* note 258, at 29 (discussing how improving the Port of Cleveland fosters job creation).

[262] *See generally Offshore Wind Has More Energy Potential than Oil, Gas Combined,* SUSTAINABLE BUS. NEWS (Sep. 29, 2010, 11:56 AM), http://www.sustainablebusiness.com/index.cfm/go/news.display/id/21137 (discussing the benefits of offshore wind utilization).

[263] *Wind Energy, supra* note 260.

[264] Ameduri, *supra* note 210, at 6. *See also* E.ON CLIMATE & RENEWABLES, E.ON OFFSHORE WIND ENERGY FACTBOOK 14-16 (June 2011), http://www.eon.com/en/downloads/2011_01_07_EON_Offshore_Factbook_en_June_final.pdf

[265] E.ON CLIMATE & RENEWABLES, *supra* note 264, at 54 (stating foundations can weigh up to 1,300 tons).

[266] ARUP, *Gravity Base Foundations* 7, http://www.google.com/ (search "ARUP Gravity Base Foundations Brochure; then follow "Gravity Base Foundations Brochure – ARUP" hyperlink).

[267] Ameduri, *supra* note 210, at 6.

[268] *Id.*

[269] James M. Taylor, *New EPA Data Show Futility Of U.S. Carbon Dioxide Restrictions,* FORBES, Feb. 24, 20110, http://www.forbes.com/2011/02/23/china-carbon-dioxide-emissions-opinions-contributors-james-taylor_2.html.

[270] *Id.*

[271] Jason Morgan, *Comparing Energy Costs of Nuclear, Coal, Gas, Wind and Solar,* NUCLEAR FISSIONARY (Apr. 2, 2010), http://nuclearfissionary.com/2010/04/02/comparing-

But if I build a nuclear plant today knowing how the industry works, if I started today it would not be up and running for ten years.[272] In 2021, what would the power coming into that be? I will tell you right now, no one would bet on it, first of all, but it certainly is going to be more than five cents a kilowatt per hour.[273]

I think those are the kind of numbers we always hear from our utility friends saying, "Why would I buy offshore wind right now at twenty-five cents a kilowatt per hour when I can produce it from coal for five cents or nuclear for four cents?" and that is true.[274] But that nuclear plant that they are going to build, and I think you said there might be two that are progressing, the only way they are going to be built is with federal loan guarantees.[275] But what is the power going to cost from those? What is the power going to cost from clean? What is the power going to cost from even our nuclear plants today if we have to go in and refit them with some of the safeties we are going to have to do based on what happened in Japan?[276]

We anticipate, and some of this comes from the Department of Energy thinking as well, the target is to get offshore wind down to twelve cents in 2020.[277] For us to get there, we have got to have that first project and then a larger one and a larger one and a larger one.[278] We have an option for Ohio. Right now we are poised very, very well.

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energy-costs-of-nuclear-coal-gas-wind-and-solar.

[272] *See generally Pros and Cons of Nuclear Power,* TIME FOR CHANGE, http://timeforchange.org/pros-and-cons-of-nuclear-power-and-sustainability (last visited Oct. 30, 2011) (discussing the time frame for planning and building a new nuclear plant).

[273] *See generally* Diana S. Powers, *Nuclear Energy Loses Cost Advantage,* N.Y. TIMES, July 26, 2010, http://www.nytimes.com/2010/07/27/business/global/27iht-renuke.html?pagewanted=all (discussing the rising costs of nuclear energy).

[274] *See* Morgan, *supra* note 271 (discussing cost of the different energy sources); *see also* Herman K. Trabish, *How Much Will Offshore Wind Really Cost?,* GREENTECH MEDIA (Mar. 17, 2011), http://www.greentechmedia.com/articles/read/how-much-will-offshore-wind-really-cost/ (discussing the perceived costs of offshore wind energy compared to other sources).

[275] Harvey Wasserman, *If Solar Energy Federal Loan Guarantees Are Killed, So Too Should Be Nuclear Guarantees,* PALTALK NEWS NETWORK, http://reportergary.com/?p=19261 (last visited Oct. 30, 2011).

