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AMERICAN ENERGY SECURITY AND INNOVATION: THE ROLE OF A DIVERSE ELECTRICITY GENERATION PORTFOLIO

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY AND POWER

OF THE

COMMITTEE ON ENERGY AND COMMERCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRTEENTH CONGRESS

FIRST SESSION

MARCH 5, 2013

Serial No. 113–12

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

U.S. GOVERNMENT PRINTING OFFICE

80–256 WASHINGTON : 2013

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
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AMERICAN ENERGY SECURITY AND INNOVATION: THE ROLE OF A DIVERSE ELECTRICITY GENERATION PORTFOLIO

TUESDAY, MARCH 5, 2013

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY AND POWER,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 10:04 a.m., in room 2322 of the Rayburn House Office Building, Hon. Ed Whitfield (chairman of the subcommittee) presiding.

Members present: Representatives Whitfield, Scalise, Shimkus, Pitts, Terry, Latta, Cassidy, Olson, McKinley, Gardner, Pompeo, Kinzinger, Griffith, Barton, Rush, McNerney, Green, Doyle, Barrow, Christensen, and Waxman (ex officio).

Staff present: Nick Abraham, Legislative Clerk; Charlotte Baker, Press Secretary; Allison Busbee, Policy Coordinator, Energy and Power, Annie Caputo, Professional Staff Member; Patrick Currier, Counsel, Energy and Power; Andy Duberstein, Deputy Press Secretary; Tom Hassenboehler, Chief Counsel, Energy and Power; Heidi King, Chief Economist; Ben Lieberman, Counsel, Energy and Power; David McCarthy, Chief Counsel, Environment and the Economy; Mary Neumayr, Senior Energy Counsel; Chris Sarley, Policy Coordinator, Environment and the Economy; Tom Wilbur, Digital Information Technology; Jeff Baran, Democratic Senior Counsel; Greg Dotson, Democratic Staff Director, Energy and Environment; Kristina Friedman, Democratic EPA Detailee; and Caitlin Haberman, Democratic Policy Analyst.

OPENING STATEMENT OF HON. ED WHITFIELD, A REPRESENTATIVE IN CONGRESS FROM THE COMMONWEALTH OF KENTUCKY

Mr. WHITFIELD. I would like to call the hearing to order this morning, and certainly want to thank our witnesses for being with us, and after opening statements, of course, I will be introducing each one of you. We certainly look forward to your testimony.

At today's hearing, we are going to be focusing on the role of a diverse source of fuel for electricity generation. We frequently all hear a vocal chorus about the need for "all of the above" to meet our Nation's demand for electricity at an affordable cost so that we can be competitive in the global marketplace, create a strong economy, and create jobs.

But I think it is also important that we be realistic, and we know that there are people in the administration, that are political leaders around the country, that there are national and international environmental groups, that there are nonprofit groups and others who really do have a desire to stop the use of fossil fuel and production of electricity. Just yesterday, for example, Mayor Michael Bloomberg of New York—and I didn't say this, but the article said that he was gleefully writing the obituary for coal, and he was quoted as saying "It used to be said that coal is king, and regrettably, coal remains king in Nations like India and China." But then he went on to say "Here in the United States, I am happy to say that the king is dead. Coal is a dead man walking."

Now, the mayor says that he supports natural gas, but he gives millions of dollars to groups that want to reduce the use of hydraulic fracturing. And of course, he made his money and he can spend his money any way that he wants to, but I think it is important that we have a national discussion about the reality of trying to eliminate fossil fuel as a source for electricity generation.

Robert Mann, the Sierra Club President, was quoted as saying "Fossil fuels have no part in America's energy future. Coal, oil, and natural gas are poisoning us. The emergence of natural gas as a significant of our energy mix is particularly frightening, because it dangerously postpones investment in clean energy at a time when we should be doubling down on wind, solar, and energy efficiency."

The EPA, without question, has established an unmistakable trend line. Coal is being taken out of the national fuel mix and EPA is methodically establishing a regulatory framework to dramatically reduce fossil fuel use throughout the economy. EPA's regulatory framework is taking fuel choice decisions away from the private sector, while it bases those decisions on a single determinate, the environment, climate change, so forth, but ignoring equally important national goals and energy security, economic growth, lower consumer costs, and electric reliability, I believe, will lead to serious problems in America. In fact, we already see signs of it. A few days ago, there was an article—which I have a copy here—that said "California is weighing how to avoid a looming electricity crisis that could be brought on by its growing reliance on wind and solar power. Even though California has a lot of plants, it does not have the right mix. Many of the solar and wind sources added in recent years have actually made the system more fragile." Those are not my words, those are the words of the author. And then in the New York Times, "Electricity prices in New England have been four to eight times higher than normal as the region's reliance on natural gas for power supplies has collided with a surge in demand for heating."

This is a little harbinger of things to come. The Northeast is littered with coal plants that have been retired. Gas pipeline capacity is inadequate, and without nuclear power plant at Indian Point, New England would have been toast. And then we have the energy bill 2007 that prohibits the use of fossil fuel for providing electricity to government buildings new and modified by the year 2030. We have greenhouse gas regulations that will not allow you to build a new coal-powered plant in America if they are finalized, and now they are thinking about applying that to existing.

So I think this hearing is a great place to have an honest discussion about the reality of trying to meet the electrical needs of America without fossil fuels, nuclear power, and those fuels that provide our base load needs. I, for one, believe we do need all of the above, but I think that it is wrong that people in America and groups in America are trying to absolutely stop the use of fossil fuels.

I see my time is expired. At this time, I recognize the gentleman from Illinois, Mr. Rush, for his opening statement.

[The prepared statement of Mr. Whitfield follows:]

PREPARED STATEMENT OF HON. ED WHITFIELD

American electricity is like the American people—our strength is in our diversity. And that is the topic of discussion for today's hearing, which is entitled "American Energy Security and Innovation: The Role of aDiverse Electricity Generation Portfolio."

Americans are fortunate to have a variety of electricity sourcesavailable to us. Each source brings its own unique mix of assets and liabilities. Some are inexpensive, while others are not. Some are reliably available 24 hours a day and seven days a week and ideal for baseload power, while others are not. Some can be quickly ramped up or down to match quick changes in demand, while others cannot. Some can be located almost anywhere, while others are geographically limited. Some can be easily integrated into the existing electric grid, while others would necessitate costly new infrastructure investments.

As a result, there is no one ideal means of generating electricity. The best approach for affordability and reliability is a broad mix of generation sources, be it coal, natural gas, nuclear, or renewables. Each source can serve a purpose in the electricity mix, and each has strengths that can compensate for the other's weaknesses. And the best way to strike the right balance is through market forces—not government mandates or other market distorting policies.

Of course, Washington State is not Kentucky, and Kentucky is not Texas. The best generation mix will vary significantly from region to region, which is why Congress needs to be cautious about imposing onesize- fits-all measures such as federal renewable portfolio standards, and the EPA should be considering the impacts of its regulations on fuel diversity, especially as it relates to baseload power.

The ideal electricity mix will also vary over time. That is why we need the flexibility to allow the mix to change with the times and with the inevitable fluctuations in the price of various electricity sources. This is becoming increasingly important as EPA regulations limit the options of resources and technologies available for utilities.

The best way to deal with the electricity challenges of today and tomorrow is to expand the options available, not to reduce them. That is why I believe that EPA's regulatory assault on coal is bad policy. Coal is the leading source of electricity generation in the U.S., and it certainly remains the fastest-growing source of energy for China and many of our other global competitors. We gain nothing when we foreclose the option of new coal-fired generation by regulating it out of existence.

Government should not tilt the playing field against coal, nor should it tilt it in favor of other sources like wind and solar. The reality is that these non-hydro renewables are neither cheap nor reliable at the present time, which is why they are so heavily reliant on federal subsidies. The government should not be intervening on behalf of wind and solar or any other fuel source for that matter. Sound energy planningmeans that you don't rely on one energy source, in essence putting all of your eggs into one basket.

Federal policies should encourage an all-of-the-above approach to electricity production that takes advantage of all affordable domestic energy resources. Rather than pursuing policies that could limit the diversity of energy resources, the U.S. instead should be pursuing opportunities to transition to the most advanced generation fleet in the world, inclusive of all affordable and reliable resources and technologies.

# # #

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

Mr. RUSH. I want to thank you, Mr. Chairman, for holding today's hearing, and Mr. Chairman, I commend you for allowing the Minority side to invite witnesses who have had success in renewables so that today's panel actually reflects the title of this hearing, and we are hearing from a diverse energy source base, besides just coal and nuclear.

Mr. Chairman, I believe in a truly "all of the above" energy policy, and fortunately, Mr. Chairman, we are indeed seeing more diversity in the Nation's electric generation portfolio, as we move towards more natural gas and renewable energy and away from our heavy reliance on carbon-intensive coal.

In 1993, Mr. Chairman, coal was responsible for 50 percent of the electric generation in the U.S., while natural gas accounted for less than 15 percent. However, the Energy Information Agency reports that in 2012, there was indeed a shift in electricity generation away from coal-fired generation, which declined by 12.5 percent, and towards cleaner sources of electricity, including natural gas, which increased by 21 percent, wind generation, which increased by 16 percent, and solar generation, which increased by over 138 percent in just a single year. Mr. Chairman, due to this shift in 2012, coal accounted for 37 percent of the Nation's electric generation. Natural gas accounted for 30 percent. Nineteen percent came from nuclear, and 12 percent of the Nation's electric portfolio came from renewable sources, including solar, hydropower, and wind. In fact, Mr. Chairman, the wind industry experienced rapid growth in 2012, and for the first time, wind was responsible for the largest increase of adding capacity, with 12,600 megawatts of added generation. Wind power is very important to my home State of Illinois, and in fact, there are up to 13 international wind companies headquartered in the city of Chicago alone. So I am very pleased to have witnesses here today who can discuss the importance of investing in renewable sources of energy, whose costs continue to fall and capacity continues to rise.

Mr. Chairman, the EIA also notes that U.S. energy-related combustion emissions was expected to decrease by 3.4 percent in 2012 to the lowest levels since 1994. This is as a result of the increased use of renewable energy, the transition from coal to natural gas, and also due to the slow economic growth. While energy-related carbon emissions have declined 11.5 percent since 2005, they are still 5.4 percent above 1990 levels, and Mr. Chairman, without significant policy action, the EIA expects U.S. carbon pollution emissions to increase by 6 percent between 2012 and 2020.

This is precisely why the new source performance standards are so very, very critically important. These standards, which are mandated by law, will require new facilities to install the best demonstrating technologies while also taking into account cost and allowing States to show flexibility. Implementing these proposed standards will ensure that the power generation industry has regulatory certainty and will avoid penalizing companies who have

made significant investments into their future, while not allowing the can to constantly be kicked down the road.

So Mr. Chairman, I look forward to today's hearing, and I look forward to the challenges and opportunities that are before us of maintaining fuel diversity in the Nation's electricity generation portfolio. With that, I yield back the balance of my time.

Mr. WHITFIELD. Thank you, Mr. Rush.

At this time, I recognize the gentleman from Texas, Mr. Barton, for 5 minutes.

OPENING STATEMENT OF HON. JOE BARTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. BARTON. Thank you, Mr. Chairman. I won't use that entire time.

I have served in Congress and on this committee for over a quarter of a century, and when I first got elected, we had wellhead prices on natural gas, we had the Fuel Use Act that said you couldn't use natural gas for new power plant electricity generation. The general economic model was that electricity generation was a natural monopoly and had to be regulated very heavily at the State and federal level. That has evolved in the last 25 years, and we are now at a point where we still allow States that wish to, to regulate their electricity markets, but we also accept that a true market can function, and in Texas, we have deregulated the wholesale generation of electricity. We still regulate the wholesale transmission and the retail distribution, but we have a thriving wholesale generation market in which we have power plants, independent power plants that are owned by companies all over America generating and selling electricity. We also have the largest wind generation capacity in the country, and as a consequence of that, with the subsidies that we have been providing to wind power, which I support to some extent, have had the situation where wind generators have priced their product negatively into the market simply to get the subsidy to keep their wind turbines turning.

So economic theory for electricity generation is a big deal, and we have an excellent panel today to discuss where it is today. I look forward to hearing that, and now would like to yield 1 minute to Mr. Scalise of Louisiana.

Mr. SCALISE. I want to thank my colleague from Texas for yielding, and first, before we talk a little bit about "all of the above" energy, I want to welcome Mr. Mohl for being here, speaking on behalf of Energy Wholesale Commodities, which is a Fortune 500 company based in Louisiana. We are proud to have them there. Appreciate the work you are doing in nuclear power specifically, which you are going to be talking about, I believe, today.

You know, when we talk about "all of the above," what we mean is truly all of the different sources of energy, and when you look at the portfolio that this country uses today, the things that actually run America, that help us not only enjoy our daily lives and increase our standard of living, but also to produce things. If we are going to be able to be a manufacturing country and actually create jobs here, it is going to take energy to do it, and under the current breakdown we have today, roughly 87 percent of the electricity that is generated in this country comes from coal, from nu-

clear power, and from natural gas, and unfortunately, all three are under attack by this administration. The war on coal has been duly noted, you know, you see so much coal being exported because you can't even use it in this country today, yet it represents over 37 percent of the electricity that is generated. How you can continue to enjoy the standard of living we have as a country today when the administration is attacking 37 percent of that resource, and then in addition, it is all of the other things that are produced in this country. You can't just do it on wind and solar. We support the advancement of those technologies, but when 87 percent of your electricity comes from the other sources and you are going after them, that is truly the government picking winners and losers and ultimately, the losers are families who are paying higher electricity costs when this kind of policy goes into effect.

So we are going to continue to push an "all of the above" energy strategy. It is not only good for America, it helps families and it helps the ability for our economy to create jobs and compete. So I appreciate all the panelists today, especially you, Mr. Mohl, for what you have to say as well, and with that, I would yield back to my colleague from Texas, Mr. Barton.

Mr. BARTON. I am going to yield the remaining time to Mr. Shimkus of Illinois.

Mr. SHIMKUS. Thank you, Joe, for giving me the time.

The "all of the above" should be all of the above. I think my friend, Mr. Scalise, said it well.

You know, the State of Illinois is a 50 percent nuclear, 50 percent coal, so we have the benefits, but we are both being, I think, disenfranchised in both those generating sectors. Natural gas, there is going to be a big natural gas plant in my State. It is going to be very, very helpful, but that commodity product is going to go where that commodity product can be used. I will just end with high electricity prices hurt everybody. They hurt jobs and the economy, they hurt the poor rural folks, expensive gas and the like, so an "all of the above" strategy should be a lower cost fuel for everybody, whether electricity generation or liquid transportation fuels.

Thank you, Joe, and I yield back.

Mr. BARTON. Yield back, Mr. Chairman.

Mr. WHITFIELD. Thank you.

At this time, I recognize the gentleman from California, Mr. Waxman, for 5 minutes.

OPENING STATEMENT OF HON. HENRY A. WAXMAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

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

Today the subcommittee is going to look at the electric utility industry and America's evolving electricity generation portfolio. There is no question that a significant transition is underway, and today's hearing is the first in a series.

Cheap natural gas is also helpting to transform our electricity sector. This market reality is driving a shift away from the use of polluting coal to generate electricity. Even boosters of coal acknowledge that it is not cost effective to build new coal plants today.

State and federal renewable energy policies are paying off. We have doubled our capacity to generate renewable electricity from wind and solar in just 4 years. This has cut pollution and invigorated clean energy manufacturing. The cost of renewable energy is rapidly declining. Wind power is already cost competitive with fossil fuel generation in some parts of the country. Last year, for the first time, wind power added more electricity generation capacity than any other resources. Nearly half of all new generation capacity came from wind.

These changes are positive developments, but we will hear today that controlling carbon pollution would reduce the diversity and resilience of our energy supply.

I have exactly the opposite view. In this committee, we like to pretend that there is no connection between how we generate our energy and climate change. But the fact is, climate change is the biggest energy challenge we face as a country. We can't have a conversation about America's energy policy without also having a conversation about climate change.

In November, the International Energy Agency concluded that if the world does not take action to reduce carbon pollution before 2017, that it will be impossible to prevent the worst effects of climate change because of the carbon dioxide emissions that would be locked in by the energy infrastructure existing at that time.

That means the energy policy decisions that we make today will have a real and direct impact on whether we can prevent the worst impacts of climate change in the future. Every decision to build a new fossil fuel-fired power plant poses climate risks. We need to understand and weigh those risks.

Otherwise, we are going to be locking in infrastructure that will produce carbon pollution for decades to come, or creating stranded investments that must be shut down before they have served their useful life.

Ideally, this committee would listen to the scientific experts and enact a responsible energy policy that recognizes the reality of climate change. But as the President said in his State of the Union Address, he will act if we don't. EPA's proposed carbon pollution standard for new power plants is a good first step. It is a fuel-neutral standard that requires new plants to keep their pollution below a specified level.

The proposed standard provides compliance flexibility and incentives for the deployment of carbon capture and sequestration technologies. Both natural gas and clean coal can meet this standard, which creates a level playing field for fossil fuel-fired generation.

Some utilities don't like this proposed rule. The question we should ask them is how can they reconcile unrestrained and ever-increasing carbon pollution with the scientific reality of climate change?

I am glad we are providing a forum to hear from the electric utilities today. I know we are going to have a second hearing to hear from federal and State electricity regulators. That will help us get another valuable perspective on the issues facing the electricity sector.

But we also need to hear from the scientists who can explain to us why EPA should take action to address climate change. Chair-

man Whitfield, I would like to make a request at this time that you schedule such a hearing as a third in this series to ensure that the subcommittee hears all sides of the issue.

If you want an "all of the above" portfolio, well, we have got to have policies that will encourage alternatives to fossil fuels. And by denying the tax breaks for wind and solar energy, by subsidizing oil, by ignoring the full consequences of fossil fuels and the impact they have and the cost they have on public health and the environment, we are not giving a level playing field. We are skewing our policies to more fossil fuel pollution that will cost us in the climate problems for years to come.

I yield back my time.

[The prepared statement of Mr. Waxman follows:]

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I yield back my time.

Mr. WHITFIELD. Thank you very much.

At this time, I would like to introduce our witnesses. We have a distinguished panel of witnesses. I am going to introduce all of them except for one, and then I am going to call on——

Mr. WAXMAN. Mr. Chairman, may I just comment that I wish I could stay here to hear all the witnesses. I did get a chance to review your testimony, but we have several subcommittees meeting at the same time, so I will be back and forth.

Mr. WHITFIELD. OK, thank you.

First of all, we have Mr. Mark McCullough, who is the Executive Vice President, Generation, at American Electric Power. We have Mr. William Mohl, who is the President of the Energy Wholesale Commodities that Mr. Scalise referred to. We have Mr. Benjamin Fowke, who is President and CEO, Xcel Energy. We have Mr. Marc Gerken, President and CEO, American Municipal Power. We have Mr. Robert Gramlich, who is the Interim Chief Executive Officer of the American Wind Energy Association.

At this time, I would like to recognize the gentleman from Nebraska, Mr. Terry, for the introduction of our last witness.

Mr. TERRY. Thank you. I want to introduce someone I consider a friend, and I pick his brain on electrical generation issues as they come up, and that is John from Nebraska Power, John McClure, Nebraska Public Power District. He is the VP and General Counsel of Nebraska Public Power, a very diverse energy group. I yield back.

Mr. WHITFIELD. That was a wonderful introduction, Mr. Terry. Thank you.

Once again, welcome to all of you. I am going to call on you and each of you will be given 5 minutes. There is a little box on the table that will turn red when your time is up, and obviously, we will let you go over a little bit, maybe, but not too far. But Mr. McCullough, thanks for being here, and we look forward to your testimony.

STATEMENTS OF MARK C. MCCULLOUGH, EXECUTIVE VICE PRESIDENT, GENERATION, AMERICAN ELECTRIC POWER; WILLIAM M. MOHL, PRESIDENT, ENTERGY WHOLESALE COMMODITIES; BENJAMIN G.S. FOWKE, III, PRESIDENT AND CEO, XCEL ENERGY; MARC S. GERKEN, PE, PRESIDENT AND CEO, AMERICAN MUNICIPAL POWER, INC.; ROBERT GRAMLICH, INTERIM CHIEF EXECUTIVE OFFICER, AMERICAN WIND ENERGY ASSOCIATION; AND JOHN C. MCCLURE, VICE PRESIDENT, GOVERNMENT AFFAIRS, AND GENERAL COUNSEL, NEBRASKA PUBLIC POWER DISTRICT

STATEMENT OF MARK C. MCCULLOUGH

Mr. MCCULLOUGH. Good morning, Chairman Whitfield, Ranking Member Rush, and distinguished members of the Subcommittee on energy and Power. Thank you for inviting me here today, and for this opportunity to offer the views of American Electric Power on this very critical issue. We applaud your efforts to examine energy diversity, and are encouraged that you have identified the importance of innovative technology as part of the solution.

AEP has long been an industry leader in technology development and fuel diversity planning, which has led to dramatic improvements in the reliable, efficient, and clean production and delivery of our product. Recent AEP initiatives include Mountaineer Plant's 2009 startup of the world's first carbon capture and storage demonstration at a coal power plant, and the commissioning of an ultra-supercritical John W. Turk coal power plant, one of the world's most efficient coal power plants. AEP has also demonstrated industry leading technologies in energy efficiency and grid intelligence.

Energy diversity plays an important role in reducing the potential exposure of our company and our customers to major fluctuations in markets, costs, regulations, and electric demand. This allows for the use of the lowest cost resources possible while enabling rapid response to demand changes. However, policies that could prevent the construction of new base load generating units or force the retirement of existing capacity could lead to significant shifts to this balanced energy mix and reduce capacity diversity.

For example, the proposed CO_2 NSPS for new sources effectively prohibits the construction of any new coal-fired power plant because of a lack of commercially available CO_2 control technology. Due to these regulations, as well as numerous other challenges facing nuclear energy, our Nation's electric grid will become increasingly reliant on a single fuel for new base load generation capacity, likely eliminating both diversity and flexibility in new power plant builds. Federal policy should support fuel diversity, not preclude it.

The importance of fuel diversity cannot be overstated given. Too great a reliance upon any one energy source creates a significant risk of exposure to electricity price spikes and supply disruptions. Among other benefits, coal and nuclear plants buffer against fuel supply disruptions because they can inventory months of fuel on site, a fundamental value to any energy security solution with national security benefits.

Over the past 12 years, AEP has added more than 5,000 megawatts of natural gas fuel diversity, enabling our company to

switch between fuel sources based on price fluctuations. While we recognize the value that natural gas brings to the diversity equation, AEP is concerned that a prolonged "dash" to gas will lead to over reliance on one fuel and have adverse consequences for the balance and diversity of the power sector and the economy.

With the current low cost of natural gas, coal, and uranium, now is the ideal time to look to the future and adjust the focus of technology development to truly innovative, revolutionary paradigms for energy conversion and use. We support commercialization of Small Modular Reactor, or SMR, technology for the next generation of nuclear power. For fossil fuels, the United States must invest in technologies that show promise of a step change move of the needle regarding cost, fuel efficiency, and environmental performance. With success, technologies like chemical looping and other new revolutionary technologies will enable our next generation of power plants to use coal with extremely high efficiency and ultra-low emissions, while producing a pure stream of CO_2 with no added energy penalty. These technologies can open a vast, yet untapped, oil reserves in this country to enhanced oil recovery production by making enormous quantities of low-cost CO_2 available for EOR purposes, bringing an even higher level of energy security.

However, these technology innovations require attention now to enable industry to overcome the high cost of commercialization. Encouragingly, as stated in the CURC–EPRI Technology Roadmap, the necessary funding to develop and commercialize these concepts is not beyond the levels invested in recent years with DOE's Fossil Energy clean coal programs. This funding just needs to be focused on the proper technologies. Similarly, SMR development could address nuclear risk that prevents its broad deployment today.

In summary, AEP urges the development of federal polices that promote fuel diversity to use gas, coal, nuclear, and renewable energy in revolutionary ways that minimize volatility and environmental impacts, while increasing energy efficiency. This not only addresses energy and economic security in the U.S., but brings technology solutions to the globe, where real emission impacts can be realized. It is important, as U.S. is now less than 12 percent of global carbon emissions and is getting less every year.

Thank you, chairman and members, for the opportunity to participate in this important hearing.

[The prepared statement of Mr. McCullough follows:]

SUMMARY OF TESTIMONY OF MARK MCCULLOUGH
ON BEHALF OF AMERICAN ELECTRIC POWER

AEP has long been an industry leader in technology development and fuel diversity planning. Our leadership and innovation in core generation, transmission, and distribution services have led to dramatic improvements in the efficient and clean production and delivery of our product. This innovation has helped insulate our customers from fluctuations in the cost of electricity, reduced overall costs, and diversified the ways we provide service to our customers. Technology solutions have also enabled us to use domestic and abundant coal more efficiently, minimizing customer exposure to volatile fuel markets. Some recent AEP technology initiatives include the 2009 startup of the world's first CCS demonstration at a coal power plant and the December 2012 commissioning of the ultra-supercritical John W. Turk Power Plant, one of the world's most efficient coal power plants. Both initiatives underscore AEP's industry leadership and prove the value of technology innovation.

Energy diversity plays an important role in reducing the potential exposure of our company and customers to major fluctuations in markets, costs, regulations, and electric demand by allowing for the use of the lowest cost resources possible while enabling rapid response to changes in demand that occur throughout the day. However, policies that could prevent the construction of new baseload generating units or force the retirement of existing coal-fired capacity could cause significant shifts to this balanced energy mix; reduce capacity diversity; and hinder our ability to provide reliable and affordable electricity to our communities and customers. For example, the proposed CO_2 NSPS for new sources effectively prohibits the construction of any new coal-fired power plant because of the lack of a commercially available CO_2 control technology. Due to these regulations, as well as numerous other challenges facing nuclear energy, our nation's electric grid will become increasing reliant on natural gas for new generation capacity, likely eliminating both diversity and flexibility in new power plant builds. Federal policy should support fuel diversity, not preclude it.

The importance of fuel diversity cannot be overstated given its implications for assuring economic and energy security. Too great a reliance upon any one energy source (particularly those with a history of price volatility) creates a significant risk of exposure to electricity price spikes and supply disruptions. This can lead to severe impacts on the supply stability and price of electricity for residential, commercial, and industrial customers. Consider the Tsunami catastrophe in Japan, where a natural disaster resulted in all 54 nuclear reactors being abruptly removed from service. Nearly two years later only two units are back in service. Hurricane Katrina in 2005 disabled nine oil refineries and rendered 30 oil platforms damaged or destroyed. Coal and nuclear plants buffer against fuel supply disruptions because they can inventory months of fuel on site, a fundamental value to any energy security solution with national security benefits.

Over the past twelve years AEP has added more than 5,000MW of natural gas fuel diversity, which has enabled our company to switch between fuel sources based on price fluctuations of fuels over time. This diversity has served our customers and communities well and has allowed us to keep our electricity rates low. For example, AEP responded to the spikes in natural gas pricing during the mid-2000's by increasing its use of cheaper coal to serve our customers, while at the same time decreasing emissions. Similarly, recently depressed natural gas pricing have allowed us to keep our electricity prices low by using additional natural gas where more cost effective than coal. However, AEP is concerned that a prolonged "dash" to gas will lead to over reliance on one fuel and have adverse consequences for the balance and diversity of the power sector and the economy.

With the current low cost of natural gas, now is the ideal time to look to the future and adjust the focus of technology development to truly innovative, revolutionary paradigms for energy conversion and use. We support commercialization of Small Modular Reactor (SMR) technology for the next generation of nuclear power. For fossil fuels, the United States must invest in technologies that show promise of meaningfully moving the needle regarding cost, fuel efficiency, and environmental performance. With success, chemical looping and other new revolutionary technologies will enable our next generation of power plants to use coal with extremely high efficiency and ultra-low emissions, while producing a pure stream of CO2 with no added energy penalty. Not only will these new paradigms revolutionize the power generation industry, they can open the vast, yet untapped, oil reserves in this country to Enhanced Oil Recovery (EOR) production by making enormous quantities of low-cost CO2 available for EOR purposes. These technology innovations are essential to a diverse energy future, but they require attention now and focused funding to enable industry to overcome the high cost of commercialization. Encouragingly, as stated in the CURC-EPRI Technology Roadmap, the necessary funding to develop and commercialize these concepts is not beyond the levels invested in recent years with DOE's Fossil Energy clean coal programs; this funding just needs to be focused on the proper technologies.

WRITTEN TESTIMONY OF MARK MCCULLOUGH

EXECUTIVE VICE PRESIDENT

AMERICAN ELECTRIC POWER

BEFORE THE U.S. HOUSE OF REPRESENTATIVES

ENERGY AND COMMERCE COMMITTEE

SUBCOMMITTEE ON ENERGY AND POWER

March 5, 2013

Chairman Whitfield, Ranking Member Rush, and distinguished members of the Subcommittee on Energy and Power, thank you for inviting me here today. I appreciate this opportunity to offer the views of American Electric Power (AEP) on fuel diversity and the role of technology in supplying clean and affordable electricity. My name is Mark McCullough, and I am the Executive Vice President of Generation at AEP. Headquartered in Columbus, Ohio, AEP is one of the nation's largest generators – with more than 37,000 megawatts (MW) of generating capacity – and serves more than five million retail consumers in 11 states in the Midwest and South Central regions of our nation. AEP's generating fleet employs diverse fuel sources – including coal, nuclear, hydroelectric, natural gas, oil, and wind power. Due to the location of our service area and the historic importance of coal to the economies of our states, approximately two-thirds of our generating capacity uses coal to generate electricity.

AEP TECHNOLOGAL DEVELOPMENT AND DIVERSITY PLANNING

AEP has a long history of proactive involvement in technology development and fuel diversity planning. This practice is ingrained in our culture as we remain committed to providing our customers with low cost and reliable electric service and minimizing their exposure to cost increases due to fuel cost

fluctuations or regulatory changes.

