QUADRENNIAL ENERGY REVIEW

PUBLIC MEETING #6

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RASHID AUDITORIUM-HILLMAN CENTER
CARNEGIE MELLON UNIVERSITY
4902 FORBES AVENUE
PITTSBURGH, PENNSYLVANIA

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PANEL 1: NATURAL GAS INFRASTRUCTURE: HISTORICAL OVERVIEW AND CURRENT STATUS

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PANEL 2: HOW PRUDENT INFRASTRUCTURE INVESTMENT CAN HELP MAXIMIZE RESOURCE POTENTIAL

SHELLEY CORMAN, EXECUTIVE VICE PRESIDENT - INTERSTATE PIPELINES, ENERGY TRANSFER PARTNERS

RORY MILLER, SENIOR VICE PRESIDENT, ATLANTIC-GULF, WILLIAMS

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JIM SULLIVAN, MEMBER-PUBLIC GAS POLICY COUNCIL, AMERICAN PUBLIC GAS ASSOCIATION
PANEL 3: HOW PUBLIC-PRIVATE PARTNERSHIPS CAN PRODUCE SUSTAINABLE ECONOMIC DEVELOPMENT OUT TO 2030 AND BEYOND
DAVID PEEBLES, VICE PRESIDENT, ASCENT AND SENIOR DIRECTOR, THE ODEBRECHT GROUP
TOM CONWAY, INTERNATIONAL VICE PRESIDENT, THE UNITED STEELWORKERS
DR. ANDREW GELLMAN, LORD PROFESSOR OF CHEMICAL ENGINEERING AND CO-DIRECTOR, W.E. SCOTT INSTITUTE FOR ENERGY INNOVATION, CARNEGIE MELLON UNIVERSITY
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A G E N D A

P R O C E E D I N G S

10:08 a.m.

MODERATOR KELLEY: Well good morning everyone. Good morning. I'd like to welcome those of you in the room to the Quadrennial Energy Review Public Meeting here in Pittsburgh, Pennsylvania, at the Carnegie-Mellon University. I'd also like to welcome those of you who are joining us by live streaming on the web.

My name is Chris Kelley. I'm with Energetics. We're providing support for the Department of Energy for this QER effort, and I have the distinct honor of being a facilitator for today's meeting. We'll be hearing from a number of speakers today, but before we get started, I just have some housekeeping notes.

First, the QER Task Force welcomes comments from the public. If you wish to make a comment and have not yet signed up, please do so at the front. For those who are joining us by live streaming, please email your comments to qercomments@hq.doe.gov. We have an outstanding

set of speakers here today. Their comments and presentations can be found after today's session at www.energy.gov/qer.

Before we get started, I'd like to read a short statement about the purpose of today's meeting. Pursuant to the Federal Advisory Committee Act, the purpose of today's meeting is to ask for your individual input or your organization's input regarding natural gas transmission, storage and distribution, and provide a forum to exchange information.

To that end, it would be most helpful to us for you to provide these recommendations and information based on your personal experience, your individual advice, information or facts regarding this topic. The object of this session is not to obtain any group position or consensus; rather, the U.S. Department of Energy is seeking as many recommendations as possible from all individuals at this meeting.

So with that, allow me to introduce Jim Garrett, the Dean of the College of Engineering

here at Carnegie-Mellon University. Mr. Garrett.

DEAN GARRETT: Good morning. On behalf of the entire Carnegie-Mellon community, I am honored to welcome you to this regional public forum for the Quadrennial Energy Review. I'm particularly honored to welcome two of America's energy policy leaders to this forum.

Energy Secretary Ernest Moniz is leading the development of this Quadrennial Review on behalf of the President, and brings to this task a career march from accomplishment from the lab to the highest levels of American government.

Congressman Tim Murphy, Carnegie-Mellon's good friend and partner, and chairman of the Oversight Investigations Subcommittee of the House Energy and Commerce Committee is with us today. Chairman Murphy has been a champion in ensuring that this region emerges as a national energy center for focusing on entrepreneurship, innovation and getting shale development right.

CMU is pleased to be the site for this important discussion, and we are particularly

pleased to have the event hosted by our Wilton E. Scott Institute for Energy Innovation. The Scott Institute reflects the very best of the spirit of CMU that Andrew Carnegie instilled in this institution when he launched it as a technical trade schools for the sons and daughters of steel workers.