[276] *See generally* Karoun Demirjian, *Japan's Nuclear Meltdown Prompts Talk of Safety, Yucca Mountain's Role,* LAS VEGAS SUN, Mar. 13, 2011, http://www.lasvegassun.com/news/2011/mar/13/japans-nuclear-meltdown-prompts-talk-safety-yucca-/ (discussing how the tsunami in Japan could affect United States development of nuclear plants).

[277] Ivan Castano, *Big Challenges Remain for U.S. Offshore Wind,* RENEWABLE ENERGY WORLD (Mar. 1, 2011), http://www.renewableenergyworld.com/rea/news/article/2011/03/big-challenges-remain-for-u-s-offshore-wind.

[278] *See generally Wind Energy Driving Down Consumer Electric Rates,* CLEAN TECHNICA (Oct. 25, 2011),

We have an awful lot of supply chain manufacturing already in Ohio.[279] We have a population base close to the lake.[280] We are part of what is referred to as PJM Interconnection LLC, which is the largest independent system operator of the grid, in the United States.[281] We are getting power from the lake into that grid, which allows us to actually send it anywhere in the eastern part of the United States.[282] We really want to make this the epicenter[283] and, again I think what we are going to do here is going to enable our Canadian neighbors to take advantage of what we learn in Lake Erie, relative to all of the things that we are going to do impacting the environment as well.[284]

Specifically, the turbines will be located about seven miles offshore from Cleveland.[285] You can kind of see that up in the far corner. We are going to be putting five to eight turbines out there, a total of about twenty-five to thirty megawatts, a very, very small system.[286] We are going to produce enough power and enough energy to do five thousand to six thousand homes.[287] A lot of things have been done already down that left-hand side.[288]

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http://cleantechnica.com/2011/10/25/wind-energy-driving-down-consumer-electric-rates/ (discussing investment in wind turbines and the current low costs of wind energy).

[279] Ashley Craig et al., *The Solar and Wind Energy Supply Chain in Ohio*, ENVTL. L. & POL'Y CTR. 2 (Jan. 2011), http://elpc.org/wp-content/uploads/2011/01/OhioWindSupplyFinal_HQ.pdf.

[280] *Lake Erie: A Lake in Flux*, ENV'T CAN. (last updated Aug. 13, 2001), http://www.on.ec.gc.ca/laws/coa/2001/lake-erie-e.html.

[281] Peter Key, *PJM Interconnection Expands In Ohio*, PHILA. BUS. JOURNAL (June 1, 2011), http://www.bizjournals.com/philadelphia/news/2011/06/01/pjm-interconnection-expands-territory.html, *and* Press Release, EnerNOC, EnerNOC's DemandSMART Demand Response Network Dispatched at Record-Breaking Levels Throughout North America (July 26, 2011), *available at* http://www.enernoc.com/press/releases/248/enernoc-s-demandsmart-demand-response-network-dispatched-at-record-breaking-levels-throughout-north-america.php.

[282] *See generally* Cathy Day & Kevin Gibbons, *The Grid: The Most Significant Engineering Achievement of the 20th Century*, CHE ENERGY, http://envhist.wisc.edu/cool_stuff/energy/grid.shtml (last visited Nov. 3, 2011) (discussing how the properties, functions, and inner-workings of the power grid of the United States).

[283] David Beach, *Lake Erie Wind Turbine Views*, GREENCITYBLUELAKE (July 26, 2010), http://www.gcbl.org/blog/david-beach/lake-erie-wind-turbine-views.

[284] *See generally Wind Energy, supra* note 260 (discussing advantages and environmental impact of the project).

[285] Beach, *supra* note 283.

[286] Press Release, Lorain County Growth Partnership, Lorain County Commissioners Approve Revenue Sharing Agreement (May 25, 2011), *available at* http://loraincounty.us/getdoc/46f8fada-a2b1-4dc8-9734-f08943f0c728/Commissioners-Approve-Revenue-Sharing-Agreement.aspx.