AEP's leadership and innovation in our core generation, transmission and distribution services have led to improvements in efficient and clean production and delivery of our product. We accomplished these improvements through continual advances in generation technology efficiency, improved environmental performance, reduced transmission line losses, implementation of energy audits, support of improvements in the efficiency of end-use appliances and fixtures, and improved delivery of real-time pricing and usage information for the electric grid. This innovation has helped insulate our customers from fluctuations in the cost of electricity, reduced overall costs and diversified the ways we provide service to our customers.

For over a century, AEP has been a pioneer in the development of advanced coal-fueled generation technologies, which include many first-in-the-world accomplishments that have set the standard for combustion efficiencies, emissions control, and system performance. A few examples include the first reheat generating coal unit (1924); the first heat rate (a measure of efficiency) below 10,000 Btu/kWh at a coal plant (1950); the first natural-draft, hyperbolic cooling tower in the Western Hemisphere (1963); and the first operation of a pressurized, fluidized bed combustion plant in the United States (1990). The technologies have enabled us to use domestic and abundant coal more efficiently and thus minimize customer exposure to volatile fuel markets.

While the AEP generation portfolio has shifted over the last decade to include more natural gas-fired and renewable generation, we also, last year, completed construction of the country's first ultra-supercritical coal-fired generating unit, the John W. Turk, Jr. Power Plant in Hempstead County, Arkansas. The Turk Plant has one of the highest thermal efficiencies of any coal plant in the world. This unit was designed to provide low-cost baseload power to complement new gas generating resources that were constructed in recent years, thus maintaining a diverse generating resource mix.

The Turk Plant represents a new generation of power plant design using a higher temperature and pressure steam cycle that results in the use of less fuel to produce each megawatt hour of electricity. This

means that all emissions, including sulfur dioxide (SO_2), nitrogen oxides (NOx), mercury, and carbon dioxide (CO_2), are lower than conventional coal-combustion processes per unit of electricity produced. The Turk Plant was placed in commercial service on December 20, 2012.

To ensure our current investments in coal-fired generation can be retained in the future to maintain diversity, we have also invested heavily in the advancement of carbon capture and storage technology. The Mountaineer CCS Project treated a 20-MW portion of flue gas from our 1300-MW Mountaineer Plant, removed the carbon dioxide (CO_2), and compressed and injected the CO_2 into two deep underground formations more than 7,000 feet below the surface of the plant property. The project successfully operated from 2009 to 2011, and permanently stored nearly 40,000 tons of CO_2 in deep saline reservoirs, with continuing post-closure monitoring. A second phase of that project, which would have advanced the technology to a 235-MW commercial scale, was deferred due to the failure to raise funding.

AEP also has pursued the development of Integrated Gasification Combined Cycle (IGCC) technology. IGCC represents a major breakthrough in efforts to improve the environmental performance of coal-based electric power generation. IGCC technology integrates two proven processes - coal gasification and combined cycle power generation - to convert coal into electricity more efficiently and cleanly than any existing uncontrolled power plant. IGCC also has the potential to be equipped with carbon capture technology at a lower capital cost and with less of an energy penalty than traditional power plant designs, but only after the carbon capture technology has been proven at a commercial scale. We recognize others in our industry who have continued the pursuit of this technology and support their efforts.

THE ROLE OF DIVERSITY

Diversity plays an important role in reducing the potential exposure of our company and customers to fluctuations in markets, costs, regulations, and electric demand. Diversity within the electric power sector can refer to a variety of practices that reduce these exposures. Perhaps the most important measure of diversity for the electric power sector is the practice of fuel diversity.

The U.S. has an abundance of energy resources that can be used to generate electricity, including coal, natural gas, uranium, wind, solar, water, biomass and geothermal. These fuel sources each have a unique cost profile based on both supply and demand of the fuel as well as the unique generating technology required to turn chemical, solar or kinetic energy into useful electrical energy. However, each fuel type and technology present different risk characteristics in terms of availability, reliability, cost, and performance. As such, fuel diversity among these energy resources will lower the overall risk of the generation portfolio and provide for a more reliable and cost effective electric supply.

Generating technologies are specific to the fuel or energy resource used to produce electricity to our electric grid. Developing capacity diversity within our generating system is important because it allows for the use of the lowest cost resources when possible while enabling rapid response to changes in demand that occur throughout the day. Capacity diversity is achieved by constructing baseload, intermediate and peaking facilities in addition to intermittent facilities (e.g. wind and solar), which may or may not be available to generate electricity at any given time. When properly deployed, each type of resource can synergistically operate during the various fluctuations in supply and demand to reliably support customer needs and requirements. Generally speaking, baseload facilities (coal, nuclear, hydro, and more recently gas) are designed to run around the clock with low fuel costs and provide the bulk of electricity to the grid. Intermediate and peaking facilities are designed to run primarily during periods of higher electric demand. However, policies that could prevent the construction of new baseload facilities or force their retirement could cause significant shifts to this mix; reduce capacity diversity; and increase risk of availability, reliability, and cost of electricity.

IMPORTANCE OF FUEL DIVERSITY

The importance of fuel diversity cannot be overstated given its implications for assuring economic and energy security. Too great a reliance upon any one energy source (particularly those with a history of price volatility) creates a significant risk exposure to electricity price escalation and supply disruptions. As has been proven repeatedly across the globe, such exposure can lead to severe impacts on the supply and

price of electricity for residential, commercial, and industrial customers.

For example, the recent catastrophe in Japan serves as a sobering reminder of what can happen if a single energy source is abruptly removed from use. In 2011, an earthquake and tsunami devastated shoreline communities and seriously damaged the Fukushima Daiichi nuclear power plant. Resultant radiation leaks and a greatly eroded public faith in safety of nuclear power lead to the shutting down of all of Japan's 54 nuclear reactors for mandatory maintenance and safety checks. To date, only two units are back in service. Heavily populated areas of the country have faced the realities of rolling blackouts, while manufacturing facilities are reducing output, with some making moves to relocate abroad. Meanwhile, natural gas prices in Japan nearly tripled as power producers scrambled to fill the massive void left in their energy infrastructure.

Domestic energy disruptions and their consequences are clearly evident by such disasters as Hurricane Katrina in 2005, where nine oil refineries were shut down for an extended period of time and 30 oil platforms were either damaged or completely destroyed, dramatically hampering oil and gas production. United States natural gas prices spiked following the disaster and for months afterward remained more than double the price over the previous year.

There is another unique feature to coal that must be considered from an energy security perspective. Coal is a solid and physically stable energy resource that can be safely stockpiled at the power plant site. A typical power plant takes advantage of this feature by keeping an inventory of 30 to 60 days of supply of coal at the plant site. This is an incredibly valuable characteristic when considering the risks associated with supply interruptions of other fuels, such as natural gas. If storms, natural disasters, or other forces interrupt major gas pipeline infrastructure, gas-fired power plants immediately cease to produce electricity and cannot resume production until infrastructure repairs are made. Coal plants, on the other hand, can continue to operate if the major fuel supply is compromised. Similarly, nuclear power enjoys the benefit of large reserves of fuel capacity on the plant site. This is a factor of fundamental value to any energy security solution and has national security benefits as well – particularly given the abundant reserves of coal in the United States.

HOW AEP HAS DIVERSIFIED ITS FUEL MIX

AEP has a long history of using a variety of fuels within its generation mix and has increasingly has sought to diversify its resources. Much of AEP's eastern service territory, due to its proximity to Appalachian coal, has typically been served by coal-fired generation. These large coal reserves have served AEP's customers well, resulting in some of the lowest costs for electricity in the country and fueling industrial and economic expansion. However, the advent of nuclear power allowed AEP to begin to diversify away from coal in the 1970's and further diversification occurred in the 2000's with natural gas combined cycle generating facilities being added to the system, in addition to purchases of wind power, due in large part to government tax incentives. Over the past twelve years AEP has added more than 5,000MW of natural gas fuel diversity, which has enabled our company to switch between fuel sources based on price fluctuations of fuels over time.

In AEP's Western service territory, diversification occurred in an opposite manner. Due to local natural gas and oil production in the region, these fuels represented AEP's dominant generation sources up through the 1970's. However concerns over dwindling oil and gas supplies and discovery of enormous coal reserves in the Powder River Basin of Wyoming lead to coal-fired facilities being developed in Texas and Oklahoma in the late 1970's and early 1980's. This diversification has continued in recent years through both the addition of new and highly efficient natural gas combined cycle and natural gas simple cycle generation as well as our state-of-the-art Turk Plant.

As a result of this fuel diversity, AEP has been able to switch between fuel sources based on price fluctuations of fuels over time. This diversity has served us well and has allowed us to keep our electricity rates low. For example, AEP responded to the spikes in natural gas pricing during the mid-2000's allowed by increasing its use of cheaper coal to serve our customers. Similarly, recently depressed natural gas pricing have allowed us to keep our electricity prices low by using additional natural gas where more cost effective than coal. As a result, AEP's natural gas consumption has increased by 130 percent since 2009.

While we value natural gas as a critical component of our generation energy mix, AEP is concerned that the United States has reached an important crossroads in terms of fuel diversity planning. EPA's regulations have led to the premature shut down of some of our existing coal fired facilities, while not allowing the construction of new coal-fired facilities, as discussed later. This effectively precludes further use of a low-cost, abundant and domestic resource, coal, within the U.S. generating mix and will force AEP and others to increasingly rely on natural gas for generating electricity – which has a long history of price volatility.

AEP is concerned that a prolonged "dash" to gas will lead to over reliance on one fuel and have adverse consequences for the balance and diversity of the power sector and the economy. For example, the increased use of natural gas to generate electricity puts stress on a natural gas supply system designed to meeting peak winter heating needs by requiring increasingly larger supply and flow rate to power plants, which currently represent a minority share of U.S. natural gas demand. As an example, ISO New England just told the Federal Energy Regulatory Commission on February 7 that it was concerned about "increasing reliance on natural gas-fueled generators at times when there is an increasingly tight availability of pipeline capacity to deliver natural gas from the south and west to New England." This increased reliance has contributed to rapid price spikes in the cost of natural gas in that area, which translates into much higher wholesale electric prices.

There are additional concerns surrounding the synchronization of electricity and natural gas markets as supplies of power and natural gas are secured on a different time basis. This disconnect may prevent facilities committed to provide electric power from securing the gas supplies they need to operate. This picture is further complicated by the interdependent nature of the natural gas supply and electric generation industries. As more of the power generation comes from gas, the impact of simultaneous peak electricity demand and peak consumer heating demands converge, creating a scenario where gas deliverability capability can become a bottleneck. This is particularly true in the winter when shorter days and colder temperatures increase demands for heating and lighting. While adequate supply of gas may exist, delivering

at the rate needed during peaks could be constrained. Additional coordination between these two industries is needed, in addition to fuel diversity, which will reduce this interdependent risk. We are engaged in developing solutions with all of our stakeholders.

The dash to gas and the potential problems created in its wake has come at the same time that other countries around the world are increasingly turning to coal to fuel their economies. China is currently far and away the largest consumer of coal, and in fact is consuming almost as much coal as the rest of the world combined.[1] Additionally, Europe is increasingly returning to coal to fuel its electric sector, with much of the imported coal coming from the United States.[2] Consequently, any policy, direct or indirect, to restrict coal use within the U.S. is unlikely to have a significant impact on reducing global coal consumption. The more significant impacts will be felt however by the U.S. economy, particularly in regions of the country which rely on coal production for economic stability and low-cost electric generation.

REGULATORY BARRIERS TO FUEL DIVERSITY

There are numerous barriers to fuel diversity within the electric generation fleet; however our most pressing concerns are the new federal environmental regulations and the lack of an energy policy promoting diversity and therefore energy security. As an example, the proposed CO_2 NSPS for new sources effectively prohibits the construction of new coal-fired facilities for the reasons discussed in the next section. These proposed CO_2 performance standards come in the wake of other new environmental regulations, most notably the Mercury and Air Toxics Standards. Due to these new EPA rules and other factors, electric utilities have already publicly announced their plans to shut down 335 coal-fired generating units, totaling about 47,000 MW. Additional coal plant shutdowns are expected as companies finalize their air toxics compliance plans.[3] Once these additional plant retirements are combined with already announced retirements, it is likely that over 20 percent of the U.S. coal fleet will be shut down within the next few years.

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[1] *See* http://www.eia.gov/todayinenergy/detail.cfm?id=9751 .
[2] *See* http://www.economist.com/news/briefing/21569039-europes-energy-policy-delivers-worst-all-possible-worlds-unwelcome-renaissance.
[3] *See* ACCCE paper, entitled "Coal Unit Shutdowns" (February 14, 2013).

Due to these regulations, our nation's electric grid will become increasing reliant on natural gas for new generation capacity, likely eliminating both diversity and flexibility in new power plant builds. Federal policy should support fuel diversity, not preclude it.

EPA REGULATION OF GHGs IS THREATENING DIVERSITY

Notwithstanding our lengthy history of environmental conservation and support for federal GHG reduction efforts, AEP has long maintained that the Clean Air Act (CAA or Act) is not a practical or cost-effective way to limit GHG emissions and any system to regulate GHG emissions should be developed by Congress. To this end, we have supported over the past decade ambitious federal legislation to reduce GHG emissions on an economy-wide basis through flexible market-based mechanisms. Although not enacted into law, these bills would have established a declining economy-wide cap on GHG emissions and achieved substantial GHG emissions reductions in an efficient and cost-effective manner through an emissions trading system.

In the absence of federal legislation to reduce GHG emissions, and in response to the 2007 Supreme Court decision of *Massachusetts v. EPA*, the EPA has begun to regulate GHG emissions using its existing CAA authorities. The EPA has already established a rule requiring new and modified major stationary sources to obtain pre-construction permits and install "best available control technologies" for their GHG emissions under the New Source Review (NSR) provisions of the Act.[4] In April 2012, EPA proposed a New Source Performance Standard (NSPS) for CO_2 emissions from new electric generating units (EGUs) under Section 111(b) of the CAA.

Both of these existing regulatory programs are based on a framework that was never intended to apply to GHG emissions from stationary sources. Both programs impose source-specific emissions control requirements that lack the kind of flexibility that would encourage widespread, cost-effective implementation

[4] The NSR permit requirements include a rigorous technology review requirement to ensure the installation of state-of-the-art air pollution control equipment and extensive public notice and comment procedures.

of a broad suite of emission reduction techniques and technologies. When the CAA was enacted into law over 40 years ago, its primary focus was on reducing emissions of certain air pollutants with recognized, localized health effects. A major part of the Act established national ambient air quality standards for criteria pollutants such as NO_x, ozone, SO_2, PM, and lead. These ambient air quality standards were implemented through facility-by-facility emission limits that ensured that health-based standards were met on a local basis in each state. In 1990, Congress added specific provisions to address new science that suggested that SO_2 and NO_x emissions also presented other broader regional or interstate concerns that could not be adequately or cost-effectively addressed without giving regulators new tools under the existing CAA. Congress provided those tools, first with the SO_2 cap-and-trade program for remedying acid rain across broad geographic regions and second with new authority to remedy interstate transport of air pollution that significantly contributes to nonattainment.

However, concerns regarding the relationship of global climate change and GHG emissions present a totally different set of issues (*e.g.*, both national and global emissions and ultimately global GHG concentrations are relevant) that the existing framework of the CAA was never intended to address. As such, regulation of GHGs under the existing CAA authorities is likely to be ill-designed, inflexible, and significantly more costly than a more flexible approach, while doing little to address the global issue of climate change. In short, this approach is very expensive and provides little impact on global GHGs. Therefore, if this nation wants to move forward with effective GHG regulatory programs, congressional action is necessary to provide the tools required to ensure flexible, cost-effective regulation of GHG emissions on an economy-wide basis.

AEP does not support EPA's proposed CO_2 NSPS for EGUs and has submitted extensive comments to the Agency about its concerns with the EPA proposal. EPA itself acknowledges that its proposal will not alter current plans for new generating facilities by noting that the proposal merely reinforces what the market currently encourages and what EPA assumes will continue in the future – that in an era of record-setting low natural gas prices and abundant shale gas reserves, the logical fuel of choice is natural gas. But the proposal

treats **current** market conditions as if they are reliable constants **in the future**. History tells us a very different story; that fuel diversity is a critical component of stable energy costs, and that relying on a single fuel creates significant vulnerability to major fluctuations in market prices.

Furthermore, we believe that EPA's proposed rule is unlawful, is based on faulty information, and would hinder the very efforts to develop clean coal technology that Congress, EPA, and AEP have worked so long and so hard to further. AEP is particularly concerned that the proposed rule will likely impede the development of CCS technology and hinder the progress that will be needed for coal to continue to play a vital role in America's energy policy. A summary of the current state of CCS technology is included later in this testimony, which supports EPA's own conclusion that CCS is neither commercially demonstrated nor economically viable for coal-fueled EGUs. Notably, this is the same conclusion that numerous other public and private efforts have reached, including President Obama's Interagency Task Force on CCS, the Secretary of Energy's National Coal Council, and the Department of Energy's research and development programs.

THE PROPOSED NSPS HAS CONSIDERABLE FLAWS

The specifics of EPA's recently proposed NSPS standards for new EGUs further support our concerns that the CAA is not the proper vehicle to address GHG emissions. The proposed regulations do not represent a balanced or cost-effective solution. For example, EPA has taken the extraordinary step of combining two separate well-established NSPS source categories that set different standards for different fuels for all other types of emissions, and proposed a single NSPS limit for CO_2 emissions that applies to **all** new fossil-fueled EGUs from those two categories.[5] The proposal requires that both new coal-fueled and natural gas-fueled EGUs meet a CO_2 emissions limit of 1,000 pounds per megawatt-hour (lb/MWh). AEP believes that the proposed regulations are inconsistent with the CAA because they fail to establish standards that can be achieved regardless of the fuel used (a so-called "fuel neutral" standard). Instead, for the first time, EPA has proposed to set one, **uniform**, performance standard for **all** sources within the combined EGU

[5] The proposed rule combines the NSPS source categories of Subpart Da (for fossil-fuel fired electric steam generating units) and Subpart KKKK (for stationary combustion turbines) into a common source category for GHG emissions (Subpart TTTT).

source category that is potentially achievable only by units burning fuels with the lowest inherent emissions (*i.e.*, natural gas).[6]

Under the proposed regulations, **all** new baseload and intermediate demand fossil-fueled EGUs would have to achieve an emission rate equivalent to EPA's estimate of the emission rate achievable at a new natural gas combined cycle unit. However, due to different fuel characteristics, plant designs, and operational considerations between coal and natural gas power plants, a coal-fueled power plant cannot meet a CO_2 emission rate equivalent to natural gas without some form of technology capable of reducing CO_2 from the power plant emissions. This proposed regulation is instead fuel discriminatory in that it prevents the construction of **any** new coal-fueled units without a defined, plausible plan for CCS implementation. CCS is not currently commercially available or economically viable at this time, as described later.

EPA supports its fuel discriminatory standard by stating that the rule would not impose any additional costs on the economy because under current economic conditions, no new coal-fueled units will be built. While AEP agrees that **current** market conditions generally do not support development of new coal-fueled units, this result is driven primarily by current low prices of a very volatile commodity, natural gas. Natural gas prices have fluctuated over the past decade between $2 and $13 per MMBtu on a monthly average basis. Average prices over most of the last decade have been above $6 per MMBtu. Most 10-year projections show gas prices in the range of $4 to $6 per MMBtu. By contrast, most coal prices in the US are less than $3 per MMBtu. In light of the significant historical fluctuation of natural gas prices, it is reasonable to plan for some continued variation in natural gas prices over the long-term even though shale gas reserves appear to be plentiful at this time. If, for example, natural gas prices were to increase modestly to levels seen only a few years ago, electric generating companies could opt to build new coal units based on economics,

[6] In past NSPS rulemakings for power plants, EPA has used one of the following two methodologies. The first is to set different performance standards based on lowest emission rate achievable through application of "best demonstrated technology" for each specific type of fuel burned (*i.e.*, coal, oil, natural gas). The second is to set a single performance standard for all fuels based on the emissions control levels achievable through application of the "best demonstrated technology" at *all* power plants, regardless of the fuels used. Under the latter approach, EPA has set the single performance standard based on the lowest emissions rate achievable by EGUs using coal. However, as noted above, EPA has never adopted a single NSPS for all fossil-fueled power plants based on an emissions rate achievable only by the fuel with the lowest inherent emissions (*i.e.*, natural gas).

absent the proposed CO_2 NSPS requirements. However, with EPA's proposal to adopt a CO_2 emissions standard based on the performance of natural gas combined cycle units, electric generating companies are unable to build coal-fueled units without assuming unreasonable risks, and therefore generally have no choice but to build gas units instead.

AEP believes that it is not prudent for EPA, or any other agency, to adopt federal policies that foreclose the use of coal in the future development of baseload generation. Locking exclusively into new natural gas baseload generation over the long term could increase an over reliance on natural gas for power generation to the detriment of the economy. Rather, maintaining fuel diversity through a balanced portfolio of energy resources that includes coal has been a successful strategy in providing abundant, reliable, low-cost electricity to power the nation's economic growth and high standard of living. The continued reliance on a diverse portfolio of fuels is clearly the wisest course of action to safeguard against the risk of market price fluctuations of natural gas or any of our energy resources over the long-term.

By contrast, foreclosing the option to use of coal over the long-term could burden U.S. consumers with additional and unnecessary costs as U.S. energy providers replace retiring older generation sources and try to keep up with rising demand over the coming years. Further, as EGUs begin to rely more heavily on a single fuel source for electric generation, we run the risk that the energy prices will become increasingly volatile over the long term, with implications for the entire economy.

Nuclear energy also faces daunting challenges. According to an MIT study "The Future of Nuclear Power", nuclear energy faces four unresolved problems: high relative cost; perceived adverse safety, environmental, and health effects; potential security risks stemming from proliferation; and unresolved challenges in long-term management of nuclear wastes. From a new plant construction perspective, risks associated with cost escalation, scheduling, and sheer project size suggest that very few new nuclear plants will be built. Compounding this with the fact that existing nuclear power plants are facing expiration of their operating licenses over the coming years or decades, there is a real threat that nuclear energy will not be a viable participant in a long term diverse energy portfolio.

AEP'S WORK TO ENSURE DIVERSITY

AEP believes that technological solutions are critical to reducing emissions as well as improving the reliability, efficiency, and availability of electricity production. More than a century of technology innovation qualifies AEP as an industry leader and expert in these topics. Nonetheless, as a consequence of our first-hand experience and intimate understanding of CCS technologies, AEP is convinced that CCS is many years from providing a commercially viable solution to capturing and permanently storing CO_2 emissions due to the numerous technical, financial, legal, and regulatory challenges that must first be addressed. However, these solutions will need to be developed to ensure fuel diversity can be maintained with the possibility of a carbon-constrained world.

Additionally, there are a number of other new and innovative technologies that convert coal to electric power and other products while producing a pure stream of CO_2, not requiring the added processes to capture and purify CO_2 emissions. While still in the developmental phase, these emerging technologies are showing tremendous promise at the laboratory and pilot-plant level. In many cases, these new technologies, such as chemical looping applications, are revolutionary as opposed to evolutionary in nature and could usher in a new generation of technology solutions that are lower in cost, perform at higher energy efficiencies, and provide more flexibility in fuel selection.

With respect to CCS, AEP partnered in 2007 with Alstom to design, build, and operate the world's first integrated CCS project on a coal-based electricity generating plant. The validation project began operation on September 1, 2009 and continued through May 31, 2011. Over that time period, the installed chilled ammonia process captured more than 50,000 metric tons of CO_2 and injected nearly 40,000 metric tons of that CO_2 into deep saline reservoirs beneath the plant site. Because the system was built as a validation platform, with all the flexibilities necessary for systematic process adjustments, the operators were able to fine-tune and control all process streams and energy inputs to thoroughly evaluate the technology. Once completed, the AEP/Alstom team possessed a comprehensive understanding of the integrated CCS processes and specifics about the operation of each system within the process. This in-depth knowledge

includes a detailed understanding of key process parameters such as energy penalty, reagent loss, CO_2 capture rate, and all aspects of geologic CO_2 sequestration. The success of the validation project positioned the team to receive a grant from the U.S. Department of Energy to move forward with an engineering study and preliminary design of a commercial-scale CCS project at the same facility.

The lessons learned from these efforts uniquely position AEP to comment on the current status and future prospects of CCS technology deployment, including operational performance and cost specifics, as well as the significant remaining developmental challenges that must be addressed before CCS can be considered commercially available.

"Commercially available" technologies are those that can be purchased from a vendor, have been proven at commercial scale on a representative application, and are offered with robust guarantees on performance and reliability. Vendors cannot provide meaningful guarantees without extensive testing at representative scale. Based on this point of reference, no commercially available technologies for the capture of CO_2 from coal-based power plants exist today. The Department of Energy's Major CCS Demonstration program currently includes twelve projects that propose to demonstrate CO_2 capture along with some form of storage and/or utilization of the captured CO_2. If this were a list of twelve successfully completed projects, then it could certainly be argued that the technologies are ready for commercial deployment. However, not one of the projects has been completed, and in fact, none have even commenced operation. Most are no more developed than the work on paper required for conception of the project. Moreover, some that had previously been included on DOE's list have been cancelled or delayed indefinitely. From a global perspective, the United States leads all others in work completed and proposed for future CCS projects. But today, the technologies to capture and sequester CO_2 are not commercially available, domestically or otherwise.

While several promising CO_2 capture technologies are under development, none are ready for commercial deployment. They must be advanced in a systematic and step-wise manner to ensure their technological and economic feasibility. AEP had begun the process of moving the CCS technology to

commercial scale with the Mountaineer CCS Demonstration Project, but the lack of an adequate funding mechanism resulted in the company placing the project on hold. Even if AEP's project had remained on schedule, the CCS technology, like other first-of-a-kind projects, would have been installed without any commercial guarantees from vendors and would have run the risk of not continuously or reliably achieving high CO_2 capture levels. AEP's expectation was that a commercial-scale CCS demonstration project was essential *now*, so that in 2020 or later, a reliable commercial-scale CO_2 capture system *might* be commercially available and ready for deployment.

With the suspension of the AEP project and as similar DOE projects are delayed or discontinued, the date for commercial readiness of CCS technology continues to move further out on the horizon. A reasonable estimate for commercial availability, based on the current state of technology development, is at least ten years away, and this is assuming that current financial and regulatory barriers to demonstration projects are expeditiously removed. Without a clear path forward, we will remain, perhaps indefinitely, ten years or more from commercialization of CO_2 capture technology. Numerous studies and projects by public and private organizations also have concluded that the availability of commercially available CCS is at least a decade away, even if a much more ambitious research, development, and demonstration program were implemented. Even then, CCS equipment is large, expensive to install, and highly energy intensive. There is a real risk that project economics could discourage wide deployment of CCS. Revolutionary technology innovations show promise to mitigate these risks and are discussed later in this testimony.

Furthermore, the path to CCS commercialization is filled with significant regulatory and legal barriers. These include issues related to the ownership of, acquisition of, and/or access to geologic pore space, as well as issues surrounding long-term liability and stewardship of geologically stored CO_2. The removal of these barriers in many cases will most likely be through the development of state legislation and regulatory programs. Efforts at the state and federal level are underway and in various stages of development, but significant challenges remain before these and other legal and regulatory issues will be sufficiently resolved to support the commercialization of CCS on coal-based generation.

Finally, EPA has proposed an alternative compliance option that will not help coal-fueled EGUs achieve the CO_2 performance standard.[7] EPA's averaging approach will not work without much greater certainty pertaining to CCS cost and technology. In fact, this alternative compliance option does nothing to ensure the demonstration and deployment of CCS technologies. As just discussed, CCS is not yet commercially demonstrated for large-scale commercial applications and the high cost of the CCS technology effectively precludes its commercial deployment, even if the technology was ready. As a result, there are many technical, economic, and legal risks with CCS technology that must be addressed **before** an EGU developer would consider investing in a new multi-billion dollar plant. These risks will not be taken if the new plant might have to cease operation after ten years if CCS cannot achieve a regulatory standard developed without any real-world data. Without much greater certainty on the timing and success of CCS commercialization efforts, such risk simply will not be acceptable and will effectively preclude the development of any new generation technology that must rely on CCS to operate. Similarly, it is unlikely that the developer could ever obtain the necessary funding for building the plant until these matters are satisfactorily addressed. Lending institutions and state regulatory commissions will not risk several billion dollars[8] unless they obtain adequate assurances that a CCS technology is capable of achieving the CO_2 performance standard and can be installed at the new coal-fueled plant within the initial ten-year period of operation.

Simply put, a utility operator will never select an electric generating technology or unit design that requires a control equipment retrofit of *unknown* technology to be installed ten years after initial operation. Work done to date on the advancement of CCS technology has yielded incremental improvements in cost and process efficiency. Substantial "game changing" innovations for CCS cost and performance will require

[7] Under this approach, a new coal-fueled EGU could be built without CCS, provided that the developer of the new power plant commits to achieve the following two requirements. The first is that the new coal plant achieves a CO_2 emissions limit of a highly efficient ultra-supercritical coal-fueled EGU (set at 1,800 pounds per MWh) during the first ten years of operation. The second is that the developer commits to install and operate CCS on the new plant by the 11th year of operation and achieve a CO_2 emissions limit of 600 pounds per MWh during the next 20 years so that the weighted average CO_2 emissions rate during the 30-year period would comply with the 1,000 lb/MWh CO_2 performance standard.