The Scott Institute is focused on bringing to bear cutting edge research in the sciences, engineering and public policy to advance practical solutions to real world problems. We launched the Scott Institute to be a resource for engaging the very kinds of challenges and opportunities this forum will address today.

It's also worth noting that where we are gathered for this important discussion, the Hillman Center for Future Generation Technology, we are just a few yards from the spot where the institution that would become the National Energy Technology Laboratory was born.

NETL played the pivotal role in advancing the technologies that would make shale

gas development possible, providing a great example of the power of collaboration among federally supported basic science research, academia and industry.

We bring that same spirit of innovation to today's dialogue, which is centered on the question of how we will most safely and effectively realize the full potential of shale resources for America's energy security, sustainability and industrial competitiveness.

Secretary Moniz and Chairman Murphy welcome, and thank you for both for bringing your leadership to this important forum. I'm now honored to introduce Mellanie Kenderdine, the Director of the Office of Energy Policy and Systems Analysis, and energy counselor to the Secretary.

Mellanie joined the Secretary's team in May 2013, after serving as the executive director and associate director of the MIT Energy Initiative. Before joying MIT, Ms. Kenderdine served as the vice president of Washington

Operations for the Gas Technology Institute. From 1993 to 2001, she served as a political appointee in President Bill Clinton's administration in several key posts at the DOE.

Prior to joining the Clinton Administration, Ms. Kenderdine was chief of staff and legislative director for New Mexico Congressman Bill Richardson, who later was named U.S. Secretary of Energy. Please join me in welcoming Mellanie Kenderdine.

(Applause.)

MS. KENDERDINE: Thank you, Dean Garrett, and thank you all for coming today. This is our seventh stakeholder outreaching meeting to inform the Quadrennial Energy Review. We have a total of 15 such meetings scheduled around the country. They are designed to be both geographically and topically diverse.

Secretary Moniz is going to say a little bit more about the QER in a moment. I just note that the office I run at DOE, Energy Policy and Systems Analysis, is leading the analysis and

outreach efforts for this White House-led initiative, and I want to extend special thanks to my deputy, Karen Wayland and her staff here. They are putting all of these outreach meetings together.

They do outstanding work to ensure that your views are integrated into the larger effort that we're all working on.

First, I want to introduce you to Dr. Tim Murphy, the Congressman from Pennsylvania's 18th District in the U.S. House of Representatives. Several things struck me about Congressman Murphy's file. He has a Ph.D., which is pretty rare in Congress. I know (name) has one. He's retiring. I don't know of others.

He's a psychologist. I will resist the temptation to tell Congressman psychologist jokes, and instead note that my sister is also a Ph.D. psychologist, and she has given me a strong appreciation for this profession.

I also Mr. Murphy's commitment to mental health issues. My family and I'm sure many other

families have been deeply impacted by such issues, and I applaud his work in Congressman and his ongoing commitment to those issues.

Congressman Murphy is a member of the House Energy and Commerce Committee, the committee that gave me my start on energy policy almost 30 years ago, when I was chief of staff and legislative director for Congressman Richardson then.

I'm sure you all know the Energy and Commerce Committee has broad jurisdiction over energy issues, and Congressman Murphy has been a strong supporter and advocate on that committee for things such as energy research and support of carbon capture and storage.

Finally, Congressman Murphy founded the Congressional Gas Caucus, is focused on responsible development of shale gas. I have a long professional history working with natural gas issues, as has Secretary Moniz. When we were at MIT together, we both worked for several years as researchers on the MIT Future of Natural Gas

study, where we analyze the many impacts of unconventional gas development on U.S. energy markets and global markets.

We look forward to hearing from Mr. Murphy and his insights on this topic. Ladies and gentlemen, Congressman Murphy.

(Applause.)

Congressman Tim Murphy

CONGRESSMAN MURPHY: Thank you. Good morning, it's great to be with you for this topic, which Pittsburgh is the ideal location to discuss anything from energy, and a special welcome to Secretary Moniz. Thank you for being here again. You're always welcome back in the energy capital of the world.

(Laughter.)