[287] *Cleveland Could Be The Center of Innovation for Clean, Alternative Energy*, OFFSHORE WIND. (Feb. 10, 2011), http://www.offshorewind.biz/2011/02/10/cleveland-could-be-the-center-of-innovation-for-clean-alternative-energy-usa/.

[288] Ameduri, *supra* note 210, at 10. *See also Report & Study*, CUYAHOGA COUNTY DEP'T OF DEV., http://development.cuyahogacounty.us/en-US/report-study.aspx (last visited Nov. 3,

Those are the kind of items that take anywhere from one to three years, so the good news is a lot of that has been done.[289] It allows us to potentially, unless we see some additional show-stoppers, get this thing built and up and running in late 2012 and in 2013.[290] Our hope and our plan is to have this in commercial operation by late 2013, early 2014.[291] We have a lot of pieces in place to get that done.[292]

The kind of the things we have to get done in the short term, like I said, involve working on legislative activity right now in the State of Ohio on coming up with a methodology to take advantage of the existing energy credit rate structure to convert that to offshore and help us put ourselves in a position where the energy will be sold into the grid through the utility companies by taking advantage of the rate structure.[293]

We have got to work very closely with the Ohio Department of Natural Resources on taking our lease option that we have right now and converting it to a lease.[294] These are all submerged land leases for land under the lake and then the Ohio Power Siting Board as well, so we have a lot of work to do.[295] I think what is difficult with these projects is that we are the first, so there is no cookbook.[296] There is no template, and anytime we sit down with whatever agency, it is starting from scratch, educating, and then working out that this is not a dock.[297] That is what they really want to force us into for that kind of impact and what not, and so many, many things here are so different that it just takes a long time.[298] Thank you very much.

2011).

[289] *Id.*

[290] Brad Dicken, *Lorain County to Get Money From Lake Erie Wind Turbines,* THE CHRONICLE-TELEGRAM (May 26, 2011), http://chronicle.northcoastnow.com/2011/05/26/lorain-county-to-get-money-from-lake-erie-wind-turbines/.

[291] *Morning Roundup: Deepwater Submits Bid to Sell Offshore Wind Electricity to Long Island,* OFFSHORE WIND WIRE (May 9, 2011), http://offshorewindwire.com/2011/05/09/roundup-deepwater-bid-to-longisland/.

[292] *See generally Wind Energy, supra* note 260 (discussing reports and steps undertaken to start and develop the project).

[293] *See generally Partners, supra* note 212 (describing LEEDCo's collaborative efforts with General Electric to work on public policy issues relating to offshore wind energy).

[294] *See generally* State of Ohio Wind Powered Electric Generation Facility Option to Lease Lake Erie Submerged Lands (Nov. 1, 2010), *available at* http://www.ohiodnr.com/LinkClick.aspx?fileticket=NK38BX05uWc%3D&tabid=21234.

[295] *Id.*

[296] *About LEEDCo,* LEEDCO, http://www.leedco.org/about/about-leedco/ (last visited Dec. 22, 2011).

[297] *Id.*

[298] *Id.*

DISCUSSION FOLLOWING THE PANELISTS' REMARKS

MS. ANDERSON: I see we have a few minutes for questions and answers. Please, are there any for panel members?

MR. NORTON: I am Roy Norton. I live in Detroit,[299] and I did not know that I could answer your question, Jim. In Detroit, they think they know what the Stanley Cup is. They expect they will win it every year.

I am the Consul General of Canada to Ohio.[300] I appreciated Mr. Ameduri's comments about the integrated economy. You did not provide the stats; I will. Last year there was thirty-one billion dollars in two-way trade between Ohio and Canada, where Ohio continues to enjoy, as it has routinely for years, surplus in that trade.[301] The thoroughly integrated economy supply chains are totally integrated.[302] I am hoping the Department of Energy ("DOE") is listening because, in the American Recovery and Reinvestment Act, the spending that you described at great length was conditioned to buy American provisions, which we did not like and which we proceeded to negotiate.[303] We spent a year negotiating with the United States Administration.[304]

A reciprocal arrangement was struck whereby Canada and the United States would have access to subnational procurement on a national treatment basis above a certain threshold,[305] and what we are experiencing now, not far from here in Mahoning County, Ohio in fact, is a phenomenon whereby a DOE funded project is being broken, it would seem, into smaller bits and pieces perhaps.[306] I can only say perhaps, so as to evade or avoid the threshold requirements, meaning the Canada and Canadian firm that is

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[299] *Consulate General of Canada in Detroit,* GOV'T OF CAN., http://www.canadainternational.gc.ca/detroit/index.aspx (last visited Dec. 12, 2011).