[8] EIA estimates that the capital cost of a single 650 MW coal-fueled EGU without any CCS technology is approximately $1.9 billion. This means that a new multiple unit coal-fueled plant without CCS would cost well in excess of $4 billion including financing costs.

the integration of new CCS technologies with advanced next generation coal-based systems, such as advanced IGCC, oxycombustion, and chemical looping combustion or gasification. As a result, EPA's proposed rule is likely to delay for many years the development of CCS technology because new coal-fueled generation will not be built and, without the development of such new coal-based units in the future, the incentive to invest in and advance CCS technology will be greatly diminished.

THE NEED FOR REVOLUTIONARY TECHNOLOGY DEVELOPMENT

Throughout the past several decades of the power industry, technologies have taken an evolutionary path of advancement. As needs have arisen or new concepts were developed, existing power plants have adopted technologies as either retrofit installations or in-kind replacements to older technology. But times have changed and an opportunity has arisen. We support commercialization of Small Modular Reactor (SMR) technology for the next generation of nuclear power, which addresses the capital-intensive challenges with conventional nuclear power technology, and strongly encourage a concentrated focus on transformational technology development for fossil fuel power generation. As stated above, the current regulatory climate and market are such that no new coal-fired power plants are likely to be built so long as gas prices remain low. At the same time, there are compelling arguments to maintain a balanced portfolio of energy resources for U.S. electric power generation. Currently, most power generation-related technology development is focused on modifications and retrofit applications to the existing power plant fleet. Yet, most of the existing fleet in the US is over 30 years of age and already carrying expensive and complex retrofit systems, many of which were installed at costs rivaling the original power plant. Any further modification or retrofit will add complexity and most likely reduce the energy efficiency of the power plant. A more fruitful and forward-thinking approach would be to invest in technology that would be ready to replace the existing fleet as it completes its useful life and heads for retirement in the coming decades. Now is the ideal time to adjust the focus of technology development to truly innovative, revolutionary concepts for energy conversion.

While innovation at the laboratory and pilot-scale level is thriving across the U.S., new coal-fueled electric power projects are not advancing to the large scale demonstration phase due to the high cost of these

projects. To remedy this problem, the federal government must step in and take a strong leadership role in making revolutionary technologies a commercial reality for the future. A change in focus from predominantly existing fleet applications and near-term solutions to a longer-reaching view is needed. We must invest in technologies that show promise of truly moving the needle in a meaningful manner in terms of cost, fuel efficiency, and environmental performance. The CURC-EPRI (Coal Utilization Research Council – Electric Power Research Institute) Roadmap lays out a plan to enable the needed innovative technology development utilizing annual budgets no greater than those appropriated to the DOE Fossil Energy clean coal programs over the past couple years.

One excellent example of innovation is in the field of chemical looping technology. Chemical looping is not a carbon capture technology, nor is it a combustion technology in the way we typically describe combustion today. In one application of chemical looping, coal undergoes a flameless chemical reaction with a metal oxide, known as an oxygen carrier. The oxide reacts with the carbon in the coal to produce a pure stream of CO_2 while the chemical energy in the coal is transferred to the oxygen-depleted (reduced) metal. The CO_2 can be compressed and sequestered, or hopefully utilized for a more meaningful purpose. The reduced metal is then sent to an oxidation reactor, where air is introduced to provide the oxygen needed to re-form the metal oxide, generating large amounts of heat. That heat can be used to produce steam for use in the power generating cycle. The metal oxide that exits the oxidation reaction is then "looped" back to react again with more coal and the cycle repeats. Both The Ohio State University and Alstom are global leaders in this promising new technology and have advance the key design elements of the technology to the point where large investments are now needed to move to commercial-scale demonstrations.

With success, this and other new revolutionary technologies will enable our next generation of power plants to use coal with extremely high efficiency, with ultra-low emissions, and produce a pure stream of CO_2 with no added energy penalty. Not only will these concepts revolutionize the power generation industry, they can open the vast, yet untapped, oil reserves in this country to Enhanced Oil Recovery (EOR) production by making enormous quantities of low-cost CO_2 available for EOR purposes. These technology

innovations are essential to a diverse energy future, but they require attention now and focused funding to enable industry to overcome the high cost of commercialization. Encouragingly, as stated in the CURC-EPRI Technology Roadmap, the funding needed to develop and commercialize these concepts is not beyond the levels invested in recent years with DOE's Fossil Energy clean coal programs; this funding just need to be focused on the proper technologies.

SUMMARY

AEP has a long history of using a variety of resources to generate electricity to provide low cost and reliable electricity. We are increasingly concerned that federal environmental and energy regulation and policy is constraining fuel diversity to the detriment of those we serve. Particularly concerning is EPA's proposed NSPS, which is a fuel-discriminatory standard that in effect requires nascent, not yet commercially-available CCS technologies to be used on all new coal plants. As such, the proposed NSPS is impractical and not legally justifiable. For these reasons, AEP urges the development of federal policies that promote fuel diversity, including the continued use of coal to generate low-cost, reliable electricity, and encourage policies that seek to use coal and nuclear energy in revolutionary ways that minimize environmental impacts and increase efficiency. The funding to develop and commercialize advanced coal generation technology is not beyond the levels invested in recent years with DOE's Fossil Energy clean coal programs; rather these funding levels just need to be focused on the proper technologies.

Thank you for the opportunity to testify.

Mr. WHITFIELD. Thank you, Mr. McCullough, and now Mr. Mohl, you are recognized for 5 minutes.

STATEMENT OF WILLIAM M. MOHL

Mr. MOHL. Good morning, Chairman Whitfield, Ranking Member Rush, Vice Chairman Scalise, and members of the committee. My name is William Mohl and I am the President of Entergy Wholesale Commodities. I appreciate the opportunity to discuss the importance of nuclear generation to a diverse electricity generation portfolio. My company's view and my personal perspective is that all fuel sources have something to offer, and a diverse portfolio is key to a reliable electric grid. This general approach to national energy policy is consistent with the supply planning principles of many electric utilities where generation portfolio decisions reflect the consideration of numerous factors and numerous risks.

Entergy is one of the largest nuclear operators in the United States. We currently operate 11 nuclear power facilities in New York, Vermont, Michigan, Massachusetts, Arkansas, Louisiana, and Mississippi. Entergy was the first U.S. utility to voluntarily stabilize greenhouse gas emissions, and has earned local, national, and international recognition for its leadership on a wide range of issues, including those related to environmental policy and corporate governance.

Nuclear plants are an essential part of this Nation's energy portfolio. Regional electric grids require a mix of base load, load-following, and peaking facilities. While each regional electric system has its own unique characteristics, in general, coal and nuclear plants have long supplied base load power, while natural gas-fired units have been used as the predominant source of load-following and peaking capacity.

There are 103 operating nuclear power plants in the United States, generating approximately 20 percent of the Nation's electricity. Those nuclear plants operate as base load, high capacity factor units that power and help stabilize the electric grid in or near many major American cities. Throughout the Nation, nuclear generators help keep wholesale electricity prices lower than they otherwise would be.

A simple way of looking at the economic value of the existing nuclear generation fleet is to consider the potential cost of replacing it. Using data from the Energy Information Administration, we have calculated that replacing the 100,000 megawatts of nuclear capacity with new combined cycle technology gas plants would cost more than $110 billion. To put that number in perspective, in 2011, American utilities invested slightly more than $30 billion in transmission and distribution facilities, less than 1/3 of the nuclear for combined cycle replacement cost. Moreover, this replacement cost estimate does not include any costs of expanding pipeline capacity to serve new gas-fired plants. The adequacy of pipeline capacity is a key consideration, as was recently demonstrated in New England.

Nuclear power is also a crucial contributor to maintaining America's air quality. Nuclear generation produces virtually no carbon emissions. Since 1995, nuclear plants in the U.S. have prevented the release of over 11 billion metric tons of carbon dioxide into the

atmosphere. As reliable sources of base load generation, nuclear plants provide a foundation in the power supply portfolio to support emerging wind and solar power projects, which are characterized by intermittent availability.

Safe operation of our facilities is our top priority. Entergy has made capital investments of more than $300 million to upgrade safety and security systems at its Northeast and Midwest merchant nuclear plants. We ensure safety and security through a defense-in-depth approach that integrates constant training, robust design, multiple layers of redundant safety systems, comprehensive plant security, and detailed emergency planning.

We believe the fuel diversity, economic, reliability, and environmental benefits of nuclear power are clear, but every source of energy has advantages and disadvantages. The bottom line is that America needs a balanced portfolio that includes all existing generation technologies while continuing to focus on the development of new technologies for power supply resources. Nuclear plants are a critical part of that diverse portfolio and provide critical reliability, economic, and emissions benefits to the United States. To preserve those benefits for the public, we have to maintain our primary focus on safety while engaging with policy makers, and especially regulators, to ensure that market rules foster open competition and that regulation is rational and evidence-based.

Thank you for the opportunity to testify today. I look forward to answering your questions.

[The prepared statement of Mr. Mohl follows:]

BEFORE THE
U.S. HOUSE ENERGY AND COMMERCE COMMITTEE

SUBCOMMITTEE ON ENERGY AND POWER

OVERSIGHT HEARING ON
"AMERICAN ENERGY SECURITY AND INNOVATION:
THE ROLE OF A DIVERSE ELECTRICITY GENERATION PORTFOLIO"

TESTIMONY OF WILLIAM M. MOHL
PRESIDENT, ENTERGY WHOLESALE COMMODITIES
ENTERGY CORPORATION

MARCH 5, 2013

Good morning Chairman Whitfield, Ranking Member Rush, Vice-Chairman Scalise, and Members of the Committee. My name is William Mohl and I am President of Entergy Wholesale Commodities, 440 Hamilton Avenue, White Plains, New York. I appreciate the opportunity to discuss the importance of nuclear power to a diverse electricity generation portfolio. My company's view and my personal view is that all fuel sources have something to offer and that it is prudent to maintain an appropriate mix. This general approach is consistent with sound utility planning principles that consider reliability, production costs, load-following capability, price stability, supply diversity, environmental factors, and regional or local conditions as some of the key components in developing a generation resource portfolio.

Introduction

Entergy is one of the largest nuclear operators in the United States. It owns and operates 11 nuclear power units in New York, Massachusetts, Vermont, Michigan, Arkansas, Louisiana, and Mississippi. It also provides management support services for a twelfth unit owned by the Nebraska Public Power District. Entergy has approximately 15,000 employees, owns and operates approximately 30,000 megawatts of electrical generating capacity, and delivers electricity as a retail utility provider to

approximately 2.8 million customers in the south central U.S. Entergy was the first U.S. utility to voluntarily stabilize greenhouse gas emissions. Entergy has earned local, national, and international recognition for its leadership on a wide range of issues, including those related to environmental policy and corporate governance.

During my 31-year career in the energy industry, I have worked in utility operations, business development, asset optimization, and system planning and operations, including the procurement of fuel for generation. My immediate past job was President and CEO of two of Entergy's integrated utilities that provide retail electric service in Louisiana. Those utilities have a diverse fuel mix that includes gas, coal, and hydro as well as nuclear. In my current position I am responsible for Entergy's non-utility wholesale business, which includes merchant nuclear plants operating at five locations in the Northeast and Midwest. Entergy's non-utility wholesale business also holds fossil and renewable generation facilities, but my comments today will focus on nuclear generation.

Baseload Nuclear Generators Provide Vital Reliability, Economic, and Environmental Benefits

Regional electric grids require a mix of baseload, load-following, and peaking facilities. Baseload power sources are those plants that can generate dependable power to consistently meet demand. Baseload generation typically runs at full capacity, 24 hours a day, seven days a week, unless a unit is off-line for a scheduled or unscheduled outage. Load-following power sources are typically called upon to increase or reduce output throughout the course of a day as demand for power from end users changes. Peaking units are usually called into service only when demand for electricity is especially high, such as during periods of extreme heat or cold. While each regional electric system has its own unique characteristics, in general, coal and nuclear plants have long supplied baseload power,

while natural gas-fired units have been used as the predominant source of load-following and peaking capacity.

There are 103[1] operating nuclear power plants in the United States generating approximately twenty percent (20%)[2] of the Nation's electricity. Those nuclear plants operate as baseload, high capacity factor (approximately 89% in 2011[1]) units that power -- and help stabilize -- the electric grid in or near many major American cities, including New York, Boston, Philadelphia, Pittsburgh, Baltimore, Washington, D.C., Chicago, Detroit, Cleveland, Charlotte, Miami, New Orleans, and Phoenix, among others. Almost half of U.S. nuclear reactors are located within 50 miles of a metropolitan area that has a population of more than half a million. Throughout the Nation, nuclear generators help keep wholesale electricity prices lower than they otherwise would be.

A misconception about nuclear power plants we sometimes encounter is that they remain as they were when they first began operating. To the contrary, many key components are upgraded or replaced periodically, incorporating technological innovations that have been tested and proven suitable. One example is digital instrumentation, which has replaced other types of instrumentation for multiple systems and sub-systems at Entergy plants. Where digital instrumentation has been installed after rigorous analysis and testing, it generally allows plant operators to exercise finer control of systems and provides more immediate feedback. Another example is replacement components made from innovative new materials, such as working components of feed-water pumps and the turbine blades that are driven by steam to produce power. Components such as these, which often cost much more than the

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[1] February 2013 NEI Status Report *"Status and Outlook for Nuclear Energy In the United States"* This figure includes Kewaunee Power Station but not Crystal River Nuclear Generating Plant, Unit 3.

[2] NEI U.S. "Nuclear Generating Statistics 1971-2011" (http://www.nei.org/resourcesandstats/Documentlibrary/Reliable-and-Affordable-Energy/graphicsandcharts/usnucleargeneratingstatistics).

components they replace due to their use of cutting-edge materials, last longer and increase plant reliability.

New turbine blades also are an example of the use of computer-aided design, which together with innovative materials allows them to be considerably more efficient in converting steam into power. Finally, components that are not typically replaced are subjected to rigorous inspection, monitoring and testing using the latest diagnostic techniques. There are many other examples of enhancements that nuclear operators have made to maintain and strengthen safety and reliability at their plants. For Entergy's part, we have made more than $3 billion in capital investments in our Northeastern and Midwest merchant nuclear plants alone since we acquired them.

Nuclear plant owners, including Entergy, also have made very substantial investments in power uprates that increase a plant's generating capability. Each power uprate is, of course, subject to a rigorous Nuclear Regulatory Commission (NRC) review and approval process to ensure that safety is maintained. Nuclear power uprates have added 6,823 megawatts of capacity to the Nation's generation fleet,[3] which is equivalent to construction of more than six large nuclear plants. Entergy has successfully implemented a 178 megawatt power uprate at the Grand Gulf nuclear generating plant in Mississippi, bringing that plant's total capacity to 1,443 megawatts and making it the world's largest boiling water reactor facility.

According to statistics from the Nuclear Energy Institute, nuclear plants collectively employ more than 100,000 workers.[4] Each plant directly employs between 400 and 700 full-time workers.[4] The average nuclear plant generates approximately $470 million in annual sales of goods and services in its

[3] Nuclear Regulatory Commission http://www.nrc.gov/reactors/operating/licensing/power-uprates/status-power-apps/approved-applications.html

[4] April 2012 NEI White Paper *"Nuclear Energy's Economic Benefits – Current and Future."*

local community and nearly $40 million in total labor income.[4] These figures include both direct and indirect spending. Moreover, the average nuclear plant pays approximately $16 million annually in state and local taxes.[4]

Another way of looking at the economic value of existing U.S. nuclear generation is to consider the potential cost of replacing it. Based on data publicly available from the U.S. Energy Information Administration, Entergy has calculated that building gas-fired Combined-Cycle Gas Turbine (CCGT) plants to replace the approximately 101,000 megawatts of capacity provided by U.S. nuclear plants would cost between $100 and $110 billion dollars.[5] An investment of this magnitude to replace an existing asset class would be enormous for the U.S. power industry. To provide some perspective, in 2011 U.S. investor-owned utilities (including stand-alone transmission companies) invested slightly more than $30 billion aggregate in transmission and distribution facilities[6] – well under one-third of the low end of the range of the estimated cost that would be required to replace nuclear generation with CCGT plants. Moreover, the $100 billion to $110 billion replacement cost estimate does not include any costs of expanding pipeline capacity to serve new gas-fired plants. The adequacy of pipeline capacity is a key consideration, as was recently demonstrated in New England.

Nuclear power is a crucial contributor to maintaining America's air quality. Nuclear generation produces virtually no carbon emissions.[7] Since 1995, U.S. nuclear plants have prevented the release of

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[5] Total US Nuclear Capacity of 101,419 MW *(Table 8.1 Nuclear Energy Overview, EIA Monthly Energy Review, Feb 25th, 2013)* is gradually replaced over a ten year period using same amount of Conventional or Advanced Gas/Oil Combined Cycle capacity. The cost estimate range is calculated using "Total Overnight Cost in 2012" of $901/kW for Conventional and $1,006/kW for Advanced units *(EIA Annual Energy Outlook 2013 Early Release , Electricity Market Module, Draft Table 8.2 Cost and Performance Characteristics of New Central Station Electricity Generation Technologies).* Ten percent of capacity is replaced each year, and the cost is escalated at 2% inflation rate during the ten year period.

[6] EEI December 2012 "Annual Property & Plant Capital Investment Survey."

[7] On a life-cycle basis, carbon emissions from nuclear generation compare favorably to emissions from solar, wind, and hydro generation. NEI, Sources of Emission-Free Electricity InfoGraphic (2011) http://www.nei.org/resourcesandstats/Documentlibrary/Protecting-the-Environment/graphicsandcharts/infographicemissionfree.

more than 11 billion metric tons of carbon dioxide into the atmosphere.[8] Renewable energy sources can contribute to environmental sustainability, and should be considered for inclusion in a generation portfolio, taking account of emissions, cost, operating characteristics, land use, and other factors. Clean-coal technology shows promise but is not yet as cost-effective as existing nuclear as a source of baseload power. As reliable sources of baseload generation, nuclear plants provide a foundation in the power supply portfolio to support emerging wind and solar power projects, which are characterized by intermittent availability.

Nuclear Power Plant Operators Are Focused On Safety

While achieving these public benefits, safe operation of our nuclear facilities is our top priority. Entergy has made capital investments of more than $300 million to upgrade safety and security systems at its Northeast and Midwest merchant nuclear plants since acquiring them, all with the overarching goal of making sure our facilities maintain the highest safety and security standards. We ensure safety and security through a defense-in-depth approach that integrates constant training, robust design, multiple layers of redundant safety systems, comprehensive plant security, and detailed emergency planning.

Operator and technical training programs are evaluated on an ongoing basis by the Institute of Nuclear Power Operations (INPO) to identify strengths, weaknesses and recommended improvements. Selected programs are accredited through the independent National Nuclear Accrediting Board.[9] After undergoing extensive training prior to assuming their plant responsibilities, reactor operators continue to receive one week of additional training for every six weeks they are on the job to ensure they maintain high levels of skill and proficiency.

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[8] NEI, Emissions Avoided by the U.S. Nuclear Industry (1995-2011) http://www.nei.org/resourcesandstats/Documentlibrary/Protecting-the-Environment/graphicsandcharts/emissionsavoidedbytheusnuclearindustryyearly

[9] Institute of Nuclear Power Operations (http://www.inpo.info/AboutUs.htm).

In addition to the extensive operational training, the containment structures at our facilities were designed with numerous safety systems and components based on redundant protections, starting with some of the strongest buildings ever built and the most robust containment systems. Moreover, the plants have multiple layers of backup safety systems and diverse features to address emergency conditions, including multiple emergency backup power generators capable of shutting down the plant in the event of a total loss of all offsite power. These systems are monitored 24 hours a day, seven days a week by highly trained personnel.

Each of our nuclear plants has multiple layers of security including highly restricted access that is controlled by state-of-the-art security systems. Access to the plant is restricted to employees who have passed in-depth security and behavioral background checks and who daily undergo a lengthy entry and exit search process at our security checkpoints. A continual behavioral observation program and random drug and alcohol screenings help ensure employee fitness for duty on an ongoing basis.

We handle spent nuclear fuel in ways that are safe, secure, environmentally responsible, and proven over decades of operating history. While awaiting a federal permanent central spent nuclear fuel facility, we can continue to store spent fuel safely for decades to come through a combination of spent fuel pools and dry cask storage.

In the highly unlikely event of an emergency, we are prepared. For each of its nuclear plants, Entergy has invested in a wide-ranging, multi-layered, and coordinated emergency response plan. This plan features central coordination, clear communications, and stringent testing. The involvement of local communities in the emergency planning process ensures the sharing of information and coordination among various levels of government and the plant operator. All of this is designed to

ensure that everyone at and around our facilities is informed and knows how to react in case of an emergency.

The NRC is responsible for ensuring that nuclear plant operators meet federal safety regulations that ultimately assure that the plants are operated safely. Resident NRC inspectors work full-time at each of our plants, reviewing day-to-day activities and programs. Additional inspectors conduct several special inspections of specific areas and programs each year. NRC inspection reports and other regulatory records are readily available to the public.

Nuclear Power Is an Essential Component of a Diverse Energy Portfolio

Earlier in my testimony I noted that nuclear and coal traditionally were the primary fuels used to provide baseload power in the United States. Over the last ten years, improvements in power plant technology coupled with recent low gas prices have created the opportunity to operate CCGTs as baseload units as well. While there are benefits to being able to operate CCGTs as baseload, diversification is a prudent strategy for a generation portfolio, just as it is for an investment portfolio. Sound utility resource planning practices suggest that "you don't want to put all your eggs in one basket." In addition to its other benefits, nuclear generation provides a valuable hedge for electric consumers against potential gas price volatility.

Aside from price concerns, there are also challenges presented by the existing pipeline infrastructure and its ability to meet rising demand, particularly in certain regions of the country such as New England. Consider that replacing all U.S. nuclear units with gas-fired generation would require an additional 14.5 billion cubic feet per day of additional gas supply, a 70% increase over the 20.8 billion cubic feet per day of gas that electric generators used in 2011.[10] Natural gas fired generators do not have

[10] EIA 2011 data.

on-site fuel inventory and must be continuously supplied through a pipeline system, and while some facilities may have access to gas storage facilities to ensure continuous supply, many facilities do not. Supply issues can arise during peak times, when pipeline capacity is needed to satisfy the demands of local gas distribution companies to serve homes and businesses, in addition to the needs of power plants that may not have contracts for firm delivery. By contrast, nuclear plants have up to eighteen months of fuel supply on site and do not compete with residential and business consumers for fuel, making nuclear plants far less likely to be affected by fuel supply interruptions.

Challenges to Merchant Nuclear Generators

We believe the fuel diversity, economic, reliability, and environmental benefits of nuclear power are clear. Maintaining the existing nuclear fleet so those benefits can continue to be obtained will not be easy. One challenge to the merchant nuclear sector that has received some attention lately is the very low natural gas prices I spoke of earlier. While there are unquestioned benefits for consumers from low gas prices, the long-term viability of some power plants, including some nuclear plants, may be in question for a variety of reasons. For example, last October, the owner of one merchant nuclear plant announced that it would retire the facility because it was no longer economic to operate.

Let me be clear that we view natural gas prices as a market condition to which, as a business, we must adapt. That is our job. At the same time, the revenue effects of current gas prices underscore the importance of getting regulation right. In other words, preserving the many benefits of nuclear generation – reliability, economic, and environmental -- depends more than ever before on rational, evidence-based regulation.

Conclusion

The approximately twenty percent (20%) of the U.S. electricity supply safely generated by nuclear plants provides critical reliability, economic, and emissions benefits and contribute to a diverse generation mix for the United States. To preserve those benefits for the public, those of us in the industry must maintain our primary focus on safety while engaging with policymakers, and especially regulators, to ensure that market rules foster open competition and that other regulation is rational and evidence-based.

In summary, every source of energy has advantages and disadvantages. We know this to be true in transportation, home heating and also with electricity. Each generation source varies in terms of cost, economic and environmental impact, and other factors that complement and may be weighed against each other. Generation diversity is simply necessary to ensure a reliable and secure generation portfolio for the nation.

Thank you for the opportunity to testify today. I look forward to the opportunity to answer questions.

Mr. WHITFIELD. Thank you, Mr. Mohl.
Mr. Fowke, you are recognized for 5 minutes.

STATEMENT OF BENJAMIN G.S. FOWKE, III

Mr. FOWKE. Thank you, Chairman Whitfield, Ranking Member Rush, and members of the subcommittee for the opportunity to testify at today's hearing. My name is Ben Fowke, and I am Chairman, President, and Chief Executive Officer of Xcel Energy. We are a public utility holding company headquartered in Minneapolis, Minnesota. We serve 3.4 million electric customers and 1.9 million gas customers in eight States throughout the upper Midwest, Colorado, panhandle of Texas, and New Mexico.

The topic of today's hearing could not be more important at this critical juncture for the energy sector. We all share the goal of satisfying the country's growing energy demands in the least expensive, most reliable, and cleanest way possible. Xcel Energy has been successful in pursuing a strategy that has reduced customer risk and promoted clean energy while maintaining reliable service at a competitive price. Fuel diversity is an important part of that strategy. Our system is a strong example of an "all of the above" strategy.

Xcel Energy owns a power generation fleet that includes more than 17,000 megawatts of electrical capacity from sources including coal, natural gas, nuclear, wind, hydro, biomass and solar. We are unique among utilities in our commitment to renewable energy.

Today, we have about 4,900 megawatts of wind on our system. We are also leaders in energy efficiency and innovative State emission reduction and fleet modernization programs.

Our strategy has put us on track to reduce our carbon dioxide emissions over 20 percent from 2005 levels by 2020. At the same time, we have been able to maintain power prices at or below the national average.

We are achieving these remarkable results by maintaining a robust, diverse system. Although clean energy plays an important role in our electric system, we do continue to rely on coal and nuclear power to provide the low-cost base on which our system depends.

These reliable energy sources have not stood in the way of our environmental achievements: Our company has been able to achieve significant emissions reductions despite the recent addition of Comanche 3, a large coal plant in Colorado. We are also in the process of extending and uprating our three nuclear plants for another 20 years of service. Coal and nuclear energy remain critical to the efficiency and reliability of our system.

For that reason, we have been proactive in seeing the need either to invest in coal fleet improvements or to retire and repower aging coal plants through programs like the Colorado Clean Air-Clean Jobs Act and the Minnesota Emission Reduction Program. Like many utilities, we have taken advantage of low natural gas prices to serve growing customer demand and allow replacement of aging coal plants. However, because of our renewable portfolio, we have been able to avoid becoming too reliant on natural gas. Wind energy acts as a natural hedge against fuel price risk, reduces our emissions and meets our customers' interest in clean energy.

In fact, wind is key to our strategy. We recently contracted for wind power in Colorado at a price that is competitive with natural gas-fired generation even at today's low gas prices. As a result, we're now integrating wind at levels that we never before imagined—up to 57 percent of our energy in Colorado in the peak hour. Our annual average wind energy will reach 20 percent this year in Colorado and 14 percent in Minnesota. Now, the integration of these renewables is manageable, but it is not free. At the penetration rates we have achieved, and look to expand, our customers bear increasing costs of ensuring system reliability.

With the help of the wind development community, we are working to modify federal renewable policy to ensure some benefits flow directly to utilities responsible for integrating wind on their systems and, by extension, their customers. Importantly, these changes, which we call the Customer Renewable Credit, would constitute just a small fraction of the current cost of federal incentives flowing to renewable energy.

Much of our diversification strategy results from our long-standing desire to prepare for federal regulation of carbon dioxide emissions. Without passing judgment as to the wisdom of such regulation, we do believe there are principles that should guide government action in this regard. These principles include the belief that legislation is better than regulation; State flexibility is key; and Early Action Credit is essential. Because future legislation is uncertain, we are preparing for EPA's regulation of carbon dioxide from existing power plants. We hope that the EPA will allow States to develop diverse emission reduction strategies like those that have been successful in Colorado, Minnesota, and elsewhere.

For my company, it is most critical that carbon dioxide regulation gives credit to States and energy companies that have already acted early to address carbon issues. Many customers are already are paying for clean energy programs and should be rewarded for having done so.

We believe with these approaches to policy, the Nation can assure continued diversity of its energy resources and achieve what Xcel Energy has been working towards in our States for more than a decade: clean energy and environmental improvement at a competitive price.

Thank you for the opportunity, and I am happy to take any questions you may have.

[The prepared statement of Mr. Fowke follows:]

Witness Testimony
before the
House Committee on Energy and Commerce
Subcommittee on Energy and Power

"American Energy Security and Innovation:
the Role of a Diverse Electricity Generation Portfolio"

Benjamin G.S. Fowke, III
President and Chief Executive Officer
Xcel Energy

March 5, 2013

Thank you, Chairman Whitfield, Ranking Member Rush, and members of the subcommittee for the opportunity to testify at today's hearing.

My name is Ben Fowke, and I am chairman, president and chief executive officer of Xcel Energy, a public utility holding company headquartered in Minneapolis, Minnesota. We serve 3.4 million electric customers and 1.9 million gas customers in eight states throughout the Upper Midwest, Colorado, the panhandle of Texas and New Mexico.

The topic of today's hearing could not be more important at this critical juncture for the energy sector.

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With these approaches to policy, the nation can assure continued diversity of its energy resources and achieve what Xcel Energy has been working toward in our states for more than a decade: clean energy and environmental improvement at a competitive price.

Thank you for this opportunity. I am happy to take any questions you may have.

Mr. WHITFIELD. Thanks, Mr. Fowke.
Mr. Gerken, you are recognized for 5 minutes.

STATEMENT OF MARC S. GERKEN

Mr. GERKEN. Good morning, Chairman Whitfield, Ranking Member Rush, and the subcommittee members. I am Marc Gerken, CEO of American Municipal Power, and I am pleased to have the opportunity to appear before you to discuss the importance of the electric sector's fuel diversity. My remarks will focus on the role hydropower can play in these diverse resource portfolios, and also the challenges that are faced in the development process.