CONGRESSMAN MURPHY: I say that because every square inch below us has got some coal, some natural gas, and of course nuclear energy began here and it was not too far from here that the oil drilling first started. When I talk to my colleagues from Texas and they start telling me

about it, I say wait a minute. We taught you how to do that, so just back off.

This shale revolution that we are in the beginnings of continues to have global impact, and I want to talk about where this is leading us here, and how we are faced with several major challenges regionally, nationally and worldwide, and how energy is going to be an important part of that answer.

Remember that polar vortex we had a few months ago, and it was cold, but there was a huge impact that that had, particularly in the New England area. That is as there's been a push to reduce the amount of coal-produced energy, which will be perhaps a 60 gigawatt loss in the next couple of years, there continues to be a higher demand for electricity.

But when the temperature in New York City bottomed out at seven degrees in January, the price to deliver natural gas in the City spiked to a record $120 per million Btus in the spot market. That's about 30 times higher than the equivalent

natural gas a hundred miles away in the Marcellus shale region.

Utilities had to also fire up gas plants using jet fuel, and a New England paper mill had to shut down. These prices weren't caused by speculation. It was a capacity issue based upon production and pipelines delivering that to the region.

Now the governors of the region requested a pipeline big enough to deliver a maximum of 600 million cubic feet per day, which would add less than ten percent to that capacity, and as we face this problem of building more pipelines, having that achieved is going to be critically important.

Pipeline permitting delays of more than 90 days have risen 28 percent since 2005. Now when the House passed the bipartisan Energy and Commerce bill, the Natural Gas Pipeline Permitting Reform Act, was to eliminate those barriers. We still hopes the Senate moves forward on this, because we need it.

But the major areas that we natural gas in particular is for exports, manufacturing, thermal electricity and energy production and transportation. First let me talk about exports. As we know, gas is less than about $4 per unit in the United States, but in Europe it's over ten, Japan about 15-1/2 dollars, China about 15 and a quarter, India about 13.75.

But there's an impact upon this, which of course is in the news every day in the last few months. Last summer when I had some members of the Ukraine Parliament come here to the Pittsburgh region, at that time they voiced their deep concerns of what Russia and Gazprom were going to do to them and continue to threaten them, and now we see those things have to come to fruition, as it continues to be a military issues and a substantial issue for the people of Ukraine.

Similar is an issue for Poland. When I visited there about six weeks ago, they described their grave concern in Poland and throughout the Balkan states. Poland has a natural gas contract

with Russian Gazprom going to 2022, and a large percent there and so much of the EU natural gas is dependent upon buying it from Russia.

Russia, of course, wishing to protect its monopoly, will use whatever force is within its quiver to make sure that happens, that recent issues that have taken place with the downing of a Malaysian jet airliner by Russian separatists, which the president says pretty clearly has been with Russian-made weapons, Russian training and Russian backing, the pressure needs to be exerted to fight back against that.

But when we put American ships out in the sea, it is clear that Russia understands were not going to fly sorties over the former Soviet block countries. We are not going to launch missiles from our cruisers and our frigates or submarines.

So whereas I see that Putin will not be afraid of any military force assembled by the United States in Eastern Europe, the Balkan states or in the seas surrounding, what would send a

shockwave throughout Gazprom would be to see a fleet of LNG ships headed that way.

As Poland and Germany have built their LNG terminals, that is important. As they see those things coming forward, and also noting that many of the officials I talked in Poland and in the Balkan states.

They said we recognize Russia is fearless on this, but we have to meet with the same sort of fearlessness, and understand that despite their attempts to basically eliminate us several times, we cannot let that happen again.

Now we have this massive resource of natural gas in the United States. What we have here, the U.S. used about 25 trillion cubic feet of natural gas in 2012. We have 3,850,000,000 cubic feet altogether, and Pennsylvania is now the largest, second largest natural gas producer.

Shale gas 25 percent of domestic production, and a decade ago it was only one percent of this. In the next two years, Marcellus will supply almost one-fifth of the country's gas

supply, and growth and production is dependent upon a profitable spot price.

If it falls to quickly, production will fall as well, but if it rises too quickly, usage will become a problem and the demand will drop. In that area is manufacturing. The greater production of natural gas means higher demand for locally-made oil and piping tube. Steel production in the U.S. energy markets accounts for about ten percent of domestic steel production, nearly 8,000 American jobs in more than 22 states.