[300] *Id.*

[301] Tracy Samilton, *Ohio to Michigan: Please Build a New Bridge to Canada*, MICH. RADIO (Nov. 21, 2011), http://michiganradio.org/post/ohio-michigan-please-build-new-bridge-canada.

[302] Roy B. Norton, *Welcome Message Continued,* GOV'T OF CAN. (Oct. 13, 2010), http://www.canadainternational.gc.ca/detroit/offices-bureaux/welcome-bienvenue.aspx?lang=eng.

[303] *Information on Canada - U.S. Agreement on Government Procurement,* FOREIGN AFFAIRS AND INT'L TRADE CAN., http://www.international.gc.ca/trade-agreements-accords-commerciaux/fo/information_renseignements.aspx?lang=eng&view=d (Jun. 7, 2010).

[304] *Id.*

[305] *Id.*

[306] *See generally Grants – Award Summary,* RECOVERY, http://www.recovery.gov/Transparency/RecipientReportedData/pages/RecipientProjectSummary508.aspx?AwardIdSur=75710&AwardType=Grants (last visited Nov. 8, 2011), *and American Recovery and Reinvestment Act Energy Efficiency and Conservation Block Grant Program Awards,* OHIO DEP'T OF DEV., http://www.development.ohio.gov/recovery/EECBGAwards.htm (last visited Nov. 10, 2011).

partnering with an Ohio firm in Northern Ohio is being discriminated against in terms of being able to win on the lowest bid basis that project.[307] It would be like, to play on your introduction, Canada saying that Sidney Crosby, if he were well enough to play, could only play providing Pittsburgh were not playing a Canadian team.

MR. CUNNINGHAM: That is the rule we Washingtonians want.[308]

MR. NORTON: Which we would, of course, never do.[309] So take note, take it back, if you would, and make some inquiries. We hope to get this resolved favorably.

MS. ANDERSON: Thank you.

MR. ROBINSON: Here, here.

MS. FICKLING: Meera Fickling from the Business Institute.[310] Sir, I just had a question for the panel and I guess anybody else in the audience who wants to take a crack at this about renewables and reliability. Obviously, there are many countries or at least a few countries in Europe that have far higher percentages of generation of renewable energy than the United States does, and far higher percentages from wind and solar than Canada.[311] I guess my question is, with the intermittency issue inherent to renewable energy, what is the threshold in terms of percentage of generation past when you start to have serious reliability issues?

MR. RASKIN: First of all, I think it is as much a cost issue as reliability issue.[312] You can firm up the intermittent power but you have to build other power plants, particularly natural gas plants with automatic generation control, which can fill in when the plants go down.[313] So it is a cost issue as much as anything else.[314]

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[307] DEP'T OF ENERGY, REQUIRED USE OF AMERICAN IRON, STEEL, AND MANUFACTURED GOODS – SECTION 1605 OF THE AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009, *available at* http://energy.gov/sites/prod/files/SPECIAL_TERMS_AND_CONDITIONS_FOR_USE_IN_MOST_GRANTS_AND_COOPERATIVE_AGREEMENTS.pdf.

[308] *Id.*

[309] Norton, *supra* note 302.

[310] *Meera Fickling—Biography,* PETERSON INST. FOR INT'L ECON., http://www.iie.com/staff/author_bio.cfm?author_id=594 (last visited Nov. 8, 2011).

[311] Kerri Shannon, *China, Europe Lapping the United States in the Clean Energy Race,* MONEY MORNING (Apr. 2, 2010), http://moneymorning.com/2010/04/02/clean-energy/. *See On-Grid Renewable Energy Systems,* ENERGY ALTERNATIVES LTD., http://energyalternatives.ca/content/GridTie.htm (last visited Nov. 10, 2011).