Ohio-based AMP is a wholesale power supplier and service provider for 130 municipal electric systems in seven States. Collectively, AMP serves more than 625,000 meters and has had a system peak in 2012 of 3,500 megawatts. Last year, AMP had power sales revenue of about $775 million and total assets of about $5.5 billion.

AMP is currently constructing four hydro projects on the Ohio River at existing U.S. Corps of Engineers locks and dams. These projects total more than 300 megawatts and a $1.6 billion investment, which represents the largest deployment of new run-of-the-river hydropower in the country today.

One of our projects is the Smithland project in Chairman Whitfield's district. Another is the Willow Island project in Representative McKinley's district. The power from these projects will benefit our members in districts of dozens of Members of Congress, including Representatives Griffith, Latta, and McKinley. Importantly, AMP's projects are resulting in around 1,200 jobs through a period of 4 years, as well as contracts with major vendors in over 12 States in this country.

Our hydro projects are part of AMP's overall "all of the above" energy strategy, which embodies the importance of fuel diversity. AMP works with the nationally recognized firm of SAIC to develop strategic long-term power supply resource plans for each one of our members, and that is a key component in our ability to undertake generation investments, and that our members are able to take a longer term look at these investments because they care about the long-term future of their customers.

AMP has long used the term "diversified" to describe our portfolio, which includes to own, operate, and then purchase output from natural gas, coal, hydropower, wind, solar, diesel, and landfill gas generating facilities, as well as strategic wholesale market purchases and a robust energy efficiency program. Our projects represent fuel technology and geographic diversity, and will yield long-term risk-balanced portfolio with predictable rates.

Run-of-the-river hydro projects are capital-intense, but have many positive attributes, as I listed on pages 7 and 8 of my written testimony. I would ask you to look at those, because I think as a renewable, hydro does set itself apart from wind and solar when it comes to load dispatch and other things.

Of the more than 80,000 dams in the United States, the more than 78 gigawatts of hydropower available today are provided by just 3 percent of these dams. In an April, 2012, report by DOE's Oak Ridge National lab, found that adding power to the national

non-powered dams has a potential to add 12 gigawatts of new capacity. Additionally, the National Hydropower Association job study shows that between 230,000 and 700,000 jobs could be created through the development of new hydropower.

Despite hydropower's positive attributes, the role as a diverse energy portfolio in the process from inception to construction for the new facilities is extremely challenging. Most developers don't enter the regulatory process with unreasonable expectations. We understand the need to balance the environmental protection with development. One of the key challenges is to keep costs down and stay on schedule, which makes the regulatory process very critical. Developers must carefully time the required modeling studies, the site assessments, because the studies have seasonal and weather limitations. A hydropower developer must also have significant capital, millions of dollars for larger projects to cover the costs through permitting. Of the regulatory process, we found that the critical path sometimes is strictly the PJM interconnection, in our case, that could take 24 months and commonly is filled with delays in that process.

AMP's experience has been—with hydropower projects on non-powered core dams, key regulatory approvals are FERC license and the Corp's 404 and 408 permits. Some of these studies required—are required in the FERC process are repeated in the Corps process.

In order to obtain a 404 permit, applicants must demonstrate that the discharge of dredged and fill material would not significantly impact or degrade the national waters, and there is no—and also that there is no practical alternatives to damaging the aquatic environment. Prior to the issuance of the 404 and 408 permits, approvals must be provided by the Corps to ensure that the locks and dams are not compromised. AMP was the first entity required to obtain a 408 permit in lieu of—as well as a 404 permit. We saw considerable delays. We witnessed delays in financing, which cost us significant dollars, and we see the need to streamline that process.

What can be done to improve the process and bring more hydropower online is to help diversify the national energy portfolio. AMP is pleased that a bipartisan legislation sponsored by Representative McMorris Rodgers has been favorably considered in the House. The Hydropower Regulatory Efficiency Act will improve the process for smaller hydropower projects and require study of additional improvements to a broader scale.

I believe that fuel diversification is paramount to our Nation's energy security. This includes ensuring that reliability and affordability are considered in rulemakings, impacting existing generation resources, and that more efficient regulatory processes are in place to help facilitate the development of new infrastructure to meet our Nation's energy capacity and reliability needs. I commend the subcommittee for reviewing this topic, and I wish to thank you very much, and will be happy to respond to questions.

[The prepared statement of Mr. Gerken follows:]

U.S. HOUSE SUBCOMMITTEE ON ENERGY AND POWER

HEARING ON *AMERICAN ENERGY SECURITY AND INNOVATION: THE ROLE OF A DIVERSE ELECTRICITY GENERATION PORTFOLIO*

MARCH 5, 2013

WRITTEN TESTIMONY OF
MARC S. GERKEN, PE, CEO/PRESIDENT,
AMERICAN MUNICIPAL POWER, INC. (AMP)

SUMMARY POINTS

- Electric sector fuel diversity is important to our nation's energy security, as well as to maintaining a supply of affordable, reliable electricity to power our homes, businesses and factories.

- AMP has embraced a diverse resource portfolio with a balanced approach to fossil and renewable technologies and has considerable experience in siting and permitting of various generation technologies.

- Hydropower plays an important role in AMP's efforts, and we are encouraged by the increasing recognition by policymakers of the untapped potential for new and enhanced hydropower development in the United States.

- To facilitate development and to ensure that new resources of all types can economically and timely be brought online, it's important that regulatory processes be streamlined to eliminate redundancies and provide developers and investors with added certainty.

Good morning, Chairman Whitfield, Ranking Member Rush and distinguished members of the Subcommittee. My name is Marc Gerken and I'm the Chief Executive Officer of American Municipal Power, Inc. (AMP). I'm pleased to have the opportunity to appear before you this morning to discuss the importance of electric sector fuel diversity. My oral remarks will focus on the critical role played by hydropower generation.

While I am appearing on behalf of AMP, I currently serve on the National Hydropower Association Board of Directors and as Co-Chair of the NHA CEO Council.

AMP is currently constructing four hydropower projects designed to further diversity our generation portfolio. These projects, which total more than 300 megawatts (MW) and $1.6 billion in investment, represent the largest development of new run-of-the-river hydropower in the United States today, and will join two AMP member-owned operating hydropower projects on the Ohio River. An additional 48 MW hydropower project on the Ohio River is in the licensing process.

Our projects under construction are new run-of-the-river facilities at four existing US Army Corps of Engineers locks and dams along the Ohio River in Kentucky and West Virginia. Two of these are the Smithland project in Chairman Whitfield's district, where we were honored that the Chairman offered remarks at our groundbreaking ceremony, and the Willow Island project in Representative McKinley's district. The power from these projects once online will go to benefit the AMP member municipal electric customers in districts of

dozens of members of Congress, including Representatives Griffiths, Latta and McKinley. Importantly, AMP's projects are resulting in more than 1,200 construction jobs and contracts for vendors from at least 12 states.

As I will explain, our hydropower projects are part of AMP's "all of the above" energy strategy, which embodies the importance of fuel diversity and includes investments in fossil and renewable generation, as well as energy efficiency.

AMP, OUR BUSINESS MODEL AND EMBRACE OF A DIVERSE PORTFOLIO

AMP is the wholesale power supplier and services provider for 130 municipal electric entities in seven states (Ohio, Pennsylvania, Michigan, Virginia, Kentucky, West Virginia and Delaware). AMP is based in Ohio and has more than 150 employees at its headquarters and generating facilities. The organization is governed by a 20-member Board of Trustees, comprised of member community officials.

AMP's mission is to develop, manage and supply diverse, competitively priced, reliable wholesale energy to public power members through strategic partnerships, member-focused relationships and a diversified power supply resource mix. Collectively, AMP members serve more than 625,000 retail customers and had a non-coincident system peak of 3,494 MW in 2012. Last year, the organization sold 12.5 million MWh of energy, with power sales revenue of $775 million and total assets of more than $5.5 billion. In addition to power supply, AMP offers a variety of services to its members to assist in their service to their customers, including: engineering, financial, environmental, sustainability, generation operations, legal, mutual aid coordination, safety training and regulatory support.

Starting about nine years ago and with the desire of our members to better forecast their wholesale power costs, AMP engaged the nationally recognized firm of RW Beck (now SAIC) to develop strategic long-term power resource plans for each of our members. Those plans are updated periodically to reflect changes in load forecasts, market projections, new power supply contracts, member project subscriptions (including energy efficiency), and optimization of new generation resource options. Our members use this information as part of their local decision-making regarding their long-term power supply planning with respect to purchase power agreements and generation project investments. One key component in our ability to undertake our generation asset investments is that our members take a long-term planning view and are not focused on a shorter-term, quarterly profit model.

With respect to the AMP generation projects, we offer our members the opportunity to subscribe to each project, providing them with an independent feasibility study, beneficial use analysis and market projection. Members who choose to participate in a project do so only after affirmative action by their local governing board and execution of a take-or-pay power sales contract. Our projects move forward if we achieve the critical mass of AMP member participation required. When projects advance, a committee representing our participating member communities is formed to govern major project decisions.

AMP finances our projects using a mix of tax-exempt and taxable bonds. Since 2000, all AMP construction project financing ratings have been in the "A" category and AMP has maintained an A1 entity rating from Moody's (the only agency to offer such a rating). Because of the importance of tax-exempt financing to our infrastructure projects, we have been working in tandem with other state and local

government groups to protect this important mechanism in the context of congressional tax reform.

With respect to our mix of generation resources, we have long used the term "diversified" to describe our portfolio. Our philosophy is not to place all of our eggs in one basket, but to layer our resource portfolio to include slices of fossil fuel assets, renewable assets, purchase power contracts and energy efficiency so that our members can blend costs and risks.

AMP's resource portfolio includes owned, operated and purchased output from natural gas, coal, hydropower, wind, solar, diesel and landfill gas generating facilities, as well as strategic wholesale market purchases and a robust energy efficiency program. AMP truly embodies an "all of the above" energy strategy. Our projects represent fuel, technology and geographic diversity, and will yield a long-term, risk-balanced portfolio with predictable rates. We firmly believe this is the best approach.

More detailed information about AMP's generation projects - both operating and under construction - appears on our website.

In addition to the hydroelectric projects previously mentioned, AMP has the following projects under development:

- Options for a nearly 900-acre greenfield site in Meigs County, Ohio, that was to be the location of the coal-fired American Municipal Power Generating Station. The project was fully permitted, but cancelled as a coal-fired project in the early stages of construction after an unexpected 37 percent increase in construction costs.

- In late 2012, AMP entered into a memorandum of understanding with FirstEnergy Corp. to develop an 873 MW (summer) gas combustion turbine project on the premises of FirstEnergy's former Eastlake coal plant.

- The potential for substantial utility-scale solar deployments located behind the meter in our member communities. Our first solar deployment took place in Napoleon, Ohio in 2012 and at 3.54 MW is one of the largest projects in Ohio to date.

AMP also owns and/or manages existing generating projects on behalf of its participating member systems, including:

- A 23.3 percent ownership stake (368 MW) in the Prairie State Energy Campus, a 1,600 MW state-of-the-art supercritical pulverized coal plant and mining operation in southern Illinois that came online in 2012.

- A 707 MW (fired) natural gas combined cycle facility in Fremont, Ohio, that AMP purchased from FirstEnergy. The project became commercially available in early 2012.

- The run-of-the-river Belleville Hydroelectric Plant, located on the West Virginia side of the Ohio River at the Belleville Locks and Dam, which provides 42 MW of renewable energy to 42 Ohio participating municipal electric communities and is backed up by local distributed generation.

- AMP is partnering with its member community of Hamilton, Ohio, on one of our four hydropower projects under construction. As part of that agreement, upon commercial operation of the new

project, AMP will obtain a 48.6 percent share of the existing 72 MW Greenup Hydro Project currently owned by Hamilton on the Ohio River.

- A 7.2 MW wind power project located at the Wood County Landfill near Bowling Green, Ohio, which began producing power in November 2003, and was the first utility-size wind farm in the state. AMP members also have contracted for 52.16 MW of output from an Iberdrola wind farm in northwestern Ohio.

- Contracts for purchases from landfill gas generating facilities, which provide 24 MW of power to participating member communities. Located at landfills in the northeastern section of the state, the projects use recovered methane gas as fuel. The contract was recently expanded to provide 57 MW of power from 2012-2021.

- Distributed natural gas and diesel generation facilities that provide up to 138.65 MW of power for use during peak times by 36 participating communities.

- A $26 million energy efficiency program called Efficiency Smart in which 49 AMP member systems have enrolled. We view energy efficiency as an important component of resource planning. The program, which to date has saved more than 60,000 MWh of energy, has been well-received by our members and their customers.

AMP has been active as a customer in the wholesale electric market since the 1970s, and traditionally, AMP members had relied heavily on the wholesale market - with nearly 70 percent of our members' base

load energy needs and 90 percent of their intermediate needs being met with wholesale electricity purchases. In an effort to insulate our members from market volatility and uncertainty, and to ensure a more predictable supply of competitively priced power, AMP has undertaken an aggressive generation asset development effort with new resources in four states, including Ohio. On average, these projects will reduce our members' market exposure to about 30 percent of their portfolio and will result in a portfolio that is 20 percent renewable in 2015.

Attachment A to this document shows wholesale energy prices from 2003 into 2012; this illustrates the wholesale market volatility that drove AMP members to want to diversity their portfolio and invest in more owned generating capacity. Wholesale electric prices have been low for the past few years as a result of both low natural gas prices and the economic downturn - the latter of which has resulted in many utilities having excess power. While the natural gas boom bodes well for natural gas as the electric generating resource choice for the foreseeable future, there are challenges of relying too heavily on any one resource, including the issues that this Subcommittee is reviewing - electric/natural gas coordination, the need for additional natural gas pipeline infrastructure, competing natural gas uses, and the reliability concerns associated with the closure of many older coal plants due to US Environmental Protection Agency rules.

AMP is unique in our resource planning approach because we are able to take a longer view than utilities that are subject to quarterly profit reports. Our member city, village and borough council members have been willing to invest in some projects that will be above market in the early years because of the overall benefits in the long term. Our development of hydropower generation is a good example -

the price of power from these facilities will be above market in the early years, competitive in the middle years and below market in the later years once the debt service is paid off. However, when you take into account the many positive attributes associated with hydropower, the value of the investment is clear even in the early years.

THE UNTAPPED POTENTIAL OF HYDROPOWER

Run-of-the-river hydropower projects are capital intensive, but have many very attractive qualities, including:

- A long life span;
- No emissions (a sustainable resource and the leading form of renewable energy in the country);
- The ability to provide base load power (unlike many other renewable resources), because we can forecast the output a day ahead;
- No fuel risk (meaning no hedging exposure, no counterparty risk and no transportation risk);
- No waste stream;
- Low operation and maintenance costs;
- Reliability;
- Affordability (taking into account the full project lifetime, fuel costs and operation and maintenance, hydropower has the lowest levelized cost of electricity of any resource);
- Predictable rates; and
- Limited regulatory risk (once operating)

We've had a very positive experience with our Belleville Hydro Project operating since late 1990s. The project has bested its feasibility study estimates and been recognized with national safety

awards. Hydropower does have limitations, particularly in our region where the number of existing dams and the generation capacity are finite; however, more can still be done with hydropower even in our region, and the figures regarding untapped hydropower nationally are staggering.

Of the more than 80,000 dams in the United States, just three percent (roughly 2,500) provide the more than 78 gigawatts (GW) of hydropower. While many non-powered dams are, for various reasons, not appropriate candidates for power additions, a significant number are well suited for the addition of hydropower assets. An April 2012 report by the Department of Energy's Oak Ridge National Lab found that adding power to the nation's non-powered dams has the potential to add more than 12 GW of new capacity (representing a 15 percent increase of hydropower capacity and nearly 10 percent increase of the total current renewable capacity). The majority of the potential is concentrated at just 100 non-powered dams, which could add 8 GW of capacity. The top ten facilities could add up to 3 GW of new hydropower; all of the top ten, as well as 48 of the 50 top non-powered dams are USACE facilities.

The National Hydropower Association worked with Navigant to conduct a jobs study that shows 230,000-700,000 jobs could be created through the development of new hydropower. More information about the NHA study can be found on their website.

In addition to new development, existing hydropower resources can play an important role in efficient operation of the grid. Hydropower, like natural gas, can be a good partner for balancing resources like wind and solar, and can provide ancillary services such as frequency control, regulation, load following, spinning reserve and supplemental reserve. Natural gas and some hydropower

resources have the capability to come online quickly and provide significant rotating mass (inertia). Hydro pumped storage stands alone as the only widely implemented grid-scale energy storage technology. The benefits to the grid are considerable, including deferral or avoidance of costly transmission upgrades at a time when the North American Electric Reliability Council has estimated that 27 percent of grid upgrades are related to integrating wind and solar resources.

In addition to new hydropower at non-powered existing dams, hydropower growth capacity can be achieved by maxmizing existing infrastructure, including: modernizing facilities to increase their capacity; harnassing water power potential at irrigation canals, conduits and other constructed waterways, developing pump storage; and investing in emerging hydropower technologies.

CHALLENGES TO GENERATION DEVELOPMENT AND ACHIEVING/ MAINTAINING FUEL DIVERSITY

The siting and permitting processes for any new generating asset are not for the faint of heart. As a developer, you must be passionate about the benefits that will result from your project, have supportive participants and be open to working with various stakeholders. You also must be prepared to defend against detractors, which could include litigious environmental activists or local property owners.

As a developer, you have many challenges and opportunities. One of your key challenges is to keep costs down and stay on schedule - escalation can kill even the best project, and as the old adage goes "time is money." The regulatory process plays a critical role in a

project schedule and ultimately can drive whether or not a project comes to fruition.

It's important to note that most developers don't enter the regulatory process with unreasonable expectations - we understand the need to balance environmental protection with economic development, and that there will be some bumps along the road. Unfortunately, regulatory timelines don't match up efficiently across the numerous required permits, various agencies and different jurisdictions - it's not an A to Z process. Across our various projects, AMP has worked with dozens of different state and federal regulatory bodies throughout the air, water, waste, transmission and siting permitting processes. Attachment B is a listing of the various agencies and approvals that AMP has worked with during our permitting for both fossil and hydro resources. More detail on the hydro process appears later in this section.

Developers must carefully time the required modeling, studies and site assessments when preparing their regulatory schedules as some studies have seasonal or weather limitations that must be taken into account. For instance, there are only limited months of the year when you can perform certain tree clearing work in our region because of the migratory habits of the Indiana bat.

Based on our experience, the timeframe from inception to commercial operation for new natural gas combined cycle generation is four to five years - with approximately two years of that dedicated to required regulatory permitting approvals, and the remainder to siting, contract and equipment vendor negotiation, construction and commissioning. Coal and nuclear developments have a much longer timeframe. And, while the development timeframe for wind and solar resources is shorter, those projects are not necessarily "easier"

compared to fossil generation - you still must deal with "NIMBYism" and multi-faceted approval processes that can involve both state and federal agencies.

Of the regulatory processes, we've found the critical path permit across many of our projects to be the PJM interconnection process. Many developers are so focused on the environmental permits that they fail to remember the importance of the transmission side of the equation in areas served by regional transmission organizations (RTO). PJM interconnection used to have a flowchart posted on their website that reflected an anticipated 12-15 month process from entering the queue to getting through the three study phases to the point of executing agreements. That appears to have been updated to reflect a 24 month timeframe, which in our experience, is more typical. Both the transmission owner and PJM have responsibilities to perform during the study phase. One challenge is that projects that have very little chance of ultimate development remain in the interconnection queue, slowing down the process for viable projects. PJM officials understand that the process needs improvement and have been working to make some changes.

Additionally, as we look to add natural gas generating facilities at either greenfield or existing coal plant sites, we are finding gas pipeline infrastructure to be a critical issue. In many cases, dozens of miles of new pipeline are required, along with the siting and permitting challenges that accompany the plant development.

Despite hydropower's many positive attributes, the process from inception to construction for a new facility can be challenging at best.

Hydropower projects at non-powered federal dams require a license from the Federal Energy Regulatory Commission (FERC) prior to initiating construction. AMP's experience has been with projects at USACE and not Bureau of Reclamation facilities. FERC issues an Environmental Assessment prior to issuing a final license. During the FERC licensing process, the USACE serves as a key stakeholder since they are an agency with mandatory conditioning authority under Section 4(e) of the Federal Power Act. The USACE uses this authority to influence the direction and extent of license articles that FERC includes in its license order. Through a Memorandum of Understanding with the USACE, FERC includes a series of license articles that were created to help protect the USACE navigation interests established in the Rivers and Harbors Act of 1899. The articles also include a provision that the licensee provide power for the USACE dam for the term of the license.

In addition, after the FERC National Environmental Policy Act (NEPA) process has been complete, the USACE has several other regulatory approval processes an applicant must go through to get final approval to start construction of a hydropower project. One of these regulatory processes involves Section 10 of the Rivers and Harbors Act, which prohibits unauthorized obstruction or alteration of any navigable water without a permit from the USACE. The USACE retains its post licensing authority under Section 404 of the Clean Water Act, which regulates the discharge of dredged, excavated, or fill material in wetlands, streams, rivers, and other U.S. waters. In general, to obtain what is termed the "404 Permit", applicants must demonstrate that the discharge of dredged or fill material will not significantly degrade the nation's waters and there are no practicable alternatives less damaging to the aquatic environment.

Prior to issuance of the 404 Permit, a "408 Approval" must be provided by the USACE. The intent of this approval is to protect government property and ensure the facilities are not compromised by other non-federal developments. The Section 408 approval is granted by the USACE once they complete their evaluation of a project, which involves reviews of the technical aspects of a project specifically the water retaining structures and their interface with the existing USACE facilities, as well as completion of a physical hydraulic model to verify that a project will not have any detrimental effects on navigation into or out of the locks. The sign-off for the 408 Approval is initiated at the District level of the USACE, who owns and operates the locks and dam, but also requires approval from the Division and ultimately from the Director of Civil Works from the USACE Headquarters. As such, for planning purposes, it is assumed that the issuance of the 408 Approval and 404 Permit take anywhere from 12 months to 24 months after issuance of the FERC license.

In addition to the FERC license and the USACE's Section 408 Approval/404 Permit, the Environmental Protection Agency (EPA) through the states involved require a 401 Water Quality Permit under the Clean Water Act. The intent of the 401 Permit is to provide for the protection of the physical, chemical, and biological integrity of waters from federal permits

AMP was the first hydropower developer ever required to obtain a 408 Permit in addition to the 404 Permit. Unfortunately, this extended our permitting timeframe considerably for each of our projects currently under construction. Attachment C to this document illustrates the permitting timeframes experienced for our four projects currently under construction.

A developer must have significant capital (millions of dollars in many cases) to cover the cost of the hydropower project through permitting, including: design, subsurface core drilling, hydraulic model studies, design and initial payments for equipment with long lead times. Long-term financing is unlikely until a developer has all of the required permits in hand, which can drive when you access the market and the cost of money.

So what can be done to improve the process? AMP is pleased that bipartisan legislation, The Hydropower Regulatory Efficiency Act sponsored by Representative McMorris Rodgers, has been favorably considered in the House and would help improve the efficiency of the regulatory process for smaller hydropower projects and require study of additional regulatory improvements. Hydropower interests continue to work to promote further reforms to help streamline the licensing and permitting processes detailed below without sacrificing environmental quality. We look forward to working with Members of Congress on these efforts.

ADDITIONAL CONSIDERATIONS

For the past decade, the electric industry has been undergoing unparalleled changes. The future holds both significant challenges and opportunities for utilities, policymakers and customers.

Much promise exists with the significant positive impact of shale gas and combined heat and power, as well as technologies that could drive change in our industry such as energy storage, carbon capture and sequestration, modular nuclear units, biofuels and fuel cells.

However, timing is critical and the sequencing of events causes some concern. As the economy rebounds, will we be ready to meet energy

needs - particularly in light of the anticipated base load plant retirements as a result of the myriad of USEPA rules and economic pressures? Will we have adequate time to site, permit and construct new generation, transmission and natural gas transportation infrastructure? Do the current RTO market structures provide an incentive or disincentive to development in those regions of the country?

As Subcommittee members know from your previous hearings, electric utility decisions to maintain or add needed fossil base load generation capacity are being exacerbated by the breadth and complexity of the numerous rules that the USEPA has put forth to regulate electric generating units. Combined, the Utility MACT Rule, the Clean Air Transport Rule (CATR, finalized as the Cross-State Air Pollution Rule and subsequently vacated by the court), the proposal to regulate coal ash as hazardous under the Resource Conservation and Recovery Act (Coal Ash Rule), and the Cooling Water Intake Structures Rule under section 316(b) of the Clean Water Act represent the bulk of rules specifically targeting electric utilities. Coupled with New Source Performance Standards (NSPS) for greenhouse gases and criteria pollutants, new National Ambient Air Quality Standards (NAAQS) for criteria pollutants, and National Emission Standards for Hazardous Air Pollutants (NESHAP) for industrial, commercial, and industrial (ICI) boilers and reciprocating internal combustion engines (RICE units), fossil-fuel-fired electric utilities (particularly coal-fired units) are facing competing and potentially conflicting environmental requirements within the next five to 10 years. AMP has filed comments on most of these rules with the USEPA, expressing the concerns outlined in this testimony; our filings appear on our website.

Areas of the country, like ours, that have traditionally relied on the use of coal to supply essential base load power have a significant stake in the outcome. AMP is cognizant of the potential impacts of forthcoming environmental regulations on the wholesale market, as well as potential impacts on regional system reliability. The various USEPA rules will have a disproportionate impact on coal-fired electric generation units, and thus on AMP and our members that rely on market purchases from those same coal units for a portion of their electricity needs.

In addition to our concerns about federal environmental regulations, we closely track developments at the Federal Energy Regulatory Commission (FERC) and PJM Interconnection.

Under the Federal Power Act (FPA), FERC is responsible for ensuring that wholesale electric rates are "just and reasonable." Historically, FERC met this statutory requirement through active, cost-of-service rate regulation. In 1995, however, FERC embarked on a long, evolutionary path designed to introduce greater competition into the wholesale electric generation markets. In short, FERC believed that market forces could better serve the public interest and that customers would see lower prices, better service, and innovation.

This market evolution included the creation of RTOs, such as PJM, which were initially intended to provide more efficient and better coordinated transmission system operations and reliability functions. The original core objective of these RTOs was to provide non-discriminatory, open-access transmission service for electric generation transactions – by requiring that owners of transmission lines not give preference or deny the use of their transmission lines to other sellers and purchasers of

electricity. To carry out this responsibility, RTOs assumed functional control, but not ownership, of the high-voltage transmission system.

However, the evolution of RTOs did not stop there. Today, RTOs also play a major role in determining the day-to-day price of electric energy sold in their regions through several market auctions. Electric generators bid available generation into these market auctions for specific time periods, and the RTOs dispatch the generators from the lowest to highest bid - but paying all generators at the highest bid price. In essence, the last increment of demand sets the clearing price. Many RTOs also control a capacity market as well.

Consequently, RTOs can essentially determine which electric generation units operate, when they operate, and the price that the power from those units should command as a commodity in the wholesale power market. RTOs have also developed a complex menu of market products to essentially disaggregate the electricity commodity into its various components, including energy, capacity, and a variety of ancillary services. Thus, RTOs are playing an increasing role in determining the strategies for individual electric generating units.

In our experience, the higher prices paid by customers in RTO markets have largely failed to date to incent specific desired behaviors - the building of needed new generation and transmission resources. Under the current RTO market structure, there is little incentive for for-profit entities to add new generation to the grid, which would result in lower prices paid to existing generation providers for their products and services.

The following are some of the key concerns we have about the RTO markets:

- Short-term markets don't lend themselves to long-term planning. For instance, in PJM, the planning horizon for capacity auctions is three years for very long-term assets;
- The market rules are under a near constant state of change;
- The participation of financial entities in the markets has resulted in the markets being about financial concerns rather than the provision of a physical commodity;
- Market rates are no longer based on costs. FERC has instead granted market-based rate authority to many sellers of wholesale electric power partially based on the theoretical competition occurring in RTO markets and subject only to reporting and limited oversight requirements;
- Markets utilize a single, uniform clearing-price auction, where the highest price offered is paid to all generators selling into the market - even those selling power from low-cost generation;
- Lack of sufficient oversight; and
- Limited transparency with respect to the actual costs of electricity generators, electric sale prices, and other essential information needed to determine if the markets are truly competitive.

While the market impacts noted above are not uniform nationwide, they are critical drivers in the region in which AMP operates and we believe that these are important topics for the Subcommittee to examine.

CONCLUSION

In closing, I want to stress my strong belief that fuel diversity is paramount to our nation's energy security, as well as to maintaining a supply of affordable, reliable electricity to power our homes, businesses and factories. I commend the Subcommittee for reviewing this topic.