U.S. producers invested hundreds of millions of dollars to take advantage of this, including nearby in McKeesport in the U.S. Steel plant. But what has happened here is we're also fighting the dumping of oil country tubular good products, particularly from China, Korea, Turkey, India and other countries.

We're pleased that the Department of Commerce announced a reversal of their decision and saying they do see this as a dumping issue. When a country like Korea imports grew by 1,000

percent and they don't even use their OCTG pipes, and we're waiting now for a decision from other divisions to determine if we're going to have tariffs on this.

But we shouldn't be dependent upon this. If we really are using more of the pipe and building more of the pipelines that we need, this helps increase demand. But we also have to make sure there's fair trade with other nations that are dumping.

The third area, the thermal area, is an area we have to understand, that natural gas cannot replace nuclear and it cannot replace coal. Where we have been moving forward is more clean coal technology. I applaud the research efforts of NETL, in continuing to find areas for this, and the Department of Energy's continued support for clean coal technology. What we have to make sure is we're understanding that we have advanced quite a distance in cleaner coal production. We have reduced the emissions massively over the last two decades, and what we also need to improve this

further.

I'd like to challenge students in saying if you are the one that comes up with a way of increasing the amount of energy we get out of a lump of coal, instead of it being about 35 to 40 percent if you can get 70 to 80 percent and reduce emissions even more, not only will you probably win the Nobel Prize, but you may become the world's first trillionaire. So good luck on that process.

But the U.S., having the most recoverable coal in the world, and has enough to meet about 294 years' worth of demand, we need to continue that, rather than see this drop in the use of this.

Finally, let me say that it is this partnership, working forward with all these areas of energy, nuclear, coal and natural gas, which this region depends upon. But it is that balance with also recognizing the global impact. I would much rather be spending the money on pipelines and on exploration of natural gas and on advancing

these LNG terminals for exports, than saying that we are going to continue to find ways to deal with this global military threat instead.

That is what we should be doing, and recognizing the energy use will continue to grow here in the United States, even though it dropped to second place as the world's biggest manufacturer behind China. We can gain that back, and we have this incredible advantage because of the amount of domestic energy we have here.

The idea is to move forward on sound science, to remove the shackles from this, and to this extent I applaud the Department of Energy in their efforts to make sure that America continues to be the global leader in energy production, and doing this in a sound and scientific fashion. Thank you very much.

(Applause.)

MS. KENDERDINE: Thank you, Congressman Murphy. Now I would like to introduce you to Ernest Moniz, the nation's 13th Secretary of Energy. I'm going to tell you why that's a lucky

13. Fifteen years ago, then Undersecretary Moniz and I flew to Morgantown, West Virginia and Pittsburgh to discuss the possibility of turning what was then the Federal Energy Technology Center into a national lab.

Our work culminated in the establishment of the National Energy Technology Lab, NETL. I think its DOE's -- it's still DOE's newest national laboratory, and we flew up to Morgantown, West Virginia with Senator Byrd and Secretary Richardson at the time, and NETL became a national lab. It was through no small part it was now-Secretary Moniz's efforts to get that done.

Our efforts in this regard underscore Secretary Moniz's long-held commitment to an all of the above energy strategy, albeit one that comes with a strong caveat. All of the above must be pursued in the context of a carbon-constrained world.

This approach guides President Obama's energy policy today. Again, Secretary Moniz's commitment to this approach is long-standing. Not

only did we do the future of natural gas study at MIT, we did the future of coal, future of nuclear, future of the nuclear fuel cycle, the future of the electric grid and the future of solar, which I hear they will finally complete this year. It's been a study that is a long time coming.

All of these studies have been done over the course of many, many years and nine years or so, all in the context of carbon constraints. Before becoming Energy Secretary, where he is following through on the President's commitment to all of the above, Secretary Moniz was a Physics professor at MIT for 40 years, and was also the director of the MIT Energy Initiative.

He was a member of the President's Council of Advisors on Science and Technology, and was DOE's undersecretary in the Clinton Administration, where I first had the pleasure of working with him. Ladies and gentlemen, U.S. Secretary of Energy Ernest Moniz.