[312] *See generally* Jeff Anthony, *Clearing the Air: Wind Power and Reliability,* RENEWABLE ENERGY WORLD (Mar. 25, 2008), http://www.renewableenergyworld.com/rea/news/article/2008/03/clearing-the-air-wind-power-and-reliability-51767 (discussing costs associated with the reliability of wind power).

[313] *Id.*

[314] *Id.*

That being said, we have had one incident, so far in Texas, where the wind just stopped blowing.[315] I think something like 1,500 megawatts of energy just disappeared, literally in minutes, and the system voltages went down.[316] There were near-cascading outages but they managed to pick the system up.[317] My guess is they are learning from that, and so the next time it happens, then we will have to deal with it.

But the North American Electric Reliability Council, which is responsible for reliability and establishes the rules, and I worry about this, they are studying that very question and trying to figure out how to do it.[318]

I think at the end of the day it is about money and not about the reliability, as most reliability issues end up being about money.[319] But as to the cost, it has to be considered when you compare the cost of wind versus something like a gas plant or a coal plant, which is not a variable.[320]

MR. CUNNINGHAM: Dick Cunningham of Steptoe & Johnson.[321] I would like to pursue this thing, feed-in tariffs for just a moment, because I have looked at this as a trade issue. The Chinese use it extensively and have used it quite successfully to subsidize the demand side for wind power and have built up what is probably the largest wind power industry in the world.[322] The Spaniards did the same thing, although apparently there is a bit of a collapse coming there.[323] From a World Trade Organization standpoint it is much cleaner, subsidies to producers are much more difficult to sustain under the World Trade Organization's old rules than subsidies to consumption.[324] So why are we not doing this?

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[315] *The Need for Electricity Storage,* MEGAWATT STORAGE FARMS, INC., http://www.megawattsf.com/gridstorage/gridstorage.htm (last visited Nov. 14, 2011).

[316] *Id.*

[317] *Id.*

[318] *See About NERC*, NERC, http://www.nerc.com/page.php?cid=1 (last visited Nov. 14, 2011).

[319] Anthony, *supra* note 312.

[320] *Id.*

[321] *Richard O. Cunningham—Biography,* STEPTOE & JOHNSON, LLP, http://www.steptoe.com/professionals-168.html (last visited Nov. 14, 2011).

[322] *See generally China Sets Feed-In Tariff For Wind Power Plants*, ENVIRONMENTAL EXPERT S.L. (Jul. 27, 2009), http://www.environmental-expert.com/news/china-sets-feed-in-tariff-for-wind-power-plants-59097 (discussing China's use of feed-in tariffs for wind power plants); *see generally* Keith Bradsher, *China Leading Global Race to Make Clean Energy,* N.Y. TIMES, Jan. 30, 2010, http://www.nytimes.com/2010/01/31/business/energy-environment/31renew.html.

[323] Paul Voosen, *Spain's Solar Market Crash Offers a Cautionary Tale About Feed-In Tariffs,* N.Y. TIMES, Aug. 18, 2009, http://www.nytimes.com/gwire/2009/08/18/18greenwire-spains-solar-market-crash-offers-a-cautionary-88308.html?pagewanted=all.

[324] S*ee generally The WTO and Subsidies,* GLOBAL SUBSIDIES INITIATIVE, http://www.globalsubsidies.org/en/media-portal/the-wto-and-subsidies (last visited Nov. 15, 2011) (discussing the World Trade Ogranization's role in governing subsidies).