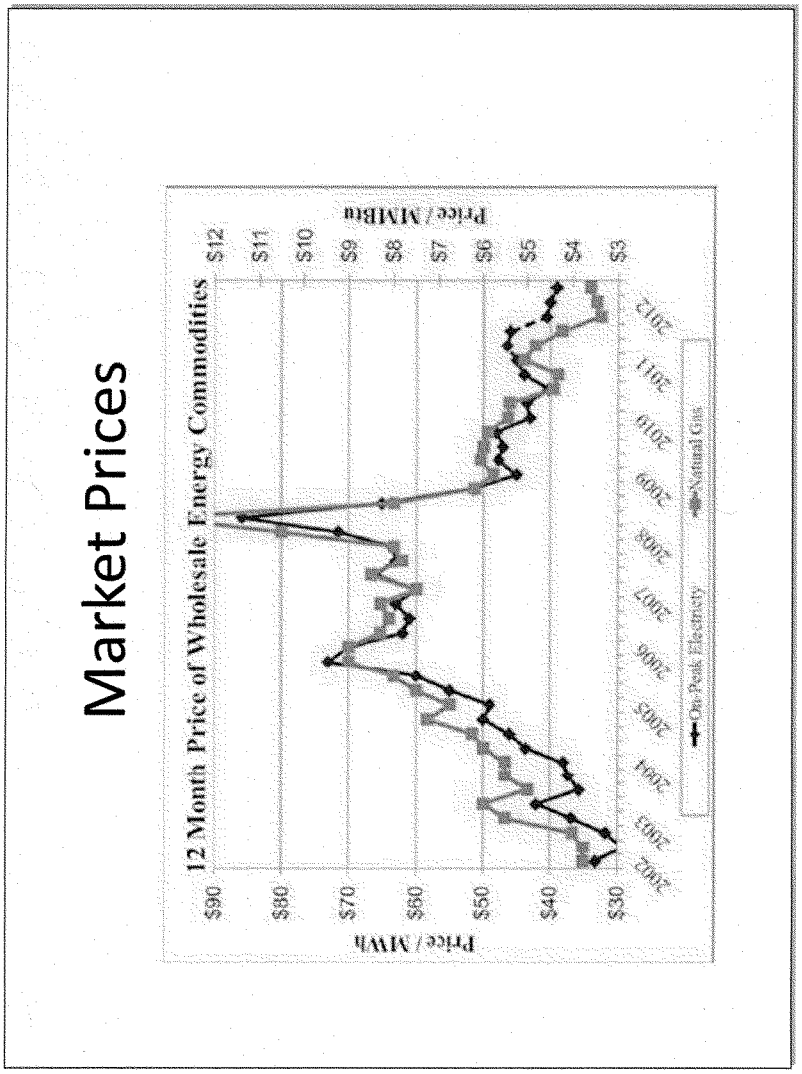
As outlined in my testimony, AMP has embraced a diverse resource portfolio with a balanced approach to fossil and renewable technologies.

Hydropower plays an important role in AMP's efforts, and we are encouraged by the increasing recognition by policymakers of the untapped potential for new and enhanced hydropower development in the United States.

To facilitate this development and to ensure that new resources of all types can economically and timely be brought online, it's important that regulatory processes be streamlined to eliminate redundancies and provide developers and investors with added certainty.

Thank you again for the opportunity to appear before you today; I would be happy to respond to any questions.

Attachment A



Attachment B

LIST OF PERMITS/APPROVAL/LICENSES/EVALUATIONS--FOSSIL

OPSB Certificate	Ohio Power Siting	Certificates for 50MW+ projects and T-line
Section 404/10	Army Corps	Impacts to jurisdictional water
Section 401	OEPA	Impacts to wetlands/streams
Permit to Install-water	OEPA	Build source(s) of water discharge
Permit to Install-sanitary	OEPA	On-site sanitary water discharge
Water withdrawal registration	ODNR	Withdrawal of water
NPDES	EPA/OEPA	Discharge of industrial water
Stormwater Permit	OEPA	Manage site/construction stormwater
Permit to Install-Air	EPA/OEPA	Installation of air emission source(s)
Title V Operating-Air	EPA/OEPA	Operation of air emission source(s)
Solid Waste Permit to Install	OEPA	Management of solid waste (ash etc)
Hazardous Waste Permit	EPA/OEPA	Management of Haz. Waste
Historic Preservation	SHPO	Evaluation of cultural/historic resources
Endangered Species Eval.	ODNR/USF&W	Evaluation of endangered/threatened species
License	FAA	Stack height approval for aviation
ODOT Permit	ODOT	Roadway considerations/crossings

LIST OF PERMITS/APPROVAL/LICENSES/EVALUATIONS--HYDRO

OPSB Certificate	Ohio Power Siting	Certificates for 50MW+ projects and T-line
Preliminary Permit	FERC	Permit to prepare and submit a License App.
License	FERC	Comprehensive energy project license
NEPA	EPA	Compliance with statute on federal projects
Section 404/10	Army Corps	Impacts to jurisdictional water
Section 408	Army Corps	Permission to impair federal structure
Section 401	OEPA	Impacts to wetlands/streams
Water withdrawal registration	ODNR	Withdrawal of water
NPDES	EPA/OEPA	Discharge of industrial water
Stormwater Permit	OEPA	Manage site/construction stormwater
Historic Preserv. Act	SHPO	Evaluation of cultural/historic resources
Endangered Species Eval.	ODNR/USF&W	Evaluation of endangered/threatened species
License	FAA	Transmission Tower approval for aviation
ODOT Permit	ODOT	Roadway considerations/crossings
Flood Impact Approval	FEMA	To insures no impacts to flood waters

OTHER REQUIRED/POTENTIAL CONSULTING AGENCIES

U.S Dept. of Agriculture-Forestry
National Park Service
U.S. Bureau of Land Management
Federal Emergency Management Agency
U.S. Geological Services
U.S. Department of Commerce

OTHER REQUIREMENT

Regional Transmission Organization Interconnection Process (more than 20 MW) – PJM or MISO in our region

Attachment C

Examples of Permitting Time Frames:

Project	404 Permit Application Date	404 / 408 Issuance Date	Duration from Application
Cannelton	April 11, 2008	May 1, 2009	1 year and 20 days
Smithland	April 11, 2008	October 30, 2009	1 year and 7 months
Willow Island	February 4, 2008	December 3, 2010	2 years and 9 months
Meldahl	December 15, 2008	April 13, 2010	1 Year and 4 months

Mr. WHITFIELD. Thank you, Mr. Gerken.
Mr. Gramlich, you are recognized for 5 minutes.

STATEMENT OF ROBERT GRAMLICH

Mr. GRAMLICH. Thank you, Chairman Whitfield, Ranking Member Rush, members of the subcommittee. I appreciate the opportunity to be here today to represent the views of the American Wind Energy industry.

As you have heard today from the electric utilities on the panel, diversity is a crucial issue for the electric industry. As you have also heard, when utilities seek to diversify, wind power is a natural choice. Wind power tends to be the next least cost source of new electric generation capacity behind natural gas. It serves as a natural hedge, or insurance policy, because fuel price risk is zero.

Wind energy production has grown dramatically in the last decade. Today wind projects in 39 States and Puerto Rico offer enough energy to power nearly 15 million American homes. At least 66 electric utilities bought or owned new wind power installed in 2012, up by 50 percent from just a year ago. Last year alone, $25 billion in private investment went into building new U.S. wind projects. Wind projects in the U.S. have brought economic growth to rural communities; roughly $400 million in property taxes or similar payments to communities; and annual lease payments to farmers and ranchers of around $120,000 per turbine over the turbine's lifetime. Already, Iowa and South Dakota produce enough wind energy to meet more than 20 percent of their electricity needs, and wind energy produces more than 10 percent of the electricity in 9 States.

Grid reliability benefits greatly from fuel diversity. Just like the Mississippi River takes water from many States and tributaries and keeps a steady flow into the Gulf of Mexico, the grid takes power from many sources to meet total demand. The grid can provide reliable energy as long as enough power is available from the diverse generation sources across the wide geographic areas of our power grids. Wind power has been an important part of that diverse portfolio, providing energy at many geographic points around the grid, helping grid operators meet demand.

Diversity promotes reliability because there is operational risk for all resources on the system, whether it is from a mechanical failure or natural causes. In many cases, what affects other resources does not affect wind energy. Wind turbines continued to operate after Hurricane Sandy, the Japanese tsunami, and the freak cold snap in Texas in February 2011. During the Texas cold snap, some 50 conventional power plants abruptly shut down due to the cold weather, contributing to rolling blackouts. But wind turbines continued to produce as expected. Water savings from wind energy are another important benefit for utilities and policy makers, especially with large parts of the country still facing a persistent drought.

Fuel diversity requires continued attention and support from Congress, utilities, and state regulatory commissions. Without that attention, there would be a tendency to rely on a single resource and effectively put all of the Nation's electric resource "eggs in one basket." At the federal level, the primary means of supporting fuel diversity has been tax credits. Tax credits played a major role in

bringing down the cost of shale gas, and they are rapidly bringing down the cost of both wind and solar energy. The U.S. wind energy industry is now getting back to work building turbines and projects after the recent extension of the production and investment tax credits. The primary challenge is that renewable tax incentive support has been sporadic and unpredictable. With more policy certainty, like that enjoyed by other energy sources, the wind energy industry could invest in the remaining cost and performance improvements needed to finish the job of becoming fully cost-competitive.

Diversity through wind power development has held rates down for homes and businesses across the country. Wind energy costs have fallen by ⅓ in the last 4 years, and the technology continues to improve. Over the long term, wind energy's zero fuel cost protects consumers from fluctuations in the price of other fuels. Wind power is an important component of a diverse domestic energy portfolio that promotes economic growth, energy security, and a clean environment.

Again, thank you for the opportunity to be here today. I look forward to answering your questions.

[The prepared statement of Mr. Gramlich follows:]

Testimony of Rob Gramlich, Interim CEO, American Wind Energy Association

House Committee on Energy and Commerce
Subcommittee on Energy and Power

Hearing on American Energy Security and Innovation: The Role of a Diverse Electricity Generation Portfolio

March 5, 2013

Thank you Chairman Whitfield, Ranking Member Rush, and Subcommittee Members. It is a pleasure to appear before you today to speak on behalf of the American Wind Energy Association (AWEA).

AWEA is the national trade association of America's wind industry, with over 1,200 member companies, including project developers, manufacturers, and component and service suppliers.

Diversity plays a crucial role in the electric industry as the primary solution to the problem of risk. Risk is a hallmark of the electric industry, as utilities make multi-decade investment decisions under great uncertainty. Electric utilities must commit to power supply options with over thirty-year lifetimes without knowing future fuel prices, future environmental regulations, future fuel supplies, cooling water availability, and more. These risks must be managed, and the best way for utilities to do that, as with one's financial investment portfolio, is to diversify.

When electric utilities today seek to diversify, wind power is a natural choice. Wind power tends to be the next least cost source of new electric generation capacity behind natural gas[i]. It serves as a natural hedge, or insurance policy, since its fuel price risk is zero.

Wind energy production has grown dramatically in the last decade. Today wind projects in 39 states and Puerto Rico offer enough energy to power nearly 15 million American homes. At least 66 utilities bought or owned new wind power installed in 2012, up by 50% from a year ago. Last year alone, $25 billion in private investment went into building new U.S. wind projects. Wind projects in the U.S. have brought economic growth to rural communities; roughly $400 million in property taxes or similar payments to communities; and annual lease payments to farmers and ranchers of around $120,000 per turbine over its lifetime. Already, Iowa and South Dakota produce enough wind energy to meet more than 20 percent of their electricity needs, and wind energy produces more than 10 percent of the electricity in 9 states.

Grid reliability benefits greatly from fuel diversity. Just like the Mississippi River takes water from many states and tributaries and keeps a steady flow into the Gulf of Mexico, the grid takes power from many sources to meet total demand. The grid can provide reliable energy as long as enough power is available from the diverse generation sources across the wide geographic areas of our power grids. Wind power has been an important part of that diverse portfolio, providing energy at many geographic points around the grid, helping grid operators meet demand. Grid operators that operate efficiently have found they can reliably add large amounts of wind energy with virtually zero need for additional reserve capacity. They have always maintained such reserves to handle fluctuating demand for electricity, and variations in how much conventional power plants can generate.

Diversity promotes reliability because there is operational risk for all resources on the system, whether it is from a mechanical failure or natural causes. In many cases, what affects other resources does not affect wind energy. Wind turbines continued to operate after

Hurricane Sandy,[ii] the Japanese tsunami,[iii] and the freak cold snap in Texas in February 2011. During the Texas cold snap, some 50 conventional power plants abruptly shut down due to the cold weather, contributing to rolling blackouts. But wind turbines continued to produce as expected and provided approximately 7 percent of ERCOT's electricity demand at the time[iv]. Water savings from wind energy are another important benefit for utilities and policymakers, especially with large parts of the country still facing a persistent drought.

Fuel diversity requires continued attention and support from Congress, utilities, and state regulatory commissions. Without that attention, there would be a tendency to rely on a single resource and effectively put all of the nation's electric resource "eggs in one basket." At the federal level, the primary means of supporting fuel diversity has been tax credits. Tax credits played a major role in bringing down the cost of shale gas, and they are rapidly bringing down the cost of both wind and solar energy. The U.S. wind energy industry is now getting back to work building turbines and projects after the recent extension of the production and investment tax credits. The primary challenge is that renewable tax incentive support has been sporadic and unpredictable. With more policy certainty, like that enjoyed by other energy sources, the wind energy industry could invest in the remaining cost and performance improvements needed to finish the job of becoming fully cost-competitive.

Diversity through wind power development has held rates down for homes and businesses across the country. Wind energy costs have fallen by one-third in the last four years, and the technology continues to improve. Even in parts of the country not considered to be great places for wind, it can be a cost-effective option[v]. Over the long term, wind energy's

zero fuel cost protects consumers from fluctuations in the price of other fuels, much like a fixed-rate mortgage works to protect consumers from variable interest rates.

Wind power is an important component of a diverse domestic energy portfolio that promotes economic growth, energy security, and a clean environment.

Again, thank you for the opportunity to be here today. I look forward to answering your questions.

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[i] Lazard, *Levelized Cost of Energy Analysis, Version 6.0,* July 2012, http://bit.ly/WxYH72

[ii] http://www.onearth.org/blog/wind-farms-withstand-sandys-wrath

[iii] http://www.huffingtonpost.com/kelly-rigg/battleproof-wind-farms-su_b_837172.html

[iv] ERCOT CEO Tripp Doggett said at the time, "We put out a special word of thanks to the wind community because they did contribute significantly through this timeframe. Wind was blowing, and we had often 3,500 megawatts of wind generation during that morning peak, which certainly helped us in this situation." http://www.texastribune.org/2011/02/04/an-interview-with-the-ceo-of-the-texas-grid/

[v] Alabama Power, a subsidiary of the Southern Company, decided to purchase wind power from Kansas in 2012. John Kelley, Director of Forecasting and Resource Planning, said, "These agreements are good for our customers for one very basic reason, and that is, they save our customers money." http://www.youtube.com/watch?v=6q6Q0_C1SX0

Mr. WHITFIELD. Thank you very much.
Mr. McClure, you are recognized for 5 minutes.

STATEMENT OF JOHN C. MCCLURE

Mr. MCCLURE. Good morning, Chairman Whitfield——
Mr. WHITFIELD. Be sure and turn your microphone on if it is not.
Mr. MCCLURE. Good morning, Chairman Whitfield, Ranking Member Rush, members of the committee. I am John McClure, Vice President and General Counsel with Nebraska Public Power District. I am here today substituting for our CEO, who unfortunately broke a bone on Sunday and was unable to travel. I appreciate being able to appear before you today to discuss some of the significant challenges facing the electric utility industry.

Everything we do in society, whether it involves commerce, communication, comfort, or convenience, has one or more crucial ties to the electric system. Consequently, it is imperative to understand the consequences of policies and regulation, since electricity usage impacts everything we do.

I am here today on behalf of the Alliance for Fuel Options, Reliability, and Diversity, or AFFORD, as we call ourselves. We are a group of consumer-owned electric utilities serving in 14 States, and have recently published a white paper which details our concerns. Our message is simple: there is no single option for producing electricity, and due to regional differences and other considerations, public policy should encourage electric utilities to pursue diverse fuel mixes that account for local, regional and national circumstances. A "one size fits all" energy policy will not work in the electricity sector. The chart in the back of the room does a great job describing how different the regional mixes are around the country, and that is worth 10,000 words that are not in my testimony in terms of educating us about the diversity around the country.

NPPD is primarily a wholesale power provider, and we have a diverse generation mix, especially compared to those in our region. Due to the proximity of low cost Wyoming low-sulfur coal, coal is a popular choice for fuel. Several large and small utilities in the region receive 75 percent or more of their electricity from coal-fired generation. At NPPD, we get approximately 60 percent from coal, with the remaining mix being nuclear, hydro, wind, and natural gas.

During the past 2 years, NPPD has been planning for the future. We began a customer and stakeholder process designed to promote dialogue about the choices and consequences of power supply and demand side options. We found customers expect the following from their power supplier: affordability, high reliability, fast outage restoration, and environmental stewardship. Achieving all of these is no simple task, as some choices may serve one or more of the criteria, but may challenge others.

The final product of our effort will be a new integrated resource plan, and must consider numerous areas of uncertainty facing our industry. Some of the key drivers of uncertainty include future regulatory requirements for fossil fuel, nuclear and renewables. One specific uncertainty involves the future price of carbon emissions. As you well know, a number of utilities have decided to close older,

smaller coal plants because the known cost of more stringent environmental regulations and the unknown cost of future carbon restrictions is deemed either too high or too uncertain to continue with coal.

You also know that natural gas is the current fuel of choice for new generation. Its environmental characteristics are superior to coal and its widespread development has created a plentiful near term supply with attractive pricing.

While the supply and price of natural gas has been a game changer and is a critical part of a diverse fuel mix, it is not a silver bullet. What many do not realize is that coal remains a more competitively priced fuel for certain regions of the country due to the proximity of supply, especially in the central and western U.S. Natural gas may be a great option if your power plant is located near a robust network of gas pipelines, but unfortunately many of the existing coal plants do not have access to pipeline capacity to convert from coal to natural gas.

As was mentioned earlier, we have been through other period of major changes. At one time, gas was taken out as a fuel option. Now, many of us are concerned coal is going to be taken out as a fuel option. We need all of the above. As the owner and operator of a nuclear power plant, we believe this, too, must be part of our Nation's mix. Nuclear remains an important part of a carbon free generation mix, but significant expansion is now less likely and again reinforces the need for diversity.

Wind and solar receive considerable attention, and like many other fuels, are significantly impacted by natural regional attributes and infrastructure availability. Some of the areas with the greatest wind potential are relatively remote and have limited transmission.

In summary, as you work through these challenging issues, it is critical that policies be developed that promote reliability and affordability through fuel diversity. Thank you for the opportunity to testify today.

[The prepared statement of Mr. McClure follows:]

Prepared Testimony of John McClure

Vice-President and General Counsel

Nebraska Public Power District

Before the

House Energy and Commerce Committee

Subcommittee on Energy and Power

March 5, 2013

Mr. Chairman and members of the committee: My name is John McClure, and I am Vice-President and General Counsel of Nebraska Public Power District, which I will sometimes refer to as NPPD. I have spent more than 30 years in my power industry career. I appreciate being able to appear before you today to discuss some of the significant challenges facing the electric utility industry. Everything we do in society, whether it involves commerce, communication, comfort or convenience has one or more crucial ties to the electric system. Consequently, it is imperative to understand the consequences of policies and regulation, since electricity usage impacts everything we do.

I am here today on behalf of the Alliance for Fuel Options, Reliability and Diversity, or AFFORD as we call ourselves. We are a group of consumer owned electric utilities serving in 14 states, and have recently published a white paper which details our concerns. Our message is simple: there is no single option for producing electricity, and due to regional differences and other considerations, public policy should encourage electric utilities to pursue fuel mixes that account for local, regional and national circumstances. A one size fits all energy policy will not work in the electricity sector.

There are far too many unique regional considerations that have shaped energy decisions in the past and will necessarily impact those decisions in the future.

Let me use my own utility as an example. NPPD is primarily a wholesale provider of power supply and transmission services throughout much of Nebraska, especially rural areas and small communities. We are also the retail electricity provider in 80 communities, and are governed by a publicly elected board of directors.

We have a diverse generation mix, especially compared to the fuel mix of many others in our region. Due in large part to the region's proximity to plentiful, low cost, low-sulfur Wyoming coal, it is a popular fuel choice. Several large and small utilities in our region receive 75 percent or more of their electricity from coal fired generation. At NPPD, approximately 60 percent of our generation is from coal with nuclear, hydro, wind and natural gas providing almost all the remainder of our generation mix.

During the past two years, NPPD has been planning for the future. We began with a customer and stakeholder process which was designed to promote dialogue with our customer base and others about the choices and consequences of power supply and demand side options. We found customers expect the following from their power supplier: affordability, high reliability, fast outage restoration, and environmental stewardship. Achieving all of these is no simple task, as some choices may serve one or more of the criteria, but may challenge others.

The final product of this effort will be an Integrated Resource Plan, and must consider numerous areas of uncertainty facing our industry. Some of the key drivers of the uncertainty include future regulatory requirements for fossil fuel, nuclear and renewables. One specific uncertainty involves the future price of carbon emissions. As

you well know, a number of utilities have decided to close older, smaller coal plants because the known cost of more stringent environmental requirements and the unknown cost of future carbon restrictions is deemed either too high or too uncertain to continue with coal.

You also know that natural gas is the current fuel of choice for new generation. Its environmental characteristics are superior to coal and its recent widespread development has created a plentiful near term supply with attractive pricing.

While the supply and price of natural gas has been a game changer and is a critical part of a diverse fuel mix, it is not the silver bullet. What many do not realize is coal remains a more competitively priced fuel for certain regions of the country due to the proximity of supply, especially in the central and western U.S. Natural gas may be a great option if your power plant is located near a robust network of gas pipelines, but unfortunately many of the existing coal plants do not have access to pipeline capacity to convert from coal to natural gas.

My tenure in this industry has taught me there are no simple solutions to building a long-term power supply mix, that fuel choices go in and out of vogue, and that a diverse mix of fuel is important to deal with the economic and policy swings that can happen over a longer period of time. For example, in the 1970's, Congress restricted the use of natural gas as a boiler fuel for electricity because of the fear we were running out of it. Today, the perspective is much different. Coal has been a mainstay of our Nation's generating mix, and the Energy Information Administration continues to show coal as an important part of a diverse fuel mix for the coming decades.

As the owner and operator of a nuclear power plant, we believe this too must be part of our Nation's mix. Prior to the events in Fukushima nearly two years ago, a nuclear renaissance was predicted. Nuclear remains an important part of a carbon free generation mix, but significant expansion is now less likely and again reinforces the need for diversity.

Wind and solar receive considerable attention, and like many other fuel choices are significantly impacted by natural regional attributes and infrastructure availability. Some of the areas with the greatest wind potential are relatively remote with limited transmission infrastructure.

In summary, the electric industry is facing substantial uncertainty as we try to plan for the future. We are one of the most capital intensive industries. As we invest in infrastructure and make commitments to assets with operating lives of 30 years and longer, we need more regulatory certainty, although mandating exactly what a fuel mix must look like takes away creativity and ignores the unique regional realities I discussed earlier. Hopefully we can find the right balance for the benefit of our customers. Thank you.

Mr. WHITFIELD. Mr. McClure, thank you, and thank all of you for your testimony.

At this time I will recognize myself for 5 minutes of questions.

Mr. McCullough, you had mentioned the Turk plant in Texarkana, Arkansas, and I would ask you from the time you obtained the first permit or applied for the first permit, how long did it take to complete the construction of that plant and begin operation?

Mr. MCCULLOUGH. We applied for the first permit in the fall of 2006, and the unit went commercial in December of 2012, so over 6 years.

Mr. WHITFIELD. And now is that technology—would you say that is one of the cleanest coal burning plants in America?

Mr. MCCULLOUGH. It is.

Mr. WHITFIELD. Would you say it is one of the cleanest coal burning plants in the world?

Mr. MCCULLOUGH. It is.

Mr. WHITFIELD. And you know, our carbon emissions in the U.S. are at the lowest point in 20 years, and as someone indicated in their opening statement, the U.S. today has less than 12 percent of global emissions. We are responsible for less than 12 percent. With that ability to build a plant that clean, if the greenhouse gas regulation—when it becomes final, would you be able to build that plant in America today?

Mr. MCCULLOUGH. We would not build that power plant.

Mr. WHITFIELD. You would not legally be able to meet the emissions standards, would you?

Mr. MCCULLOUGH. I can't answer that question entirely. That may be true. The economics of the overall situation—when you add CCS to Turk, because CCS would be required, it is not commercially available, so we would not be able to meet——

Mr. WHITFIELD. Plus it was the first time that EPA ever required one fuel source to meet the emissions standards of another fuel source, so coal has the emissions standards of natural gas.

So the thing that bothers me, all of us talk nonstop about "all of the above," but we do know that there is a concerted efforts by groups, individuals, and others in the country to eliminate some fossil fuels from being used for generating electricity. And of course, I am from an area of Kentucky that uses a lot of coal, but it is more than just that. In my opening statement, I talk about in New England they are talking about how natural gas prices are eight times higher because of lack of pipeline capacity.

Mr. Mohl, you talked about the importance of nuclear energy, and yet, they are talking about in New York State they are trying to close down the plant—the nuclear plant; that if that were not in operation, as they say, New England would be toast. And then in California, it talks about California is weighing how to avoid looming electricity crises brought on by its growing reliance on wind and solar power.

So when we are out here trying to stimulate the economy, create jobs, compete in the global marketplace, I mean, we have to have all of the above, and in my humble view, it is irresponsible for groups out there trying to deliberately shut down the use of fossil fuels, which is one of the base loads of our electricity needs.

One of the comments that you made, Mr. Gramlich, you had talked about the increasing costs—you were talking about the use of wind is not free—the increasing costs, and you specifically mentioned system reliability. Would you just elaborate on that a little bit for me, please?

Mr. GRAMLICH. Well, we get questions about reliability a lot, as everybody does. It is crucial. I used to work for one of the largest grid operators in the country, and it always sort of seemed to me that the grid could sort of be viewed as taking from really a thousand sources or more of energy and then trying to meet aggregate supply with—aggregate demand with aggregate supply. So wind energy fit very nicely, I thought then, and think now, into that portfolio. Not as a single bullet, not to run a whole system on, not to be relied on by itself, but as part of that diverse portfolio.

Mr. WHITFIELD. But what do you mean by increasing the cost of the system reliability?

Mr. GRAMLICH. I think that comment was about if you have a large grid operator like the one I described, you can add wind energy, significant amounts of it, without the need for significant additional reserves. There are reserves or back-up capacity for all resources, because any of the resources you have heard about today or on the grid can go down from time to time. It does not mean they are unreliable. It does not mean I am saying any of those resources are unreliable or wind is. But when they are operating, the grid can use them and you need a good grid operator with the right tools to keep the system——

Mr. WHITFIELD. You know, in the fiscal cliff legislation there is $12 billion of production tax credits for wind energy, and in your comments, you had mentioned that shale gas would not have been successful without equivalent types of production tax credits. Would you provide the committee with a detailed analysis of what you were referring to with that comment, please?

Mr. GRAMLICH. I would be happy to.

Mr. WHITFIELD. Thank you very much. My time is expired.

At this time I recognize the gentleman from Illinois, Mr. Rush.

Mr. RUSH. Thank you, Mr. Chairman.

Mr. Gramlich, wind power is very important to my home State, and as I mentioned in my opening statement, 13—at least 13 international wind companies that are headquartered in Chicago. Last year, I am sure you witnessed me battling Congress at the end of the year to extend the production and tax credit, and many arguing that wind is not really a viable source of energy and investing in wind is not worth the money. It is money wasted.

For this hearing, can you discuss the benefits of investing in wind on both the federal level as well as the private level, and what are some of the advantages of investing in wind, especially as it relates to job creation, electricity diversification and reliability, and implications for addressing climate change. I am not sure, I was in India several weeks ago, and we had a chance to visit the GE facility there in New Delhi, and we—they showed us some technology that was dealing with this issue of reliability. I don't know if you are familiar with that, but in their technologies that are being developed that would address some of the issues of our reliability.

Mr. GRAMLICH. Sure. Yes, I witnessed that debate about the PTC in the last Congress. We are proud to be saying with that extension, the industry is getting back to work in creating a lot of jobs, 75,000 jobs in the industry. Importantly, we have really brought the manufacturing of the wind turbines to this country. Nearly 70 percent of the 8,000 parts in a turbine are made here. We have nearly 500 manufacturing facilities around the country, including in Illinois. So we are very proud of the jobs that we are creating in our industry, as well as the rural economic development that our projects are creating in the communities where wind is being developed, rural Illinois and much of the rest of——

Mr. RUSH. Are we exporting that technology?

Mr. GRAMLICH. I am sorry—oh, exporting. Not so much, but in some cases, yes. One of the great strategic advantages of wind energy is these parts are very big, if you have seen them on the highway, which means we have a great opportunity to produce here what we deploy here. That is a large reason why we have so much domestic production of this technology, compared to other manufacturing sectors that maybe are shipping abroad, and wind energy—it is most of—if we keep deploying it here, we are going to be making most of it here.

Mr. RUSH. How has the wind industry grown in terms of both generation capacity, as well as private investment, and why is it important for policy makers to understand the trajectory of wind power and its potential for the future?

Mr. GRAMLICH. As I said in my testimony, the industry is responsible for about $25 billion in private investment in this country. Last year, that is investment that would not have otherwise occurred, and there are significant jobs, as I mentioned before, that are resulting from that. The tax credits have been critical to keeping that investment going, and hopefully they will continue.

Mr. RUSH. Mr. Fowke, in the brief period of time that I have left, in your testimony you noted that your facilities are on track to reduce carbon emissions by over 20 percent from the '05 levels by year 2020, while in the same time, you have been able to maintain power prices at or below the national average. What kind of strategies have you implemented to achieve these goals and are these measures measures that can be replicated at other facilities?

Mr. FOWKE. I think so. I mean, first, we are very fortunate to be in a very rich wind area, so that helps us with bringing in wind at a basically very competitive price. Our average wind portfolio is at $40 a megawatt hour, which is very close to parody with natural gas as an energy source.

The second thing we did is we got started early. We started repowering older coal plants that were relatively small, and we realized that the additional capital improvements wouldn't make sense in the long term. That said, we also built a new coal plant at the same time a few years ago. It came online in 2010, which is a supercritical coal plant, very efficient, and it allowed us then to retire those other, older coal plants, go to natural gas in some of them, and still have a good balance of fuel.

So if you get started early—and we have been working on this since 2002—you can do things typically at a better price point than trying to do everything all at once, which is one of the concerns we

see with some of the regulations, is that if you try to do everything at once, you can't find the labor, you can't find the materials, et cetera. So the combination of effectively deploying an "all of the above" strategy is how we maintain our competitiveness.