MR. RASKIN: Two reasons. Number one, we have a philosophy in this country to run things efficiently and subsidies are not generally viewed positively unless a politician can hide them.[325] Second, more importantly, we set electric rates to consumers at the state level and not the federal level.[326] The responsibility to establish these kinds of feed-in tariffs for retail electric service would go to the states, and in that circumstance, I think it is very hard to establish a national policy.[327]

MR. AMEDURI: Let me add to that as well, even though I have some advantage with the Department of Energy. I know she does not recall seeing that. One of the biggest problems we have in the United States is that there is no national energy policy.[328] Ohio has a renewable policy,[329] Pennsylvania has one, New York has one, and every state has something different.[330]

In reality what is happening is we are driving it by having each state's own renewable policy, and in driving it upstream with the federal government and to really get to your point, what we really want to do is, we want to go in the other direction as well.[331]

We want the federal government to set the policy on some of this.[332] I agree with this gentleman that oil and electricity do not quite mix, but at some point in time, we have got to start putting values on our military supporting what is going on in the Middle East. How much does that cost us? How much does that add to the cost of gasoline? How much does that add to the cost of everything that we are doing and becomes more of a political issue than an energy issue? But at some point in time in the United

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[325] *See generally The Static Effects of Subsidies On Efficiency,* GLOBAL SUBSIDIES INITIATIVE, http://www.globalsubsidies.org/en/resources/a-subsidy-primer/the-static-effects-subsidies-efficiency (last visited Nov. 15, 2011) (discussing how subsidies tend to reduce economic efficiency).

[326] *See generally Electric Rates By State,* SOLAR ENERGY, http://energybible.com/solar_energy/electric_rates-by-state.html (last visited Nov. 15, 2011) (discussing the variable rates of electricity by state).

[327] *Id.*

[328] *See generally National Commission on Energy Policy,* BIPARTISAN POL'Y CTR., http://bipartisanpolicy.org/projects/national-commission-energy-policy (last visited Nov. 15, 2011) (discussing the mission of the United States National Commission on Energy Policy).

[329] *See Ohio Energy Resources Division: Policy,* OHIO DEP'T OF DEV., https://development.ohio.gov/Energy/Tools/Policy.htm (last visited Nov. 15, 2011).

[330] *See State Energy Efficiency Policy,* ACEEE, http://www.aceee.org/sector/state-policy (last visited Nov. 21, 2011).

[331] *See* Jeremy Shere, *AWS Truepower CEO Bruce Bailey: Why the U.S. Needs a National Renewable Energy Policy,* RENEWABLE ENERGY WORLD (Feb. 10, 2011), http://www.renewableenergyworld.com/rea/blog/post/2011/02/aws-truepower-ceo-bruce-bailey-why-the-u-s-needs-a-national-renewable-energy-policy.

[332] *Id.*

States, we are going to wake up and develop a federal policy, but right now it is just being driven by each state.[333]

One of our worries in Ohio is that state policy could change three years from now.[334] We are building, in this little farm that I showed you, with $150 million dollars, and the bankers want the twenty-year deal and they ask how long are we will need the money going forward.[335] We say, "Well, we think . . ." and they say, "We do not invest on 'we think.'"[336]

Those kind of issues are across the board, we have got to settle here, and same thing with what is going on in Canada.[337] There was going to be 4,000 megawatts in Lake Erie and now there is going to be none on your side of the lake.[338]

MR. CUNNINGHAM: For those of you who, unlike me, know the economics of the industry, putting aside the fact that it is state level versus federal level, if we had an energy policy, would we be better off using more feed-in tariffs, or should we stick with subsidizing producers? Because right now you have a problem.

MR. AMEDURI: Exactly.

MR. CUNNINGHAM: It is not economically competitive.[339] You can either force the price of carbon up,[340] you can use feed-in tariffs to create the demand unofficially or you can subsidize the production, and I am not sure I have a view as to which is, just from an economic standpoint, better.[341] I

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[333] *See generally State Energy Efficiency Policy, supra* note 330 (discussing each state's energy policy).

[334] *See generally* Jeff Bell, *Shale Gas Potential Has Kasich Team Rethinking Ohio's Energy Policy*, COLUMBUS BUS. FIRST (Sep. 9, 2011), http://www.bizjournals.com/columbus/print-edition/2011/09/09/shale-gas-potential-has-kasich-team.html?page=2 (discussing potential changes in Ohio's energy policy).

[335] Jacqueline Gedeon, *Ohio and Michigan Race to Own the First Freshwater Offshore Wind Turbines*, BG REPORTS (Oct. 27, 2011, 3:41 AM), http://blogs.bgsu.edu/bgreports/2011/10/27/ohio-and-michigan-race-to-own-the-first-freshwater-offshore-windturbines/.

[336] *See generally* Bell, *supra* note 334.

[337] *See generally Overview of Canada's Energy Policy*, NAT. RESOURCES CAN. (Jan. 5, 2009), http://www.nrcan.gc.ca/energy/policy/1352 (discussing Canada's national energy policy).

[338] *Erie Wind Energy*, 4C OFFSHORE, http://www.4coffshore.com/windfarms/offshore-wind-prospect-canada-ca05.html (last visited Nov. 21, 2011).

[339] *See* Voosen, *supra* note 323 (discussing Spain's use of feed-in tariffs and resulting consequences); *see also The Static Effects of Subsidies On Efficiency, supra* note 325 (discussing how subsidies affect economic efficiency).

[340] *See generally* James Murray, *US 2012 Carbon Price To Hit $13.70*, BUS. GREEN (Mar. 2, 2009), http://www.businessgreen.com/bg/news/1800695/us-2012-carbon-price-hit-usd1370 (discussing the projected price of carbon and the effects of an increase in the price of carbon).

[341] *See generally Feed-in Tariffs for Renewable Energy*, NEW RULES PROJECT, http://www.newrules.org/energy/rules/feedin-tariffs-renewable-energy (last visited Nov. 21,

know darn well, from a World Trade Organization perspective, which is better, which would be the feed-in tariffs.[342]

MR. RASKIN: I would probably differ from the others on the panel, Dick, but I think establishing a price on carbon, if we can agree that there should be a price on carbon and what it should be, would be a good thing because that will be a real economic.

That is an externality that is not being priced into the cost of coal power if you believe that global warming is a serious problem, but we cannot agree on that.[343] But providing subsidies, I just think it is a fool's errand. I would rather allow the electric system to be run as efficiently as possible, and put our money into research and development so that we bring closer the day when we do not have to subsidize these other options, and I think that is the better way to do it.

We are more likely to win that way than trying to pick winners and losers. My understanding is that the feed-in tariffs have been abandoned in much of Europe because they have been a failure.[344] They are bringing forth uneconomic sources in electricity and they were unhappy with them.[345]

MS. ANDERSON: And perhaps to complete this one, because I do know we are running against time, I understand we are leading into a panel that is going to talk about cost of taxes and I think it will be a very good hour-and-a-half to come.

So thank you for both views and please stay around because what is coming next is just on that topic. One last question if I could, please?

MS. LUSSENBURG: My question builds a bit on the discussion we have just had but not in terms of whether it should be cap and trade or carbon tax. It seems, when you listen to the presentations today, that it is inevitable that we are going to have cleaner, greener energy and it costs more.[346] Everyone

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2011) (discussing feed-in tariffs and wind energy); *see also* AM. WIND ENERGY ASS'N, WIND ENERGY AND U.S. ENERGY SUBSIDIES (Jan. 2007), *available at* http://www.maine.gov/doc/mfs/windpower/pubs/bill_hopwood/Energy%20Subsidies%20Fact sheet_1.2007.pdf (discussing energy subsidies and wind energy).

[342] *See The WTO and Subsidies*, *supra* note 324 (discussing the World Trade Organization's role in governing subsidies).

[343] *See generally* Scott Malone, *Coal's Hidden Costs Top $345 billion in U.S.: Study*, REUTERS (Feb. 16, 2011, 11:57 AM), http://www.reuters.com/article/2011/02/16/us-usa-coal-study-idUSTRE71F4X820110216 (discussing the hidden costs of coal power).

[344] *See generally* Voosen, *supra* note 323 (discussing Spain's use of feed-in tariffs and resulting consequences).

[345] *Id.*

[346] *See* Taylor, *supra* note 269 (discussing the high costs of wind energy); *see also* Morgan, *supra* note 302 (discussing the high costs of solar power).

seems to accept that.[347] The question is when is that going to happen? 2015 or 2020 or 2025?