Mr. WHITFIELD. Gentleman's time is expired.

At this time I recognize the gentleman from Texas, Mr. Barton, for 5 minutes.

Mr. BARTON. Thank you, Mr. Chairman. I want to make a brief comment before I ask questions.

I think it is important—not necessarily for this panel, I think they get it, but maybe for the audience that will review the record—how important it is to have a robust energy market in America because we have based our energy policy generically on markets in this country. Today, we have got a situation where America is literally being reindustrialized in front of us. Companies are moving back to America. Manufacturing plants are moving back to America. Jobs are being created in America. I think the principal reason is because our energy markets are so robust and so diversified that we have got the lowest overall energy prices in the world. This committee can take credit for that. We have consistently, you know, sometimes up, sometimes down, but overall, supported a market-based energy policy.

With regards to electricity generation, this panel shows the diversity of the electricity gen. We have people that are proponents of nuclear power, coal power, hydro power, natural gas power. We have got independent merchants, we have got regulated utilities, we have got municipal power. We don't have co-ops, that I am aware, today but other than that, we have got it and we have got the alternative energy market, the renewable energy market. So Mr. Chairman and Mr. Rush, Ranking Member, you have all done a great job of putting this panel together.

Now my first question is to the gentleman from American Electric Power. The ranking member of the full committee in his opening statement said that the new source power plant regulations that are being proposed by the EPA are fuel and neutral. Do you agree with that?

Mr. MCCULLOUGH. No, sir, I do not. They are prejudiced towards a fuel and against another.

Mr. BARTON. Let us be honest. You are not going to build a coal plant with those regulations, and you will build, probably, almost all natural gas. I am in the Barnett Shale, so I am not anti-natural gas, but I also have lignite coal plants and I support nuclear power and wind power. So I think it is a little bit disingenuous to say that they are fuel neutral. They are not.

The gentleman from Entergy, you are a big proponent of nuclear power. Do you think it is possible in today's market environment to build a base load nuclear power plant in America?

Mr. MOHL. It is very challenging in this environment to be able to build a new nuclear plant. Currently there is a handful of them being developed down South.

Mr. BARTON. Yes, where they still have the regulated markets and you can roll in the prices. But is the challenge for new nuclear, is it more still regulatory and licensing, or is it just the simple fact that because of the competition from coal and natural gas, and to

some extent, wind power possibly, that it is just not cost effective right now? It is not economically possible?

Mr. MOHL. Well really, there are three challenges as it relates to merchant nuclear. Low gas prices obviously have depressed the markets. Regulation, we need fact-based scientific approach that is based on cost benefit, and we need fair and competitive wholesale markets. And so you are exactly right, that trying to build a new nuclear plant in a wholesale market is just not feasible.

Mr. BARTON. I want the record to show that we had a witness say I was exactly right. If you all will make a note of that.

I want to go to our friend that is recommending the wind industry. Texas is a big wind state. I am a big proponent historically of wind power. What is base load wind generation costs these days? What is the per kilowatt price?

Mr. GRAMLICH. Price does vary by region. We have great wind resource in your State. It can be—there are published contract prices at FERC for wind power contracts. They——

Mr. BARTON. I am not talking—I just want—this is not a trick question. I mean, you can build—you can generate coal and natural gas, I would say, 3, 4, maybe 5 cents a kilowatt hour. What would be an equivalent cost for wind power in a perfect situation? Is it below 10 cents, 5 cents?

Mr. GRAMLICH. There are 3 and 4 cent contracts in your State and in the middle of the country.

Mr. BARTON. But in the right situation, is it fair to say that wind power can be cost competitive with other commercial base load sources? Is that a fair statement?

Mr. GRAMLICH. Can be in certain locations.

Mr. BARTON. OK. My time is expired, but I would like for the record an answer—the comments on bidding negative into a competitive market simply to get the tax credit. My coal producers and merchant natural gas plant producers in Texas say some of the wind producers bid negative simply to keep the windmills turning because of the wind tax credit basically gives them a reason to give the power away. And my time is expired, but I would like an answer for that, if you would, sir. I yield back.

Mr. WHITFIELD. Thank you.

At this time, I recognize the gentleman from California, Mr. McNerney, for 5 minutes.

Mr. MCNERNEY. Thank you, Mr. Chairman. You know, I really think this is great testimony this morning. I filled my note sheet with every one of your testimony, which is very unusual in a hearing, so congratulations and thanks for coming this morning.

Before coming to Congress, I spent years in the wind industry, which does make me somewhat biased, but I agree wholeheartedly with the "all of the above" strategy, including nuclear. I love to see small modular reactors come online. It is a very good concept, and I did have the opportunity in my career to work with Xcel, with AWEA, and with the Nebraska Public Power, so it was a great opportunity to get to know some of your businesses.

We often hear about the war on coal, but withstanding some regional differences that were pointed out by Mr. McClure and Mr. Mohl, the war on coal was really about natural gas under-pricing

coal in most parts of the country. So I hear that refrain often, but I have a hard time swallowing it.

I have some questions, though. Mr. Fowke, would you comment on the assistance stability impacts of wind and solar energy in your utilities?

Mr. FOWKE. Yes, the reliability issues increase, obviously, the more renewables you have on system. I mentioned in my testimony at one point earlier this year, we had 57 percent of our energy coming from wind. So when that happens, you have to quickly back down your generation, and typically you want that to be a gas-fired generation versus nuclear or coal, because they are designed better for those sorts of things. So you have to ramp up and ramp down, and you have to follow the load accordingly. And that does—as you get higher levels of penetration, increase the cost of having that much renewables on your system.

Mr. MCNERNEY. You mentioned that Xcel is on track to reduce carbon emissions by 20 percent with price stability. Would you describe how that is possible?

Mr. FOWKE. Well as I said before, I mean, it is really getting started early. It is taking advantage of the very rich wind resource in our backyard. It is retiring all aging coal plants that are probably beyond their service life, particularly with the environmental regulations ahead. So I would say it is an "all of the above" strategy to do that, but you could start it early and it is steady and flow.

Mr. MCNERNEY. Good. I like your answers. They don't last too long, so I still have a little time left. I could ask 30 minutes of questions if I had the time.

How would you—Mr. Fowke, how would you—how does wind energy form a hedge against price spikes?

Mr. FOWKE. You know, that is a great question. Wind, as we all know, is interruptible, so we view it—while it has a capacity factor for planning, we put a very small capacity factor on it. So it is fuel. So you can build it and you can determine how long it is going—what it is going to cost over a 20-year period. For us, that is about $40 a megawatt hour. Then you compare that to other fuel sources, natural gas specifically. Sometimes at $40 a megawatt hour it is in the money, as it was when natural gas was at 8 and $10. Sometimes it is a little bit out of the money, as it is today in a very low natural gas environment. But it is still a hedge.

Mr. MCNERNEY. So are you investing in storage?

Mr. FOWKE. At this point with a low natural gas environment, storage is not competitive.

Mr. MCNERNEY. OK. Mr. Gramlich, would you elaborate on your statement that shale has benefitted from reliable credits, whereas wind energy hasn't?

Mr. GRAMLICH. Sure. I think shale gas is a success story. I know this committee has been interested in bringing new options into the electric portfolio, and shale gas, people can say a lot about it but certainly, it has increased dramatically and changed the game in the industry. And also, certainly, the tax credit was—played a key role in that. There was, I believe, over 20 years of stability in that credit which helped a lot with investors. Our problem with investors, we have many investors who would, as you know—and you

have the wind patent, I don't—but as you know, investing in these technologies, you could make a lot of cost-reducing investments and performance-improving investments if you knew what the market might be like a few years down the road. But if you only know a year or two at a time, it is very hard to justify those investments. So the stability of the credit is as crucial as the value, in terms of cents a kilowatt hour.

Mr. MCNERNEY. Thank you. Mr. McCullough, could you quickly explain what SMR development is for nuclear?

Mr. MCCULLOUGH. Yes. It is the small modular reactor development that you referenced.

Mr. MCNERNEY. All right, thank you.

All right, Mr. Chairman, I yield back. Thank you.

Mr. SHIMKUS. [Presiding] Gentleman yields back his time. Chair now recognizes himself for 5 minutes. My staff is bringing—and I agree, I think it was Mr. McClure, you mentioned this. This is in our committee memo and the briefing chart. It talks about the regional differences. I am in the east north central, 63 percent coal, which is a lot different than if you go to California, which is 40-some percent hydro, and 20-some percent natural gas. So the point being the regions are very, very different. And if we don't have a diversified portfolio based upon the regions, some big wind areas, some areas, they don't have a lot of wind. And if we, in a public policy arena, move to really disincentive base load generation, people are going to get harmed.

Illinois is a 50–50 state, 50 percent nuclear pretty much, 50 percent coal. Although we do have a lot of wind generation, it is still very small in the overall portfolio of the generation. Missouri, across the line, 85 percent is coal generation. Mr. Barton did mention the price. I mean, it is still base load generation is the low priced commodity product, which—so people get harmed and the economy gets harmed by high prices, which is really kind of the initial in my opening statement that I wanted to make.

And just another point before I go to my questions. Mr. Gramlich, if you have got a zero fuel cost, how many jobs are there that being that commodity product to that generator? My point is, none, oK? Coal miners mine coal, take it to the power plant. Good paying jobs, good benefits, tough work. In the coal regions around the world, they are critical to the southern Illinois economy, the West Virginia economy, the Kentucky economy. So I like zero cost, but when power is still a high cost generation, even though the fuel is no cost, and we do lose the jobs.

Mr. McCullough, the amount of coal used to generate electricity is decreasing—we have all admitted that—from 50 percent to 37 percent. What policy changes are needed to ensure that the coal continues to remain a significant part of our Nation's diverse generation fuel mix?

Mr. MCCULLOUGH. Yes, I think as we reflected earlier—and I actually would like to qualify an earlier answer to the chairman's question around the legality of NSPS. We would take the position it is not legal because it is the first time EPA has required a technology that is not commercially available.

Mr. SHIMKUS. I want to highlight that. There are three people who talked about supercritical power plants, coal, cleanest. Thank

you for doing that, but if the EPA rules on greenhouse gas ability, these brand new power plants, cleanest in the world, may not be able to operate. Is that true, Mr. McCullough?

Mr. MCCULLOUGH. We could not retrofit Turk plant, the most——

Mr. SHIMKUS. Because there is no technology?

Mr. MCCULLOUGH. It is not commercially available. There are no vendor——

Mr. SHIMKUS. And the other supercritical plants, do you agree with that, Mr. Fowke?

Mr. FOWKE. Yes.

Mr. SHIMKUS. Mr. Gerken?

Mr. GERKEN. Yes.

Mr. SHIMKUS. And that is part of the point that we are trying to make from the coal regions. Even though we have the best power plant in the world, greenhouse gas—we don't even have the technology to even capture it. And if it is, it is going to—the build out of the footprint is going to be in the billions of dollars, and it is going to take about 30 percent electricity generation, if you even had the technology.

Mr. McClure, let us talk about this shift in natural gas. I am all for it, but I think you alluded to—just like an electricity grid and a transmission grid, we may have some pipeline constraints, and you alluded that in your opening statement. Can you talk about that?

Mr. MCCLURE. Well, there is a recent example, a very real example in New England that I think many of you have become familiar with where high demand for electricity and a very cold snap, high demand for gas for heating created a real spike in prices for both natural gas and electricity. There are other parts of the country where we simply don't have the gas pipeline infrastructure. We could not convert our two coal plants to gas because there is no—not an adequate gas line infrastructure there.

Mr. SHIMKUS. And Mr. Gramlich, that is some of the challenges on wind power on the reverse side, just with the transmission grid, is it not?

Mr. GRAMLICH. Transmission is very helpful——

Mr. SHIMKUS. Just trying to wield that power to places that it might be used. So those are—I think those are especially issues in a bipartisan manner that we can talk about is expanding our natural gas pipeline, expanding the transmission grid.

And with that, my time is almost expired. I would just like to say we had a very good hearing on nuclear power last week. We talked about the NRC and the filter vent issue and how that is going to create new challenges. All we are going to ask the NRC to do is make sure before they promulgate rules, they go through regular order. Those are additional rules and regulations that are very, very costly.

So I yield back my time and now recognize the ranking member of the full committee, Mr. Waxman, for 5 minutes.

Mr. WAXMAN. Thank you very much.

First of all, I wanted to comment in his opening statement, Chairman Whitfield cited a recent Wall Street Journal article that suggested wind and solar power threatened the California grid.

There are a number of serious flaws with that article, but with the San Onofre nuclear generating station offline, the State could face some challenges this summer. This is something I am monitoring closely.

Mr. Fowke, my understanding is that for a decade or longer, Xcel has been shifting some of its generation from coal to natural gas, partly in anticipation of eventual requirements to reduce carbon emissions. Can you tell us about the thinking behind that strategy?

Mr. FOWKE. Certainly, Mr. Congressman. You are right, we have been doing it for a decade. These rules—we saw these rules coming and we—at the same time, we had an aging generation fleet, natural gas, coal, et cetera. So our decision was to put the money into the coal plants that we thought could serve customers for another 20 to 30 years, and at the same time, retire those that we felt would not justify the incremental capital to serve customers for another 20 years. We power some of those plants, and then added to that was the—our desire and the State mandate to add renewables.

And so when you put all of that together, it is kind of an "all of the above" strategy. We were able to modernize the infrastructure, reduce carbon, and keep prices competitive at the same time.

Mr. WAXMAN. Would you agree that regulatory certainty is vital and the climate legislation would revive that certainty?

Mr. FOWKE. Absolutely, because everybody in my position is making decisions on capital that are in the billions that we are going to live with for decades. So you are going to—you are never going to have perfect certainty, but regulatory uncertainty is probably one of the biggest risks we face each and every year.

Mr. WAXMAN. Do you support a clean energy standard?

Mr. FOWKE. We have advocated—we believe it is inevitable there is going to be regulation. It is already here, and we think the important thing is that it is sensible and it gives time, it gives flexibility, and it gives that certainty that you talk about so we can get started on whatever the rules are.

Mr. WAXMAN. Thank you. Well, Xcel is not alone in wanting Congress to provide regulatory certainty. Other companies represented on today's panel have been supporters of a range of policies to address climate change. Mr. Mohl, Entergy supports a tax on carbon pollution, is that correct?

Mr. MOHL. We support some type of market-based price signal that puts a price on carbon emissions. We believe that makes a lot of sense. We believe that is better than a command and control structure. We believe that that provides the incentive to develop new, cleaner technologies.

Mr. WAXMAN. Thank you, and Mr. McCullough, AEP previously supported legislation to establish an economy-wide market-based system to reduce carbon emissions and continues to support a federal legislative approach to climate change. Is that right?

Mr. MCCULLOUGH. We do support a legislative approach over a regulated approach, and depending upon the details, would be very supportive.

Mr. WAXMAN. Thanks. There is no question the United States will need to address climate change. The threat is not going away. Delaying action will only increase the urgency of the problem. Entergy, AEP and Xcel are some of the biggest utilities in the

country. Together, they operate across the country. Do you all agree that the best way to address climate change is through legislation from Congress?

Mr. FOWKE. Speaking from Xcel, yes.

Mr. WAXMAN. OK. Mr. Mohl?

Mr. MOHL. Again, we believe that whether it is legislative or regulatory, that we do need some type of market-based price signal in order to address that issue.

Mr. WAXMAN. Well, you can only get that from Congress. Mr. McCullough?

Mr. MCCULLOUGH. And again, with the qualification about the details, we would support it.

Mr. WAXMAN. OK. Mr. Chairman, when utilities tell us they are looking for regulatory certainty, they are not talking about bills that delay action. They are looking for real action and thoughtful policies. They want Congress to establish the rules of the road so they can plan for the future and make the appropriate investments. Utilities want Congress to act and I want Congress to act, but if Congress doesn't act, the President must do everything he can. When future generations look back on this time, they won't care whether we enacted my preferred approach or your preferred approach. They will simply ask whether we acted before it was too late. This is the moral imperative of our time, and we must address this challenge for the sake of our children and future generations. That is what the President said. I support what he said, and I hope we in Congress can get together and pass the legislation, rather than have action imposed only through regulation at the Executive Branch. But if we can't get anything else, I would welcome that regulation to make sure that we reduce the carbon emissions.

I yield back the balance of my time.

Mr. WHITFIELD. At this time, I recognize the gentleman from Ohio, Mr. Latta, for 5 minutes.

Mr. LATTA. Well thank you very much, Mr. Chairman, and I also want to thank you very much for the hearing today. I think it is very, very informative and I appreciate all of our panelists for being here today.

As some of you know—who are on the panel know my district. I represent northwest, west central Ohio, and I have about—according to national manufacturers, about 60,000 manufacturing jobs. It goes anywhere from light manufacturing to heavy manufacturing. I have got small folks out there, big folks out there. But when I go out—and I probably, since last August have gone through 200 facilities, businesses, schools across my district, and when I am talking to my—especially on the manufacturer's side, that base load capacity is absolutely essential.

And the two things I hear from the folks when I am back home—well, there are four, but the two I am going to mention right now—the number one issue that is always brought up is regulations. And the things that drive their costs and the things that prevent them from going ahead are regulations. And then going into that next area is when we talk about energy costs, because again, they cannot compete in this market today, not just in Ohio or the Midwest, but across the world, if we don't have energy costs that are reasonable that they can get out there and produce that product. And so

it is absolutely essential, as Mr. Shimkus pointed out on the map that he held out about east north central, Ohio is included in that area, along with Illinois, Indiana, Michigan, Wisconsin. And we do—we are looking at about 63 percent of coal being used in that area, and even higher in parts of my area.

So if I could start, Mr. McCullough, in your testimony, because it just jumps right out at me, on page nine you were talking about the shutdowns of coal-fired plants, that once these additional plant retirements, combined with already announced retirements around 20 percent of U.S. coal fuel will be shut down within the next few years. And so my first question is, are we going to have energy at the same cost, or will energy costs go up not only for you to produce, but also for the end user, for the manufacturer, for the farmers in my district—and again, I represent the largest number of farmers—senior citizens, small businesses, grocery store owners. What is going to happen to that cost?

Mr. MCCULLOUGH. That is a very good question, and one that gets misinterpreted quite often. The coal plants that we will retire are largely running today, and they are running because they are very competitive. As they move out of the generation stack, it does mean, naturally, that those units higher in the stack are now going to generate power and then any replacement capacity obviously involves capital costs and new cost of energy associated with that. So energy costs will go up as units retire.

Mr. LATTA. Well, and again, I think it is important right there because I think as you mentioned, a lot of folks out there think we can switch over to something that is going to be, all of a sudden, voila, we are going to throw a switch and something else is going to happen. We are very fortunate in the State of Ohio with the Utica shale that has been found and we are all for an "all of the above" strategy which we have been pushing since 2008.

As was mentioned a little bit earlier in the testimony, is it economical or can you even convert a coal-fired plant over to a natural gas plant?

Mr. MCCULLOUGH. We will be converting just a few plants to natural gas, but that will be for capacity reserve reasons, not for, you know, overall energy economics. You lose some efficiency, as these units are designed to burn coal and gas can't get steam temperatures to the same efficiency levels that it was designed for, so it is not going to be a very efficient use of natural gas, as you try to meet the energy needs of your jurisdiction.

Mr. LATTA. Thank you. I am going to switch briefly and quickly to Mr. Gerken with AMP, especially in my area, out my back door I can see the four wind turbines that were first in operation in Ohio, and then with the solar field over Napoleon, the gas plant over in Freemont. If I could just ask you quickly, despite the many benefits behind hydro, building the new projects is increasingly difficult due to new upfront costs. What are the reasons for some of these costs, and can Congress do anything to alleviate that, on an economic scale?

Mr. GERKEN. The hydro projects are very capital-intense, as I said. One of the problems is we started the permitting on the—all of these plants in 2005, and they will come online in 2014 and 2015. And so the regulatory process is in need of reform. If you ask

anybody, even big investor owners are saying they need the licensing and permitting streamlined.

We were in this process. I talked a little bit about the 404 permit and the 408 permit. We were the guinea pigs on the 408 permit. We were the first ones out of the block. We had four projects. Needless to say, it took—and each district handled it different and you had to go from the district to the division and then headquarters and then back and back and back and back. To give you an idea, we were permitting the last phase of the Prairie State coal plant in June of 2010, and then we were delayed on being able to get the permit—excuse me, we were financing the Prairie State project in June of 2010. We were waiting for the 404 permit to finalize the financing for the hydro projects, which was $1.3 billion. We didn't get that permit until December 13. If you remember, 2010 was when Build America bond were available, and we were trying to get to market. We actually financed three days later. It cost us 60 basis point difference in that spread on a $1.3 billion bond sale.

And so we need to streamline it. The Corps are good operators. When you operate these plants, the Corps does not have a priority and it is not their mission to develop hydro. I think with NHA and a lot of other interested parties, we are trying to streamline that process, but there—we would like to have some help there.

Mr. LATTA. Thank you.

Mr. WHITFIELD. Gentleman's time is expired.

Mr. LATTA. My time is expired and I yield back.

Mr. WHITFIELD. At this time I recognize the gentleman from Texas, Mr. Green, for 5 minutes.

Mr. GREEN. Thank you, Mr. Chairman, and thank our panel for being here.

In February of 2012, the Federal Energy Regulatory Commission initiated a number of efforts to coordinate the fuel transition and minimize concerns from both electric and gas industries. FERC received stakeholder comments and hosted five regional technical conferences in 2012 to discuss gas/electric interdependence in relation to scheduling communication and electric resource adequacy and reliability. Did any of you participate in any of these technical conferences, and if you did, do you have any feedback? Was FERC responsive to some of your concerns? Did anybody participate?

Mr. MCCULLOUGH. I did not participate personally, but someone from my staff did, and we are happy that FERC is hearing the concerns. We await strong action toward the harmonization of the electric and gas industries.

Mr. GREEN. OK. Anybody else that has comment on that?

Mr. MOHL. Same comment for Entergy. We believe that is definitely headed in the right direction and something that is critical in the long run.

Mr. GREEN. OK. Mr. Fowke, you testified that Xcel recently added a large coal plant in Colorado, and that you are also in the process of extending and updating three nuclear plants for another 20 years of service, yet several of your colleagues on the panel testified as to the market conditions that are making it difficult for coal or nuclear plants to come online. What is the secret of Xcel's success?

Mr. FOWKE. Well, I—let me just—to be sure. I don't think that same plant today would be permissible under the rules and the political realities, but we had it approved——

Mr. GREEN. Are you saying coal plants or the nuclear?

Mr. FOWKE. The coal plants.

Mr. GREEN. Coal plants.

Mr. FOWKE. Yes. So we basically—we started that process, I believe, around the 2004 timeframe. We started construction around the 2008 timeframe. We were able to get that plant sited and permitted and avoid some protracted litigation, because we also were able to commit to do some things to clean up the environment. And so it was a good package and it went forward in our State, and that was in Colorado. I don't think that same deal could be done today.

I forgot the second part of your question.

Mr. GREEN. Oh, just that if those—what is different about your company that you are doing compared to the other witnesses we have?

Mr. FOWKE. The only thing I would add, and I think everybody is trying to do the right job, but we have worked really close with our States and we have been very proactive at trying to anticipate regulation and other issues early so we can get started early.

Mr. GREEN. And I know my experience in Texas is doing the same thing. We try to do that, and of course, I am also more familiar—you know, we are in the middle of the natural gas boom, and there is fuel shifting and obviously benefits, but I also know in our expansion with our south Texas nuclear plant, I would love to get more electricity out of nuclear power in Texas. We only have two, and the one that we lost because of one of the investors is Tokyo Power, and we know that story, but you know, for our country—and I know it is difficult with the low price of natural gas—whether it is hydro or nuclear, it is upfront investments, and it is just difficult to make that work, even with the loan guarantees. It is difficult. But although I have to admit, I read just over the weekend that in Europe, we are exporting a lot of coal and it is displacing the natural gas that they are importing predominantly from Russia, because natural gas is so expensive in Europe. But again, location, location, location.

Mr. Mohl, you talked at length about the market conditions are threatening nuclear power in our country, and you testified preserving the many benefits of nuclear generation depends more on—rational and evidence-based regulation, and I agree. Like I said, even though we are in a natural gas boom, for long-term and the most carbon friendly is either windmills, solar, or nuclear, and as much as I love natural gas and the success we are having, specifically what regulations or impediments to new nuclear generation?

Mr. MOHL. Well, one of the challenges we have right now is—that we are looking at is the filtered vents discussion. What is required for the BWR technology? Our point of view is that that should be looked at on a plant-by-plant basis, and we don't need—it is probably not necessary to have something that is just kind of a rubber stamp that every plant needs to do.

Mr. GREEN. And I agree, and I think I have signed a letter expressing——

Mr. MOHL. Yes, sir.

Mr. GREEN [continuing]. Concern. It ought to look on a case-by-case basis.

Mr. MOHL. Absolutely.

Mr. GREEN. We may not need to change the filter on every plant, but it—is there anything else other than that?

Mr. MOHL. Nothing specifically, I mean——

Mr. GREEN. Because the long timeframe is just frustrating.

Mr. MOHL. It takes a long time to, you know, work through the relicensing issues, as we are experiencing on several plants. Again, the three challenges we have are low natural gas prices, we need reasonable regulation, and we need fair and competitive wholesale markets so that we can continue to, you know, participate. And you know, we have to be financially viable with these facilities to participate in these markets.

Mr. GREEN. Thank you, Mr. Chairman.

Mr. WHITFIELD. At this time I recognize the gentleman from West Virginia, Mr. McKinley, for 5 minutes.

Mr. MCKINLEY. Thank you, Mr. Chairman.

I want to go back to Mr. Gerken. You made some remark about—actually it was in your testimony that only 3 percent of the dams, 80,000 dams across America produce electricity. Could you explain that a little bit? What is holding that up?

Mr. GERKEN. Well, one issue is it is very capital intense projects, and they take such a long time to develop. And a lot of these are not your big—dams or obviously run-of-the-river where we are at, so they have smaller capacity name plate. Our projects are, example, 105 megawatts, 82 megawatts, 72 megawatts, and 48 megawatts. And so from that perspective, our business model fits it pretty well. Also I will say in defense of some of the investor owns, some of these projects have municipal preference on them, so if there is competing license and they are equal, they are going to go to a municipal system, the municipal preference. But for the most part, it is that capital intense issue.

What we have been able to do, what sets us apart—and I am not sure we would build these projects today, you know, in today's natural gas markets it would have been tough to justify this, because quite frankly, our run-of-the-river hydro are very similar to the nuclear when it comes to cost. But we look at that component from we don't have a fuel to buy and a waste stream on the other side——

Mr. MCKINLEY. Thank you.

Mr. GERKEN [continuing]. So I think that is the key.

Mr. MCKINLEY. On some other matters, I would like to hear—coming from a coal State and seeing the pushback, I chuckle over the people that say there is no war on coal. They just live under a rock if they don't understand that, and maybe we need to talk more slowly for them. But as it relates to natural gas, eventually—and we are going to see natural gas rise in its price. We know that. Right now with the—three and a quarter something. Where does it reach a point—at what price—many of you burn natural gas, but when does it reach a price—what is that level, $6, $7 when you have to go back to Public Service Commission and ask for a rate change? What would be—what is a reasonable expectation when we should become concerned about the price of natural gas?

Mr. MCCULLOUGH. I will take a shot at that. All of our fuel costs typically is pass through.

Mr. MCKINLEY. I know that, precisely, that is what I am saying. So the consumer is ultimately going to pay for using this, so I am curious, what will that level be? What is the level that becomes——

Mr. MCCULLOUGH. Yes, so our average coal cost in 2012 at AEP was about $2.40 a million, so if gas were double or more than that, we probably would be called in to justify why we chose a certain scenario for building and serving the jurisdictions. I mean, that is kind of hypothetical, but certainly when you are passing through that much increased cost, it raises awareness at the commissions and they would like to understand what——

Mr. MCKINLEY. What is the—I know in the timeframe we don't have enough of it, but I am hoping—and we have been discussing about global warming and having climate change, so that is probably a worthwhile venture of time, but I am just curious from the two of you at the end, Mr. Mohl and Mr. McCullough, do you believe that—I believe there is global warming going on. As an engineer in Congress, I believe there is global warming and climate change occurring. But my question to you though is, is it manmade?

Mr. MOHL. I guess I will take a shot at that.

Mr. MCKINLEY. I don't want to let McCullough off the hook there, but we will go back to you.

Mr. MOHL. That is fine. We have utilities in the Gulf Coast and you know, I think you could argue whether what is creating the issues associated with climate change, but the risks are real. I mean, we have seen a substantial increase in the number of hurricanes, the intensity of the hurricanes and the damage to the Gulf Coast. And so really, the way we look at it is it is a reality, and we need to manage that risk, just like we manage any other risk in our portfolio. So we look for opportunities to mitigate——

Mr. MCKINLEY. My question, Mr. Mohl, is it manmade? Did we cause it?

Mr. MOHL. As I said, I am not the one to argue that point nor do I have the scientific background to answer that question.

Mr. MCKINLEY. OK, Mr. McCullough, do you think—have we caused this?

Mr. MCCULLOUGH. Well, great question. Again, I am not a climatologist, but the incremental part of CO_2 emissions created by man is in the minority of overall CO_2 emissions. And when you look at it from a global perspective, as I mentioned in my opening remarks, here in this country we are less than 12 percent of global CO_2 emissions and getting smaller all the time. So whatever is offered up as a solution needs to be global in nature and market-based.

Mr. MCKINLEY. Thank you very much, I appreciate it. Yield back my time.

Mr. WHITFIELD. At this time I recognize the gentlelady from Virgin Islands, Mrs. Christensen, for 5 minutes.

Mrs. CHRISTENSEN. Thank you, Mr. Chairman. I wonder if I could get a slide up on the monitor, because before I ask any questions, I wanted to just share what the pie for the Virgin Islands would look like, compared to the map in the corner, and it is pretty

much the same for all the smaller territories, Guam, America Samoa, and Northern Mariana Islands. And we are working—you can put the other slide up. We are working towards diversifying our sources of energy, but small size, distance, and other factors make it very difficult compared to the States, and we don't have a grid that supplies electricity from other areas, so it is very difficult for us.

But my first question, and it will be a little bit different. We don't have nuclear energy, we don't have hydropower, and not likely to be able to move in those directions. Mr. McClure, I see in your testimony that NPPD has been doing some planning over the last 2 years, and we have been talking about an integrated resource plan in the Virgin Islands, which is something that I believe is really needed. Could you speak a little about the process that you have gone through, and describe some of the key components that the plan would consider?

Mr. MCCLURE. Every utility up here goes through an integrated resource planning process. It involves developing a number of scenarios. There is a lot of computer modeling that takes place, and obviously, we have to make assumptions about the future—the future of fuel prices of various types of fuel, other things, and what you are trying to develop is looking both at the supply side and the demand side, how do you get the best result for your customers for the long-term reliable, affordable price of energy? And again, it has a lot of regional aspects to it, but it also has national aspects as you look at various policies.

Mrs. CHRISTENSEN. Thank you. We are looking at wind energy. We have it—we are doing some solar, but haven't really moved towards wind yet, and so Mr. Gramlich and Mr. Fowke—Mr. Gramlich, you had said that good operators have been able to reliably add large amounts of wind energy to the systems, and Mr. Fowke, wind represents a large part of your portfolio. But for a place that doesn't have a grid that supplies energy from diverse areas, like the Virgin Islands, do you think that we could reach that same reliability from wind or would we need additional reserve capacity? I am thinking that we couldn't rely on it.

Mr. FOWKE. You know without specifics, the smaller the grid and the larger the one single source of wind would be, I think the more problems you would have making sure that it is integrated efficiently and reliably.

Mrs. CHRISTENSEN. Right, because Mr. Gramlich, I believe in answering another question you did say that having that grid backup is really what makes sure that you have the reliability.

Mr. GRAMLICH. The grid helps a great deal. It makes it a lot easier.

Mrs. CHRISTENSEN. Thank you.

I don't think I have any other questions right—oh yes, I do have one. I am sorry.

Hurricane Sandy, and I guess this was Mr. Gramlich, you talked about Hurricane Sandy and the fact that when you had that cold spot in Texas, the wind turbines continued to work. But I was wondering about—again, we live in a hurricane-prone area, so I was wondering if the fact that you were able to continue to provide wind—electricity from the wind from wind power in the Sandy-hit

areas was because the wind turbines in those areas were still operating, or did they come from a grid from the outside?

Mr. GRAMLICH. Well, both in the area affected, but I was making the point that diversity is critical, and what diversity brings you is whatever may affect one resource may not affect the other, and you rely on this portfolio of diverse sources of generation so that hopefully you can rely on one if you cannot rely on the other.

Mrs. CHRISTENSEN. So both the wind sources in the Sandy-hit areas worked and also it was supplied from the other?

Mr. GRAMLICH. Right.

Mrs. CHRISTENSEN. And I just want in closing to agree with what our Ranking Member, Mr. Waxman, said in the opening statement on the importance of climate change being a part of any energy conversation. We always focus on the cost, of course, of electricity production in these discussions, but it is also important to consider the cost of not reducing carbon emissions, the cost to the public health, the cost in the storms. And when you factor all of those in, really, the cost of electricity from fossil fuels with high emissions if we are not able to control those, the cost is really much higher than what we usually represent is the cost.

Thank you, Mr. Chairman.

Mr. WHITFIELD. At this time I recognize the gentleman from Colorado, Mr. Gardner, for 5 minutes.

Mr. GARDNER. Thank you, Mr. Chairman, and thank you to the witnesses for being here today. Mr. Fowke, welcome to the committee. Thank you so much for taking your time.

As you know, my district in Colorado is a very diverse energy district. It spans from the Mexico, Oklahoma, Kansas, Nebraska, Wyoming borders, so it is a district that has tremendous land area and a State that has a great deal of energy diversity. My district alone has one of the Nation's most promising oil and gas resource place. It has ethanol plants, about four ethanol plants, a number of biofuel—biodiesel plants. It has solar manufacturing. It has wind manufacturing. It has a coal mine, and so it really does present a truly "all of the above" strategy. I think I have at least one Xcel power plant in the district as well.

Over the past several years, though, the State legislature, along with Governor Ritter, Governor Hickenlooper, the congressional delegation has worked on the Colorado SIP, and I believe the Colorado SIP has bipartisan support. The entire Colorado congressional delegation supports the SIP, the governor supports the SIP, the great bipartisan appeal. But recently, the National Parks Conservation Association and Wild Earth Guardians have filed a notice to appeal EPA's approval of Colorado's State Implementation Plan regarding regional haze, and Xcel has been a great player in this, and Xcel continues to support the SIP. Is that correct?

Mr. FOWKE. We absolutely continue to support it.

Mr. GARDNER. What do you think ends up happening? I mean, this is an idea that has such tremendous bipartisan support in Colorado. What ends up happening with States like Colorado that truly do come together, creating a SIP that is recognized by both sides as a step forward, and then you have this litigation that happens? What do you think the end game is around the country for SIP?

Mr. FOWKE. I think it is a model for how you can accomplish responsible and cost effective environmental leadership, and you know, the fact that the EPA agreed with that SIP program—and by the way, we are facing the same thing in Minnesota and have the same kind of lawsuits as well. I think it shows that——

Mr. GARDNER. Same bipartisan support?

Mr. FOWKE. You have bipartisan. You can get something done at the State level, you can get EPA to buy off on it and you still are not going to make everybody happy, and that is just the way that works. But it has been, I think, a model that we could look at going forward.

Mr. GARDNER. And we have seen tremendous development of natural gas in my district as well, and Xcel Energy, you are using that energy within the State of Colorado, is that correct?

Mr. FOWKE. That is correct.

Mr. GARDNER. I wanted to talk to some of the other panelists. I heard the mention of hydropower as well. Colorado has a renewable portfolio standard, but however, hydropower is considered not to be a part of that. I think micro hydro is considered to be a part of it, but nothing beyond on a large scale. If we were to see the inclusion of hydropower at a larger scale, would we increase the opportunity to use hydro as part of a renewable portfolio standard, Mr. McCullough?

Mr. MCCULLOUGH. Yes, I think we would. Any incentive or motive to move forward with hydropower would be helpful in moving it along.

Mr. GARDNER. Mr. Mohl?

Mr. MOHL. Absolutely.

Mr. GARDNER. Mr. Fowke?

Mr. FOWKE. Yes, I think so.

Mr. GARDNER. Mr. Gerken?

Mr. GERKEN. Yes, I do, and to give an example is we have members in Michigan and Michigan was moving forward with an RPS standard, and we had five municipals in Michigan that actually—the State carved out specifically their participation in these projects we had, so I think you will see some movement there, most definitely.

Mr. GARDNER. Very good. Mr. Gramlich, if you want to answer that question or not? Mr. McClure?

Mr. MCCLURE. Yes.

Mr. GARDNER. Very good. The other question I would have is to Xcel Energy. You have been working on the customer renewables credit. Can you give me—I only have a minute left—maybe a little explanation for the committee of that idea?

Mr. FOWKE. Yes, it basically incents and recognizes that utilities that have specific amount of renewables on their system do incur some ancillary costs, and the more you have, he more you incur. It is to help those utilities and their customers bridge some of those costs, and it really is a fraction of what the PTC is now.

Mr. GARDNER. Very good.

Mr. Chairman, I yield back my time.

Mr. WHITFIELD. Thank you.

At this time I recognize the gentleman from Texas, Mr. Olson, for 5 minutes.

Mr. OLSON. I thank the chairman.

Welcome to the witnesses. Good afternoon by about 2 minutes here. I appreciate your time and expertise.

In my home State of Texas, we say Texas is like a whole other country, and we are. We are the microcosm of America's diversity electricity generation. And like Texas, each region of the United States uses a mix of fuels to generate electricity, ranging from coal, gas, nuclear, hydropower, and renewables like wind and solar. In taking a page from the former chairman, Mr. Dingell from Michigan, from his way he works here in the committee, I am going to ask all of you a question. Pleas answer yes or no.

Start with you, Mr. McCullough. Is fuel diversity important to keeping energy prices low? Yes or no?

Mr. MCCULLOUGH. Yes.

Mr. OLSON. Mr. Mohl?

Mr. MOHL. Yes.

Mr. OLSON. Mr. Fowke?

Mr. FOWKE. Got to go with yes.

Mr. OLSON. Got to go yes. Mr. Gerken?

Mr. GERKEN. Yes.

Mr. OLSON. Mr. Gramlich?

Mr. GRAMLICH. Yes.

Mr. MCCLURE. Yes.

Mr. OLSON. OK, six yeses. OK, here we go with question two. Is fuel diversity important for reliable electric service? Yes or no?

Mr. MCCULLOUGH. Absolutely, yes.

Mr. MOHL. Yes.

Mr. FOWKE. A qualified yes.

Mr. GERKEN. Yes.

Mr. GRAMLICH. Yes.

Mr. MCCLURE. Yes.

Mr. OLSON. OK, 5.9 yeses. Is fuel diversity important for keeping lights on or storing electricity quickly during major weather events or natural disasters? Yes or no?

Mr. MCCULLOUGH. Yes.

Mr. MOHL. Yes.

Mr. FOWKE. Yes.

Mr. GERKEN. Yes.

Mr. GRAMLICH. Yes.

Mr. MCCLURE. Yes.

Mr. OLSON. Oh, 6.0, all right. And the final yes or no question, to ensure affordable, reliable electricity, should federal policies support fuel diversity? Yes or no?

Mr. MCCULLOUGH. Yes.

Mr. MOHL. Absolutely, yes.

Mr. FOWKE. Yes.

Mr. GERKEN. Absolutely, yes.

Mr. GRAMLICH. Yes.

Mr. MCCLURE. Yes.

Mr. OLSON. Wow, 6.0 again, a total of 23.9. Thank you, gentlemen.

The Lone Star State is the fastest growing State in the country. In a stat that matters in this town, last census, the 2010 census, we picked up four new congressional districts because of our

growth. We all know more people means more homes, more commerce, more industry, more need for electricity generation. ERCOT is the agency in our State that regulates most of the electricity in the State, about 90 percent of it, and they did a recent study that says we may have a power crisis by 2014 unless we have new power generation brought up online. We will be short 2,500 megawatts is their estimate. If we have a heat wave like the August before last, we were over 100 degrees in every part of the State for over a month. If that happens again, we will have brownouts or blackouts. We need more capacity. And yet, any time my State has tried to take steps to address this shortage with coal, the Federal Government, through EPA, coordinated with the environmental groups, has stopped these projects dead in their tracks. One such project is a proposed pet coke plant in Texas called the Las Brisas Energy Center that has been stopped dead again by EPA after they slow-walked the project for more than 3 years. Pet coke is a byproduct from the firings right there in the Gulf Coast. I am going to have an op-ed in tomorrow's Hill that details the setbacks Las Brisas endured. EPA blocked the permitting process, even though the Texas State agency authorized by federal law to enforce the Clean Air Act granted the permit to Las Brisas. Las Brisas would have been a state-of-the-art facility, featuring a "poshing scrubber" to limit sulfur dioxide emissions, a mechanism to collect particulate matter, and an activated carbon ejection system to remove mercury, which would have ensured better air quality than some of the older plants on the Texas power grid. And yet, the environmental groups and EPA blocked it, putting reliability at risk for Texans.

A very short question for you, Mr. McCullough, and you, Mr. McClure, Mr. Gerken. In your opinion, is this treatment typical of President Obama's EPA?

Mr. MCCULLOUGH. We do see very harsh regulatory action against fossil fuels, yes.

Mr. OLSON. Mr. McClure?

Mr. MCCLURE. I would agree that fossil fuels are——

Mr. OLSON. And finally, Mr. McCullough—I had Mr. McCullough. Mr. Gerken.

Mr. GERKEN. Yes, I believe so.

Mr. OLSON. OK, I don't want to put any words in anybody's mouth, but it is pretty clear to me that President Obama is keeping a campaign promise. He is keeping his word that he said with the San Francisco Chronicle interview in the summer of 2008—and this is a quote—"If somebody wants to build a coal-powered plant, they can. It is just that it will bankrupt them because they are going to be charged a huge sum for all the greenhouse gas that is being emitted."

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

Mr. WHITFIELD. Thank you. At this time I recognize the gentleman from Illinois, Mr. Kinzinger, for 5 minutes.

Mr. KINZINGER. Thank you, Mr. Chairman. Thank you to the witnesses for being here today. We appreciate it.

Mr. Mohl, I want to thank you for being here, and I want to echo some of the comments that I have heard from power companies in Illinois.

It is interesting to me—who would have imagined that 10 years ago we would be discussing the negative impacts that an oversupply of natural gas would have on our electrical grid. My district is home to eight nuclear units, and Illinois gets 1/2 of its power from nuclear.

Mr. Mohl, if the price of natural gas stays at its current market price of $4 a unit, will nuclear maintain its 20 percent share, and if not, why not, and what can be done to ensure diverse energy supply?

Mr. MOHL. Well as I mentioned, the three challenges we face from merchant nuclear, which you have in Illinois, the low gas prices, which are suppressed market prices, we need reasonable, fact-based, scientific regulation that uses cost benefit analysis, and we need fair and competitive wholesale markets. So there are a number of things that really have to happen for these plants to be able to continue to operate.

Mr. KINZINGER. What can we do—so I mean, do you have any ideas offhand? So you are going to continue to have natural gas at that price?

Mr. MOHL. Well, I mean, natural gas prices are what they are. We have to deal with that situation. I mean, that is part of the market. Where we have opportunities is to make sure that when we look at imposing additional costs for whatever reason that may be——

Mr. KINZINGER. Regulations, requirements, stuff like that?

Mr. MOHL. Yes, right, that that—you know, we take a scientific approach, it is fact-based, and we use cost benefit. And when I say cost benefit, I don't mean doing things on the cheap.

Mr. KINZINGER. Sure.

Mr. MOHL. What I mean is we are looking at the best alternatives.

Mr. KINZINGER. And we would like to see the NRC, for instance, implement cost benefit rules and analyses. That would be nice.

Mr. MOHL. And then lastly is, you know, we need competitive wholesale markets, and they need to be free markets so people have the opportunity to earn a return on their investment.

Mr. KINZINGER. Now let me ask you, too. You state in your written testimony that throughout the Nation, nuclear generators help keep wholesale electricity prices lower than they otherwise would be. Can you further explain that?

Mr. MOHL. Well sure. We talked about nuclear generation operates at a 90 percent capacity factor. It is high capital investment, low incremental fuel, so they are one of the first resources in a stack, and so they operate very efficiently and they operate a significant portion of the time. And so that is what makes them attractive.

Mr. KINZINGER. And that is what is keeping companies like yours competitive in this environment?

Mr. MOHL. Yes, I mean, it does. Keep in mind the challenges that I mentioned. Those are still challenges, even though they are base load resources.

Mr. KINZINGER. Understood.

And for everybody, is having a diverse fuel mix ranging from fossil fuels to renewables critical for long-term planning? Do you need

diversity to protect against unforeseen fuel shortages or disruptions? We will start over there, sir.

Mr. MCCULLOUGH. Unequivocal yes.

Mr. MOHL. Absolutely.

Mr. FOWKE. Very helpful.

Mr. GERKEN. Yes.

Mr. GRAMLICH. Yes.

Mr. MCCLURE. Yes.

Mr. KINZINGER. That is not a big surprise. Is having a diverse fuel mix important for keeping electricity affordable?

Mr. MCCULLOUGH. Yes.

Mr. MOHL. Yes.

Mr. FOWKE. Yes.

Mr. GERKEN. Yes.

Mr. GRAMLICH. Yes.

Mr. MCCLURE. Yes.

Mr. KINZINGER. Everybody has got their yes hats on. That is good. When electricity rates rise, are the impacts likely to be greatest for lower income consumers or those on a fixed income, or higher income consumers?

Mr. MCCULLOUGH. When you look at the percentage of discretionary spending that people have, it is obviously a bigger impact on lower income.

Mr. MOHL. It has a huge impact.

Mr. KINZINGER. And I think you would all agree. We just wanted to get that out there.

When electricity rates rise, can it also affect manufacturers and other businesses that are large energy consumers? We talk about manufacturing in this country. It is very important in my district. Does a higher energy cost, energy price—and when we talk about EPA regulations, nuclear regulations, will that affect our business climate here?

Mr. MCCULLOUGH. I think it absolutely could and will if we don't have the diverse portfolio that supports balance and stability in the future of energy prices.

Mr. KINZINGER. Don't you wish I was your teacher in high school? It would be easier to pass every class.

With that, Mr. Chairman and the witnesses, I want to say thank you and I will yield back.

Mr. WHITFIELD. Gentleman yields back the balance of his time.

The gentleman from Louisiana—at this time I recognize for 5 minutes the gentleman from Louisiana, Dr. Cassidy, for 5 minutes.

Mr. CASSIDY. Hey, gentlemen, I am sorry to be coming at the very end. Just when you thought, man, it is over. I apologize. It is like a bad day that won't end.

Mr. McClure, you mentioned removing fossil fuel as a fuel source will increase costs. Clearly, there is a move by a variety of mechanisms to decrease our use of coal, our most plentiful fossil fuel, and saying that will have negative effects on electric reliability costs and the economy. I see increased utility costs as decreasing manufacturing jobs, if you will, energy intensive manufacturing jobs. Can you comment on that, because I think there is a push either through carbon tax or through EPA regulation or through a variety of other mechanisms to remove fossil fuel from its relative portion

of our balance, almost kind of agnostic or inconsiderate of the impact it would have on the overall economy.

Mr. MCCLURE. Well in our system, one of our largest coal plants—we have two coal plants—is our lowest cost generating resource. And we have a Nucor steel plant in our system. They came to our system because of low cost energy, and they are very much concerned as energy prices go up, they become less competitive, and they are competing at a global market.

Mr. CASSIDY. So there has been a consideration of a carbon tax. Obviously that is a way to price electricity from fossil fuel at a higher level relative to whatever other source you go to. Now, is it fair to say that would have a negative impact upon Nucor's ability to hire blue collar middle class workers?

Mr. MCCLURE. If their costs go up, it affects—I am sure it affects their operations and their decisions and who they can hire.

Mr. CASSIDY. And by definition, energy intensive enterprises are energy intensive.

Mr. MCCLURE. Yes, they are.

Mr. CASSIDY. OK. And do I know that Nucor is actually a European firm?

Mr. MCCLURE. No, Nucor is an American firm. I think they are headquartered in North Carolina.

Mr. CASSIDY. Is it? I think I recall once, they were considering building either in Brazil or the United States, and I am sure energy cost must have played a role there.

Mr. MCCLURE. My understanding is they have 60 facilities in the United States.

Mr. CASSIDY. Got you. OK.

And then you speak of the diversity of fuel sources provides lower electric rates. I think that is in your testimony. When you say diversity, I have always been concerned that if you look at the premium the taxpayer pays to subsidize some renewables, we are actually paying a heck of a lot for things like wind and solar. Not saying that we shouldn't encourage their use, but at the same time, the cost per megawatt is almost exponentially higher than that from fossil fuel sources. Can we really build a grid based upon such expensive electricity?

Mr. MCCLURE. Again, I would come back to the notion of diversity. There are certain parts of the country where wind is very competitive because of great wind conditions, and so those can be very low cost—that can be a low cost source of generation. And as has been mentioned earlier, it can help stabilize future costs because the fuel cost really doesn't change, but it is regional, like so many other issues we have discussed today. In some areas, wind can be a very valuable asset. In other areas, it is not even a viable possibility.

Mr. CASSIDY. Now, when you say that, obviously there is incredible subsidies involved with—per megawatt hour involved with, say, wind. So when you say it is total life cycle cost, I am just asking—I don't know the answer. I am asking to learn. Total life cycle cost, if you factor in those subsidies, is it still a good bargain?

Mr. MCCLURE. I think we are learning a lot in wind. The price is coming down and the early wind projects we put in, we decommissioned, but the equipment today is much better and I think

they will continue to be—the newer equipment, I believe, in the right locations will be valuable over the long haul with the subsidies.

Mr. CASSIDY. Got you. I yield back. Thank you.

Mr. WHITFIELD. Thank you, Dr. Cassidy.

That concludes today's hearing. I want to thank the panel of witnesses. We appreciate your expertise and your time for joining us today, and I would also ask unanimous consent that the following materials and statements be entered into the record: a statement for the record from the American Public Power Association, and a statement for the record from the American Chemistry Council. Mr. McClure, certainly I want to thank your company for their involvement in the Alliance for Fuel Options, Reliability, and Diversity report, and also, the Wall Street Journal article on the California grid, and the New York Times article on the New England gas price situation as well.

[The information appears at the conclusion of the hearing.]

Mr. WHITFIELD. The record will remain open for a period of 10 days, and Mr. Gramlich and others, we will be in touch with you all about some additional information that we asked that you all provide.

But thank you once again. Our next hearing will be on this subject relating to the RTOs, and that will be maybe in a couple of weeks, but thank you again, and we look forward to working with all of you as we move forward to try to keep America competitive in the global marketplace. Thank you.

[Whereupon, at 12:19 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

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March 5, 2013

The Honorable Ed Whitfield
Chairman
Subcommittee on Energy and Power
Energy and Commerce Committee
2125 Rayburn House Office Building
Washington, D.C. 20515

Dear Chairman Whitfield:

The American Public Power Association (APPA) welcomes the opportunity to submit this statement for the record in relation to the House Energy & Power Subcommittee hearing on "American Energy Security and Innovation: The Role of a Diverse Electricity Generation Portfolio."

APPA is the national service organization representing the interests of over 2,000 municipal and other state- and locally-owned, not-for-profit electric utilities throughout the United States (all but Hawaii). Collectively, public power utilities deliver electricity to one of every seven electricity consumers (approximately 47 million people), serving some of the nation's largest cities. However, the vast majority of APPA's members serve communities with populations of 10,000 people or less.

Overall, public power utilities' primary purpose is to provide reliable, efficient service to local customers at the lowest possible cost, consistent with good environmental stewardship. Public power utilities are locally created governmental institutions that address a basic community need: they operate on a not-for-profit basis to provide an essential public service, reliably and efficiently, at a reasonable price.

The Importance of Fuel Diversity for Electric Generation

APPA commends Chairman Whitfield for holding a hearing on the need for fuel diversity for electric generation. This is an issue the association has long supported. APPA members generate from a large number of fuel sources, including coal, natural gas, nuclear, hydropower, wind, solar, and biomass (among others). They recognize the need to diversify their resource portfolio as a means of risk management. Utilities know that if they are too reliant on one source, they can leave themselves open to disruptions and price volatility. Thus APPA is strongly supportive of policies that allow for the widest use a variety of fuels to ensure reliability of the electric grid and low-cost power to customers. It is important that Congress examines the implications of federal policies that reduce fuel diversity.

Natural Gas Is Becoming the Dominant Fuel Source for Electric Generation

As the subcommittee is well aware, there are a variety of factors driving electric utilities away from the use of coal-fired generation. The Environmental Protection Agency (EPA) has issued several regulations, such as utility MACT, that are driving utilities to retire coal-fired power plants and replace them with natural gas-fired ones. At the same time, the low cost of natural gas in the U.S., due to increased production, is making the use of coal for generation uneconomic, particularly when factoring in the regulatory landscape. Just a few years ago, coal was the predominant fuel type used for electric

generation. Today, its share continues to decline as electric generation from natural gas and renewables such as wind and solar increase. The use of coal for electric generation in the U.S. will further decline when EPA finalizes its New Source Performance Standards (NSPS) for greenhouse gas (GHG) emissions from new power plants.

A January 2013 APPA report examining new generation capacity in the U.S. highlights these trends in the industry. It finds that "the share of coal-fired capacity continues to diminish, as solar and nuclear, in addition to wind and natural gas, have surpassed it in the under construction category."[1] Over 40% of new plant construction is natural gas, with 19.1% wind, 12.7% solar, and 11.4% nuclear.[2] In addition, since 2007, the share of coal plants under construction has dropped dramatically. The report also notes that natural gas has the largest share of operating capacity (43.4%), with coal at 30%.[3] The operating capacity of coal will continue to drop as more coal-fired plants are retired due to age, EPA regulations, and the lower price of natural gas. In 2012 alone, over 12,200 MW of capacity were retired. Two-thirds of that retirement was coal-fired.[4]

There will be long-term implications from the greater use of natural gas for electric generation. Utilities are spending hundreds of millions of dollars to convert existing coal facilities to natural gas or to construct new natural gas plants. They are also using natural gas generation to back up wind and solar power, variable energy sources that cannot be relied on to generate power at all times. These are long-term investments being made to generate cleaner power, but that increase the risk of greater volatility in electricity prices for consumers, and potentially reduce electric reliability. As a commodity, natural gas is subject to price volatility. Prices may be low today, but can easily rise in the years to come due to a variety of factors including regulations on fracking, increased utility demand, exports, and increasing use in the transportation sector.

In addition, it is not clear yet whether there will be sufficient infrastructure or storage to accommodate the greater use of natural gas by electric utilities.[5] While the Federal Energy Regulatory Commission is examining how to promote greater coordination between the electricity and natural gas industries, no one knows whether all the changes needed for fuel switching on this scale can be accomplished in the time needed to comply with EPA regulations. As is evidenced in New England, a region of the country heavily dependent on natural gas for electric generation, there are issues with pipeline capacity and competing demand for gas for home heating. Electricity prices in the region were four to eight times higher than normal in February 2013 because of the lack of fuel diversity.[6]

And New England is not the only region of the country with potential reliability concerns. A January 2013 EPA Compliance Update by the Midwest Independent System Operator (MISO) states the ISO has concerns about whether there is sufficient resource adequacy in the Midwest beginning in 2016. With the significant number of coal-fired generation retiring due to EPA regulations and low natural gas prices, MISO projects there will be a potential 11.7 GW shortfall of resource adequacy in the winter of 2016 and

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[1] *See* APPA Report on New Generating Capacity: 2013 Update, January 2013, available at
[2] *Id.* at 2.
[3] *Id.* at 15.
[4] *Id.* at 17.
[5] A July 2010 APPA Study by the Aspen Environmental Group, Implications of Greater Reliance on Natural Gas for Electricity Generation, examines the impacts on natural gas and deliveries to electric utilities from fuel switching.
[6] *See* In New England, a Natural Gas Trap, New York Times, February 15, 2013, available at http://www.nytimes.com/2013/02/16/business/electricity-costs-up-in-gas-dependent-new-england.html?_r=0

a 3.5 GW one in the summer of 2016.[7] MISO anticipates increased utilization of natural gas fuel generation that will result in "changes to the system's generation configuration and concerns about the ability of the current pipeline infrastructure's ability to deliver enough gas."[8]

The subcommittee should be concerned about trends in the electric industry that are reducing fuel diversity. One of the key benefits of using coal for electric generation is that it can be stockpiled at the utility and readily available when needed. Utilities cannot store natural gas in the same manner. While there are many benefits to using natural gas for electric generation, over-reliance on the fuel source, especially in areas of the country that lack pipeline capacity or storage, can result in price spikes to consumers and impact reliability if natural gas is not available to meet demand. APPA believes Congress should adopt policies that promote as much fuel diversity as possible while also protecting the environment.

Other Ways Congress Can Promote Fuel Diversity

Congress should consider legislation that promotes the development of other fuel sources for electric generation such as hydropower and nuclear, or that reduces demand for electricity through energy efficiency or demand response. Such legislation would include bills to streamline hydro relicensing requirements and other regulations limiting or preventing the expansion of hydro power, and to address nuclear waste. Removing impediments to their expansion as a fuel source would also promote fuel diversity.

According to U.S. Energy Information Administration (EIA) data from 2011, hydropower is the nation's largest source of clean, renewable electricity, accounting for 62% of domestic renewable generation and 8% of total electricity generation. Despite the beneficial use of hydropower, most dams were built decades ago, for purposes other than power generation—only 3% of the country's approximately 80,000 dams currently have facilities that generate electricity. Thus, there is substantial potential to add renewable electric generation to non-power dams by installing electricity generation equipment at those sites, as well as to existing municipal, industrial, and agricultural water distribution conduits/canals.

Legislation to modernize and streamline the licensing process for new hydropower units on existing dams, for new hydropower technologies, such as marine hydrokinetic, and for relicensing of existing facilities to allow for efficiency upgrades could significantly increase this clean, renewable source. APPA has, therefore, supported several bills that have been or will be considered in the House, including Rep. Cathy McMorris Rodgers' bill, S. 267, the Hydropower Regulatory Efficiency Act, that came through this subcommittee and full committee, and recently passed the House with overwhelming bipartisan support. We applaud the subcommittee's leadership on this important issue.

With regard to nuclear waste, the broader electric sector, public power included, has long sought a solution to storage of waste, either in a permanent repository or in long-term on-site facilities. At the same time, the industry has contributed billions of dollars to the federal government to create a permanent repository, an outcome that has not been achieved. Resolution of both the financial and policy uncertainty surrounding this issue would have a positive impact on developing new nuclear power plants as well as upgrading existing plants.

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[7] See MISO EPA Compliance Update, January 11, 2013, available at https://www.misoenergy.org/Library/Repository/Communication%20Material/Power%20Up/EPA%20Compliance%20Update.pdf.