When we listen to an issue that is like the one that Mr. Ameduri has put forward, the question I have is, why are we sticking our heads in the sand? Europe has been quite successful with wind energy.[348] We have a tremendous issue in Canada, the NIMBY issue or "not in my backyard."[349] But in Europe, it is typically not in people's backyards either; it is off in the North Sea or somewhere else, or out seven miles out in Lake Erie.[350]

We have lots of wind on the East Coast and lots of wind on the West Coast in both of our countries.[351] So why are we not getting on with that and just recognizing the reality because there is this huge time period. So for sometime there will be a not-for-profit operation.[352] At some point, if governments can support the GMs of the world, governments can support these kinds of initiatives.[353] When they become financially profitable, where the cost of other energy has gone up significantly, you sell the thing, and you make a lot of money, and you recoup your costs, right?[354] Hopefully, you make a huge profit if you are business minded.[355] I continue to struggle with why we are not more forward-looking here because it is inevitable it is going to happen.

MR. SALLIANT: We have got an almost inexhaustible supply of domestic natural gas that can be produced at about four or five dollars.[356]

MS. LUSSENBURG: But it is not green.[357]

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[347] *Id.*

[348] *See International Experience,* NRG ENERGY, http://www.nrgenergy.com/nrgbluewaterwind/experience.html (last visited Nov. 25, 2011) (discussing Denmark's reliance on, and success with, wind power).

[349] *Windmills vs. NIMBYism,* THESTAR.COM (Oct. 20, 2008), http://www.thestar.com/comment/article/519708.

[350] *Germany's North Sea Wind Turbines Attracting Sea Strangers,* ABC NEWS (Sept. 22, 2010), http://abcnews.go.com/Technology/germanys-north-sea-wind-turbines-acting-reefs/story?id=11697363#.TtsVEM2KVD8. *See also* Beach, *supra* note 283.

[351] *Wind Driven Surface Currents: Gyres Background,* OCEAN MOTION, http://oceanmotion.org/html/background/wind-driven-surface.htm (last visited Dec. 3, 2011).

[352] *See generally Critical Size and Location Choice: Key Factors for Offshore Wind Farms,* ENERGY OUTLOOK (May 5, 2011), http://energy.sia-partners.com/1430 (discussing Europe's trial and error with wind turbines).

[353] *See generally Types of Financial Assistance,* U.S. DEP'T OF ENERGY, http://www.eere.energy.gov/ (last visited Dec. 3, 2011) (discussing various types of financial assistance from the United States Department of Energy for energy efficient and renewable energy projects).

[354] *See generally Critical Size and Location Choice, supra* note 352 (discussing the profitability of wind farms).

[355] *Id.*

[356] *U.S. Natural Gas Prices,* U.S. ENERGY INFO. ADMIN. (Nov. 29, 2011), http://38.96.246.204/dnav/ng/ng_pri_sum_dcu_nus_m.htm.

MR. SALLIANT: It is a great option, and unless we have agreement that we should not pursue it and we should put our money into renewables, we are not going to get anywhere with it.[358] That is having an energy policy, and people just disagree.[359]

MS. BATTERSHELL: Yes. I think while we have a range of views on things, what we all come together on is that we need a national energy policy and, in the absence of that, you really struggle to push an overall policy down the road.[360]

MS. ANDERSON: I think it is a great wrap-up on national energy policy. I think an equally good wrap-up in terms of your timing question. We all probably share a common belief that there is no either-or, that we need all types of energy, and it includes some of these renewables and many of them to be viewed as well as natural gas fossil fuels.[361] I thank you for attending. I thank the panel for their participation.

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[357] Abrahm Lustgarten, *Natural Gas Not As 'Clean' As Previously Thought, New Research Suggests*, HUFFINGTON POST (Jan. 25, 2011), http://www.huffingtonpost.com/2011/01/25/natural-gas-clean_n_813750.html.

[358] *See generally National Commission on Energy Policy*, *supra* note 328 (discussing the mission of the United States National Commission on Energy Policy).

[359] *Id.*

[360] *Id.*

[361] *Id.*