[8] https://www.misoenergy.org/WhatWeDo/StrategicInitiatives/Pages/EPACompliance.aspx

Energy efficiency also has a role in fuel diversity since it helps to reduce demand for electricity. Congress should consider energy efficiency legislation, such as S. 1000, which was introduced in the last Congress, by Senators Shaheen (D-NH) and Portman (R-OH), that would improve efficiency in a number of areas. The goal of this and other similar measures is to ensure we are using energy as efficiently as possible throughout our economy so as to minimize the need to expand our fleet of power plants.

Low-cost, reliable electricity is a critical component of our nation's economy and crucial to everyday lives. APPA members believe there is great value in diversifying their resource portfolios to ensure price stability and electric reliability. It is important that Congress does all that it can to promote fuel diversity, as well as examine the implications of any federal policies that reduce fuel diversity.

Thank you again for this opportunity to submit a statement for the record and we welcome any questions you might have.

cc: The Honorable Bobby Rush
The Honorable Fred Upton
The Honorable Henry Waxman

Statement to the Committee on Energy and Commerce

Subcommittee on Energy and Power Hearing On

"American Energy Security and Innovation:

The Role of a Diverse Electricity Generation Portfolio

March 5, 2013

The American Chemistry Council (ACC) welcomes the opportunity to comment on the critical role that fuel diversity plays in ensuring a reliable and affordable supply of electricity for all Americans. Our comments will focus on how advanced, efficient technologies can help maintain a diverse electricity mix.

The US chemical industry is the nation's largest user of combined heat and power (CHP), a technology that dramatically improves the efficiency of the fuels we use to produce power. CHP is a proven commercial technology with 82 gigawatts (GW) of installed capacity at over 3,700 sites in the United States. However, CHP is a significantly underused technology. The Oak Ridge National Laboratory has estimated that the technical potential for CHP is 130 gigawatts in U.S. commercial and industrial applications – suggesting that there is much more to be done to promote this highly efficient technology.

ACC supports policy approaches that boost CHP deployment across the country. President Obama's August 30, 2012 Executive Order on Accelerating Investment in Industrial Energy Efficiency was one such measure. CHP can play a pivotal role in replacing generation from the many coal-fired power plants that have been recently retired or are expected to retire in the coming years. CHP is reliable and resilient and because it stretches the existing fuel supply, it is one of the most cost-effective technologies on the market.

CHP has not yet reached its potential for a variety of financial, market and regulatory barriers. ACC suggests that if the Committee wants to support a more robust fleet of CHP systems, it consider the following issues:

- **Create incentives and remove disincentives for utility promotion of cost-effective industrial efficiency on-site.** State PUCs and local utility boards should consider policies and incentives to promote cost effective industrial efficiency. With the power sector facing upwards of 50 GW of retired generation capacity in the next few years, PUCs should give priority attention to CHP, the most energy-efficient and cost-effective replacement generation option.

- **State and federal authorities should allow streamlined permitting for combined heat and power (CHP) projects.** Federal environmental regulations are creating a large turnover in industrial boilers and coal-fired electric generating units. Highly efficient replacement generation, like CHP, should receive priority consideration. Making CHP eligible for fast-track permitting authorities will lead to higher investment levels.
- **Include combined heat and power in state Energy Efficiency Resource Standards (EERS) or Renewable Energy Standard (RES) programs.** Some 30 states employ renewable energy and/or energy efficiency resources standards. Of those, 13 states qualify CHP as an eligible resource. All states should include on-site industrial measures like CHP and waste energy utilization in EERS programs or RES programs.
- **Put CHP on an equal footing with renewable energy**. In a number of policy arenas, including some state RES programs, federal tax incentives, and clean energy standard proposals, CHP is excluded or overlooked compared to traditional renewable energy, even though CHP is a proven source of clean energy. Policies that create mandates or incentives to promote renewable energy should give equal treatment to CHP.
- **States should adopt utility rate structures that remove financial disincentive to use end use efficiency**, including CHP. States should adopt interconnection and back-up power rules and rates for CHP that are fair and reasonable.
- **Provide financial support to increase investment in CHP technologies**. CHP is a capital-intensive investment, much more so than replacing boilers, for example. Investments in CHP would accelerate if financial tools were available to help cover the incremental cost of CHP. CHP investments would also accelerate if operators could enter into long-term power purchase agreements to sell surplus electricity to the market.

In conclusion, CHP is one of the most energy efficient and cost effective power generation technologies on the market. Making CHP a centerpiece of utility strategies to turn over their existing generation fleets presents a robust, reliable and resilient opportunity to further diversify our sources of power generation.

Thank you for the opportunity to comment on the proven benefits of CHP.

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THE WALL STREET JOURNAL.
WSJ.com

U.S. NEWS | February 26, 2013, 7:16 p.m. ET

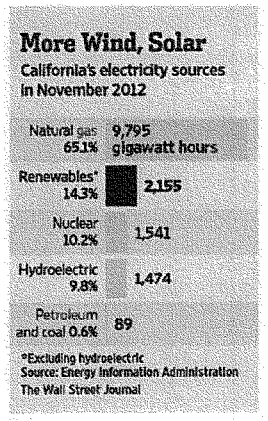
California Girds for Electricity Woes

Increased Reliance on Wind, Solar Power Means Power Production Fluctuates

By REBECCA SMITH

SAN FRANCISCO—California is weighing how to avoid a looming electricity crisis that could be brought on by its growing reliance on wind and solar power.

Regulators and energy companies met Tuesday, hoping to hash out a solution to the peculiar stresses placed on the state's network by sharp increases in wind and solar energy. Power production from renewable sources fluctuates wildly, depending on wind speeds and weather.



California has encouraged growth in solar and wind power to help reduce greenhouse-gas emissions. At the same time, the state is running low on conventional plants, such as those fueled by natural gas, that can adjust their output to keep the electric system stable. The amount of electricity being put on the grid must precisely match the amount being consumed or voltages sag, which could result in rolling blackouts.

At Tuesday's meeting, experts cautioned that the state could begin seeing problems with reliability as soon as 2015.

California isn't the only state having trouble coping with a growing share of renewables. Texas also needs more resources, such as gas-fired power plants, that can adjust output in response to unpredictable production from wind farms.

Renewable power has seen a boom in both states. On Feb. 9, wind farms in Texas set a record for output, providing nearly 28% of the state's supply for the day. Production hasn't hit that level yet in California, but the state's goal is to get one-third of its electricity from renewable resources by 2020.

"I think we're going to end up closer to 40%," said Robert Weisenmiller, chairman of the California Energy Commission, the state's policy and planning agency for electricity.

A decade ago, California was hit by an electricity crisis marked by price surges and rolling blackouts, stemming from market manipulation and tightening electricity supplies in a newly

deregulated market. To prevent a recurrence, state regulators passed rules requiring utilities to line up enough energy to meet even high power demand, with a special emphasis on in-state renewable resources.

"California has been well served by the procurement process since the crisis," said Steve Berberich, chief executive of the California Independent System Operator, which runs the state's grid. "The problem is we have a system now that needs flexibility, not capacity."

Changes in California's market have attracted lots of new generation; the state expects to have 44% more generating capacity than it needs next year. Grid officials say they expect the surplus to fall to 20% by 2022, though it will remain high for about a decade.

However, the surplus generating capacity doesn't guarantee steady power flow. Even though California has a lot of plants, it doesn't have the right mix: Many of the solar and wind sources added in recent years have actually made the system more fragile, because they provide power intermittently.

Electricity systems need some surplus, so they can cover unexpected generator outages or transmission-line failures, but having too much can depress the prices generators can charge for electricity. In part because of low power prices, many gas-fired generation units aren't profitable enough to justify refurbishments required by pending federal regulations under the Clean Water Act. That means they are likely to be shut by 2020, adding to the state's power woes.

By July, state officials hope to have a plan in place addressing the problem. Turf issues among state and federal regulators could complicate the process.

Michael Peevey, president of the California Public Utilities Commission, which regulates utilities, said action is clearly needed, but he isn't sure whether the market needs "small adjustments or a major overhaul."

Utility executives are calling for immediate action, pointing to the risk of rolling blackouts. "We see the issue hitting as soon as 2013, 2014, 2015," said Todd Strauss, the head of planning and analysis for PG&E Corp., a big utility serving Northern California, who attended Tuesday's meeting. "If we thought it was far out, we wouldn't be here."

Write to Rebecca Smith at rebecca.smith@wsj.com

A version of this article appeared February 27, 2013, on page A3 in the U.S. edition of The Wall Street Journal, with the headline: California Girds for Electricity Woes.

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The New York Times

February 15, 2013

In New England, a Natural Gas Trap

By MATTHEW L. WALD

Electricity prices in New England have been four to eight times higher than normal in the last few weeks, as the region's extreme reliance on natural gas for power supplies has collided with a surge in demand for heating.

Frigid temperatures and the snowstorm that hammered parts of the Northeast last week have revived concerns about the lack of alternatives to natural gas. Many plants that ran on coal or oil have been shuttered, and the few that remain cannot be put into service quickly enough to meet spikes in demand. The price of electricity is determined by the price of gas.

Last year, natural gas provided 52 percent of New England's electricity, and that share is expected to grow. Gas is generally cheaper than other energy sources, and the lower costs have spurred the retirement of aging coal generators and nuclear reactors. The six-state New England region and parts of Long Island are the most vulnerable now to overreliance on gas, a vulnerability heightened by a shortage of natural gas pipeline capacity, but officials worry that similar problems could spread to the Midwest.

"We are sticking a lot of straws into this soft drink," said William P. Short III, an energy consultant whose clients include companies that move and burn gas. "This is a harbinger of things to come in New England, as well as New York."

James G. Daly, vice president for energy supply at Northeast Utilities, a company that, through its subsidiaries, provides electricity to homes and businesses in Connecticut, Massachusetts and New Hampshire, said: "There is concern we don't have enough capacity to supply heating and electricity generation."

Northeast and many other companies are temporarily insulated from the spot market because they sign long-term contracts for electricity supply. But Northeast's energy charges next year could be 10 percent higher than they are now, Mr. Daly said, because the companies that sell power on a long-term basis will charge more to absorb the risk of short-term spikes in prices.

"It is certainly true that a region like New England that relies on a single fuel source like natural gas for the bulk of its power does leave itself open for more disruptions than a region with a more diverse fuel mix," said Jay Apt, executive director of the Electricity Industry Center at Carnegie Mellon University in Pittsburgh. "It's not a knock against natural gas; it's a knock against a single fuel source."

The American Public Power Association has warned since 2010 that demand is outpacing the delivery capacity of gas infrastructure. At coal plants, "you can look out the window and see that 60-day supply of your fuel," said Joe Nipper, the group's senior vice president of government relations. But gas plants tend

to deliver fuel just as it is needed.

The gyrations of the spot market are hard to follow because prices are set in units few consumers understand. Electricity is sold on the wholesale market in megawatt-hours, or thousands of kilowatt-hours; a megawatt-hour is enough to run a big suburban house for a month. Natural gas is sold in a unit called an MMBtu, or a million British thermal units. An MMBtu equals 10 therms, the unit home heating customers pay for.

Normally, a megawatt-hour costs $30 to $50, and an MMBtu less than $4. But not lately.

The problem began late last year. During a cold snap around Thanksgiving, electricity prices in New England shot up to the highest in the country: $103.20 per megawatt-hour and $12.37 per MMBtu on Nov. 27.

On Jan. 24, the cost of an MMBtu of natural gas at Algonquin Citygate, a spot near Boston where gas is traded, rose to $31.20, pushing the price of a megawatt-hour over $200. Constellation Energy, which operates plants in the region, attributed the jump to temperatures 15 to 20 degrees below average.

A megawatt-hour cost about $150 early this month, according to weekly reports from ISO New England, the independent operator that maintains the region's electricity market. A year ago, the price was around $30.

New England's problems have been moderated somewhat by imports. "Without Indian Point, New England would have been toast," Mr. Short said. "We're importing 1,400 megawatts out of New York." Indian Point is a twin-unit nuclear plant on the Hudson River that New York State is seeking to close.

But the region is littered with 1950s- and 1960s-era coal and oil plants that have been retired in the last few years. The 214-megawatt, coal-fired AES Thames unit near Uncasville, Conn., shut down in 2011; Somerset Station, a 174-megawatt, coal-fired plant in Somerset, Mass., closed in 2010.

The Salem Harbor plant in Salem, Mass., once had four coal and oil units, with a capacity of 745 megawatts. Two have closed, and the others will probably close next year. A new owner intends to build a 630-megawatt plant that will run on natural gas.

The underlying issue in New England is that gas pipeline capacity is inadequate to keep prices steady in times of high home heating demand, said Vamsi Chadalavada, executive vice president and chief operating officer of ISO New England. ISO is leading a study focused mainly on reliability, but reliability is intertwined with price, he said.

Importing liquefied natural gas would help, Dr. Chadalavada said, but cargoes are going instead to Europe and South America, where prices are higher.

Several companies want to liquefy and export gas from the continental United States because of the shale gas glut, and the events in New England could affect that debate. Opposition has come mostly from

domestic industries that use the gas. A spokesman for Senator Ron Wyden, Democrat of Oregon and chairman of the Senate Committee on Energy and Natural Resources, said Mr. Wyden saw the price gyrations in New England as a reason to "look before we leap ahead with unfettered exports of gas."

But the biggest problem may be the inadequacy of existing pipelines. On Feb. 7, ISO New England told the Federal Energy Regulatory Commission that it was concerned about "increasing reliance on natural gas-fueled generators at times when there is an increasingly tight availability of pipeline capacity to deliver natural gas from the south and west to New England."

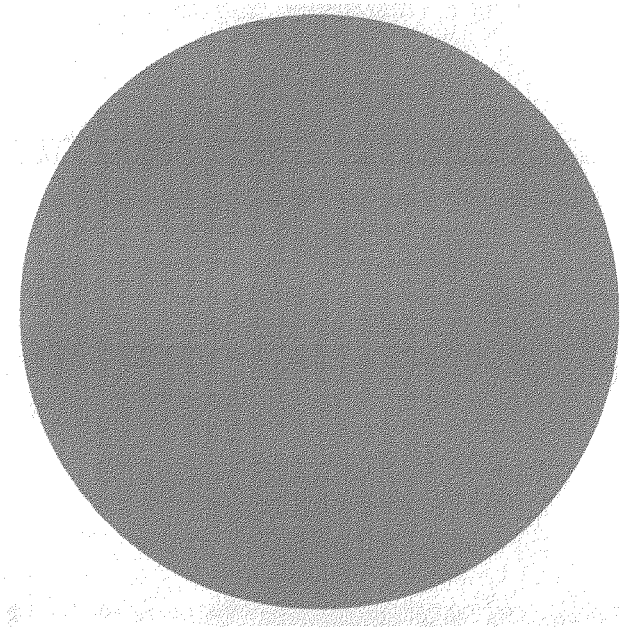
Additionally, experts say that the natural gas market and the electric market mesh poorly, because while the electric market runs around the clock, the gas market closes down at night.

During the storm last week, with transmission lines being knocked out by snow and high winds, ISO asked some gas-fired generators to start running in the middle of the night, Dr. Chadalavada said, and found they could not. "We were sitting here, 3 in the morning, trying to get gas generators to start up, and we started seeing where they couldn't access that market in the overnight hours," he said.

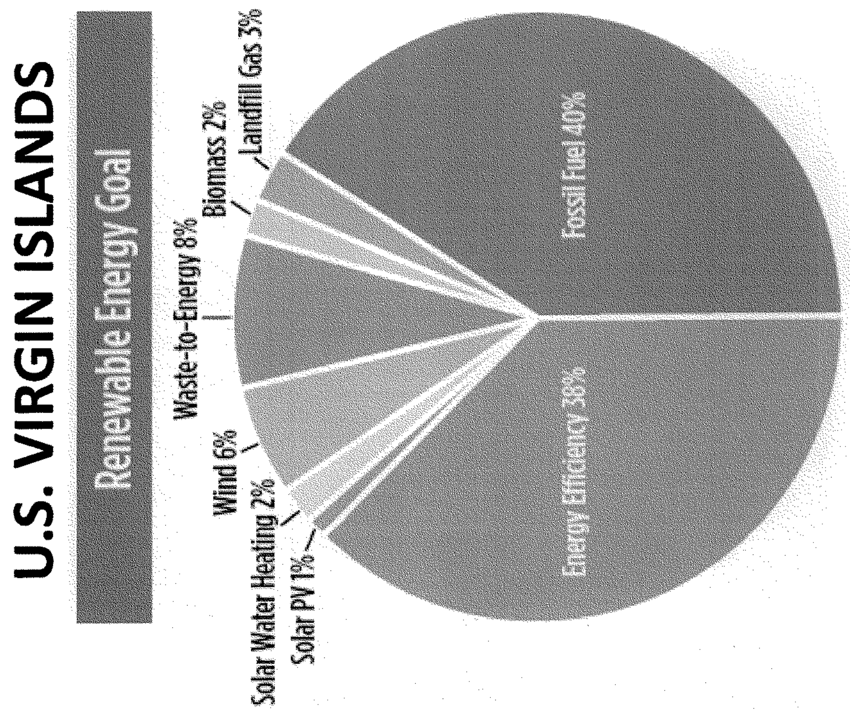
About 30 percent of the generators in the region burn coal and oil, Dr. Chadalavada said, but they produce less than 1 percent of the energy because they run so seldom. Some can take 24 hours to return to service.

ISO and the Federal Energy Regulatory Commission, which oversees interstate electricity and gas markets and transmission, are trying to make the systems mesh better.

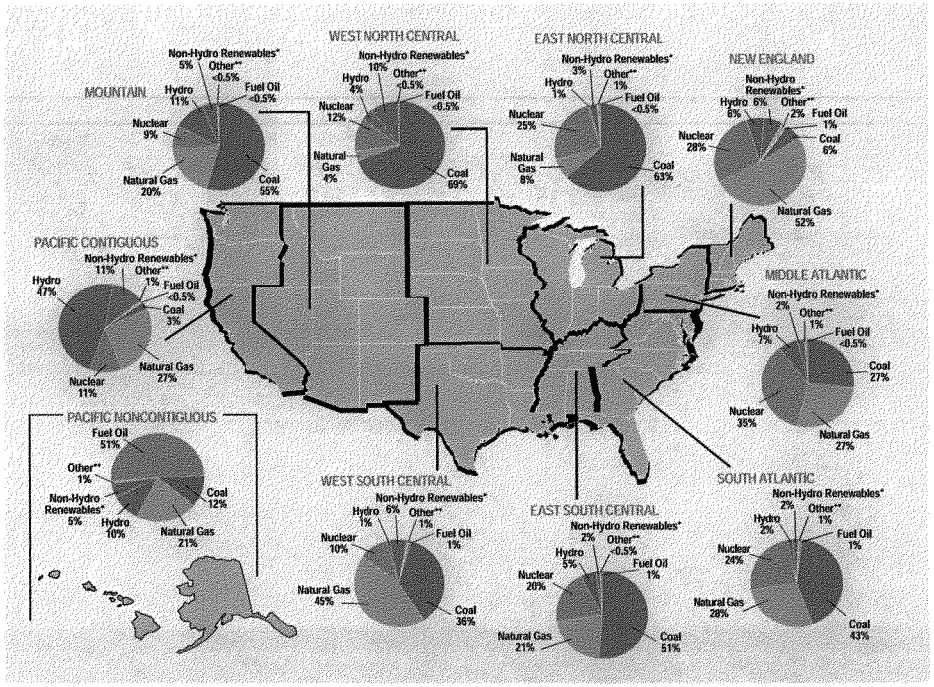
FUEL "MIX" TO GENERATE ELECTRICITY IN THE U.S. VIRGIN ISLANDS



100% No 2. & No 6. FUEL OIL


U.S. VIRGIN ISLANDS
Renewable Energy Goal
Landfill Gas 3%
Biomass 2%
Waste-to-Energy 8%
Wind 6%
Solar Water Heating 2%
Solar PV 1%
Fossil Fuel 40%
Energy Efficiency 38%

Different Regions of the Country Use Different Fuel Mixes to Generate Electricity



*Includes generation by agricultural waste, landfill gas recovery, municipal solid waste, wood, geothermal, non-wood waste, wind, and solar.

** Includes generation by tires, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.

Sum of components may not add to 100% due to independent rounding.

Source: U.S. Department of Energy, Energy Information Administration, Power Plant Operations Report (EIA-923); 2011 preliminary generation data.

October 2012

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Rob Gramlich
Interim Chief Executive Officer
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April 3, 2013

Chairman Ed Whitfield
Committee on Energy and Commerce
Subcommittee on Energy and Power
2125 Rayburn House Office Building
Washington, DC 20515-6115

Dear Chairman Whitfield:

Please find attached the responses to your questions for the record for the March 5, 2013 hearing entitled, "American Energy Security and Innovation: The Role of a Diverse Electricity Generation Portfolio." Please contact me if you have any additional questions.

Sincerely,

Rob Gramlich
Interim CEO
American Wind Energy Association

cc: The Honorable Bobby L. Rush, Ranking Member
Subcommittee on Energy and Power

The Honorable Ed Whitfield

In your written testimony, you stated that "At the federal level, the primary means of supporting fuel diversity has been tax credits. *Tax credits played a major role in bringing down the cost of shale gas,* and they are rapidly bringing down the cost of both wind and solar energy." Emphasis added. During the hearing I asked you to "provide the committee with a detailed analysis of what you were referring to with that comment." Please further explain your comment that tax credits played a major role in bringing down the cost of shale gas. Please submit any data, reports, or other analyses in support of your statement.

In 1980, the Windfall Profit Tax Act of 1980 created a new tax credit for unconventional fossil fuel production, also known as the Section 29 credit (later re-labeled the Section 45K credit). The *Alternative (Unconventional) Fuel Production Credit* was established to promote the domestic production of energy from unconventional fuel sources. Qualifying fuels included oil produced from shale or tar sands, gas produced from geopressurized brine, Devonian shale, tight formations, or coalbed methane, gas from biomass, and synthetic fuels from coal.

This credit generally applied to shale gas wells drilled between 1979 and 1992 with respect to production through 2002. This tax credit provided a value of $3 per barrel of oil-equivalent (adjusted for inflation since 1979) which was roughly the value of $1 per thousand cubic feet for fossil fuels produced from unconventional methods, including shale gas. According to Roger Bezdek, President of Management Information Services, "For much of this period, at least during the early 1990s, wellhead gas prices averaged between $1.75/Mcf and $2/Mcf." At these prices, the Section 29 credit provided a value of 50% to 57% of the price of gas.

Below is some third party information on the role, impact, and success of the Section 29 credit:

1) Congressional Research Service[1]

   "Throughout the 1990s, growth in energy tax expenditures was primarily driven by the unconventional fuel production credit (IRC §29)."

2) The Gas Technology Institute produced a study about the historical impact of the Section 29 tax credit that concluded:

   "Passage of the original Section 29 led to a tripling in the production of nonconventional gas, as well as innovations in drilling and completion technology."[2]

3) Roger Bezdek, in a Management Information Services, Inc. report concludes:

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[1] Sherlock, M (Congressional Research Service). *Energy Tax Policy: Historical Perspectives on and Current Status of Energy Tax Expenditures*. May 7, 2010.

[2] Independent Petroleum Association of America. *Nonconventional Fuels Tax Credit*. February 2005. http://www.ipaa.org/wp-content/uploads/downloads/2012/01/2005-02-Nonconventional-Fuels-Tax-Credit.pdf

"The Section 29 tax credits were an important incentive for the development of eastern gas shales in the late 1980s and early 1990s..."[3]

4) Interview with Dan Seward, former Mitchell Energy Vice President

"We had a gas contract with a natural gas pipeline that gave us a higher price. We had a basket of prices and gases and with the different categories we could keep our gas price. So you could say that those pricing scenarios, and the [Section 29] tax credit, created the possibility for shale gas."[4]

The Honorable Joe Barton

Strong price signals are critical to maintaining resource adequacy in ERCOT's competitive electricity market. Because power plant developers bear the risks associated with new capacity expansion, they must be confident that they can recover the cost. The Production Tax Credit's (PTC) per megawatt hour subsidy distorts markets by allowing wind generators to bid negative prices and still make a profit. When wind generation is bid into the market at a negative price – which occurred close to 10% of the time in ERCOT's West region in 2011 – electricity sourced from other forms of generation (i.e. coal, natural gas, nuclear) must match that negative price or be replaced on the grid.

a. Does AWEA agree that a positive correlation exists in regions of the country, especially in Texas, between installed wind generation capacity and the frequency of negative wholesale electricity prices? If AWEA does not agree, please provide any information, analyses, or data supporting the claim.

We do not agree that such a correlation exists. In Texas, the frequency of negative prices is so low that it is difficult to identify a significant relationship. If anything, the increase in installed wind capacity and in wind generation over the last several years has actually coincided with a decreasing frequency of negative prices.

Market data indicate that negative electricity prices are exceedingly rare in Texas. Negative prices accounted for less than 1% of day-ahead market price points and around 2% of real-time market price points in ERCOT in 2011, based on a sample of over 1 billion real-time market price points and almost 5 million day ahead price points in the ERCOT market analyzed by Ventyx, a company that compiles and analyzes electricity market data.[5] Moreover, other energy sources account for some share of these negative prices. Nuclear power plants have historically caused electricity prices to go negative in portions of the Midwest, and high hydroelectric output can also cause negative prices in regions of the country with a large amount of hydropower generation.

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[3] Bezdek, R. *An Energy Policy that Actually Worked.* June 2002. http://www.misi-net.com/publications/Energy_Policy_That_Worked.pdf

[4] The Breakthrough Institute. (December 2011). *Interview with Dan Steward, Former Mitchell Energy Vice President.* http://thebreakthrough.org/archive/interview_with_dan_steward_for

[5] Ventyx analysis for AWEA

Even though Texas added 1,825 MW of wind capacity in 2012, an increase of almost 18%, instances of negative prices are currently down more than 60% relative to the same time period last year.[6] That is because negative prices are caused by a lack of transmission capacity preventing low cost energy sources, such as wind, from reaching consumers. As Texas has increased the capacity to move low cost wind energy from the western part of the state to consumers in other parts of the state, the already extremely low frequency of negative prices has fallen even further. This trend is further confirmed by ERCOT data indicating that the amount of wind generation curtailment has fallen from 8.5% of potential wind generation in 2011 to 1.7% for the last five months of 2012.[7] Instances of negative prices should fall to near zero by the end of 2013 when the Competitive Renewable Energy Zone transmission lines are completed, and the same should occur in other regions as they complete long-needed upgrades to their grids.

b. Does AWEA support the development of additional wind generation capacity in saturated wind energy markets, such as Texas, where negative pricing is prevalent? If yes, please explain why AWEA supports adding new wind generation in such markets.

Texas and other electricity markets in the U.S. are not saturated by wind, so AWEA does support continued wind energy development in all U.S. markets. As explained above, negative prices are extremely rare and localized. In addition, the construction of new transmission capacity in ERCOT and other regions over the next several years is expected to virtually eliminate the already very rare occurrences of negative prices.

Importantly, the West Zone of ERCOT only accounts for around 5% of the total conventional generating capacity of ERCOT, and a similar share of ERCOT's electricity demand. There have been virtually zero wind-related instances of negative prices outside of the West zone, so negative prices should not have had any impact on investors' decisions regarding whether to build new power plants in the zones of ERCOT that account for around 95% of its electricity demand.

Adding wind energy to the grid does reduce electricity prices by displacing more expensive forms of energy, and that is a good thing for consumers. However, that impact has nothing to do with the Production Tax Credit. Wind energy and other renewable sources enter the real-time electricity market as the lowest cost sources of energy, as renewable sources have no fuel cost. Nuclear and hydropower also enter the real-time market as very low cost sources of energy.

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[6] Comparison of frequency of negative prices at load zones for January-March 2013 versus January-March 2012, based on ERCOT data available at http://mis.ercot.com/misapp/GetReports.do?reportTypeId=13061&reportTitle=Historical%20RTM%20Load%20Zone%20and%20Hub%20Prices&showHTMLView=&mimicKey

[7] 2011 ERCOT data from Wiser, R., Bolinger, M., *2011 Wind Technologies Market Report*, August 2012. Page 43. Available at http://eetd.lbl.gov/ea/emp/reports/lbnl-5559e.pdf ; 2012 data provided by Bolinger, M., Lawrence Berkeley National Laboratory, to appear in 2012 *Wind Technologies Market Report*

To maximize social benefits and allow the market to operate efficiently, grid operators use these low cost energy sources to displace the output of the most expensive power plants that are currently operating. This saves on fuel costs and drives down electricity market prices, benefiting consumers. When grid operators make these choices it is simply an indication of a market working efficiently to pass on to consumers the savings created by wind power, and these fuel savings are a primary reason why utilities and others added wind energy to the power system in the first place.

c. Would AWEA endeavor to mitigate market distortions by encouraging wind generators receiving the PTC to curtail output when wholesale electricity prices approach zero? If not, explain why. If yes, please identify any plans or strategies to mitigate market distortions.

As explained above, the Production Tax Credit does not cause market distortions, so no mitigation is needed. Wind plants already curtail their output when market signals indicate that there is insufficient transmission to carry their output to demand centers. Because wind plants have zero fuel cost and emit no harmful pollution, in situations where transmission constraints exist, it is usually the most efficient outcome for wind plants to continue operating. In addition, wind plants can reduce their output more quickly and accurately than any other type of power plant, so from a reliability perspective it also makes sense for wind plants to be the last to reduce their output. The current system of market mechanisms that is in place in much of the country, including Texas, achieves that outcome. We support the expansion of competitive market mechanisms to ensure that no resource has an unfair advantage on the use of the transmission system at times when curtailment is required.

Instead of curtailing generation, we support transmission development to bring low-cost electricity from wind to more customers. Negative prices occur in highly localized areas when there is a barrier keeping that supply from benefiting consumers outside that area. Adding transmission capacity is the proven solution to reduce and eliminate the occurrence of negative pricing, and we would welcome the opportunity to work with you and members of the committee on the planning, permitting, and cost allocation of new electricity transmission infrastructure.

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