(Applause.)

Secretary Ernest Moniz

SECRETARY MONIZ: Well thank you, Mellanie, and also thanks to our hosts here at Carnegie-Mellon, the Dean of Engineering and I think where I used to come from, we agree that this is the second best school of engineering in the world. It really is great to be here. I appreciate the hospitality.

I also see my old friend, Jerry Cohen, I guess former president of maybe 16 years, Ivy League, and president Cohen just on Friday, he's co-chairing a new commission set up by the -- asked for by the Congress at the Department of Energy, the Commission on the Future of Our National Laboratories. So we also thank Jerry for his continuing service to the country and to DOE specifically in this context.

I know your current president, Subra Suresh is out of the country at this moment. But just to say that he's also a very long-standing old colleague from MIT. Congressman Murphy, thank you for being here. I was in Pittsburgh last in October, and we seem to always do these gigs

together, since we were together with a little business roundtable back then.

Mellanie already mentioned you as being a founder and chair of the Congressional Natural Gas Caucus. His audacious statement about the energy capital of the world, of being here. I think there's some argument there.

CONGRESSMAN MURPHY: We can be audacious.

SECRETARY MUNIZ: That's right, and in fact I'll say that, as he said, it's not only with the current shale gas revolution, and I might say some wet shale gas as well, which is a very important part of the story, but also nuclear power.

I was just in China a week and half ago for the annual Teaching in Economic Dialogue, and the enormous program between Westinghouse and its new, new generation reactor, the AP-1000 with the Chinese is a very, very big story and in fact a story that we'll also be pursuing here today.

Even beyond that, just to mention one

other thing, that on the demand side, energy efficiency. Pittsburgh is a city, member of our better buildings challenge, which talks about getting 20 percent better efficiency out of buildings by 2020. We have more than three billion square feet across the country committed to this. Pittsburgh is in the middle of that, and in fact later today, I'm going to have a chance to go to the PNC Plaza and see their new I think it's 800,000 square foot building, which will open in about a year.

It has a whole bunch of novel technologies, and they're looking for 30 percent energy efficiency gains, I believe, and probably exceed Leed Platinum. So a lot of energy stuff going on here indeed, and I'll also mention that our NETL Pittsburgh branch is also in the district of Congressman Murphy, and we appreciate his support.

I'll just give a very brief callout to Congressman Doyle, who couldn't be here, because our Bettis Laboratory is in his district I was

informed today, and he's also like Congressman, like Chairman Murphy, a member of the Energy and Commerce Committee. So these are two people that we love to deal with on energy issues.

Maybe I'll just mention one other thing. When I was here in October, you may recall I expressed my hope then that the Red Sox and the Pirates would be in the World Series. We held up our end of the bargain.

(Laughter.)

SECRETARY MUNIZ: We did give you some revenge over the Cardinals, but unfortunately I think I can't make the same promise this year, at least for the Red Sox, who are currently in last place. But okay, moving on.

So let me say a few words about the Quadrennial Energy Review, just to frame it, those of you not familiar with it, and then of course go and say something more specifically about the topic of today, shale gas, its production and also associated issues of infrastructure.

So the Quadrennial Energy Review is

something that was put forward in President Obama's Climate Action Plan last June, following the recommendation made by his advisory group on science and technology. The idea is that while we are the Department of Energy, the fact is energy issues are very important to almost every organization, almost every department, every agency in the government.

You just think about the important energy entities across the government. So the Quadrennial Energy Review is an attempt, it's a charge, but I think we're making terrific progress. It's an attempt to put together a policy development process that brings together all those threads, whether it's the Department of Energy obviously, but Department of Defense, Department of State, Department of Commerce, Agriculture, you can just go on and on and on, to do so using the convening power of the White House.

So co-chairs from the Council on Environmental Quality and Office of Science and

Technology Policy, but the Department of Energy forming the executive secretariat, providing the capacity for deep analysis, etcetera, to move this forward.

That's what the office under Mellanie's director, Energy Policy and Systems Analysis, is really the point of that spear, in weaving together this rather complex story on setting, on developing actionable energy policy. Now given that it is a rather large task to stand up this kind of a process, and execute it over a four year horizon, the decision was made to start out by taking a one year chunk at the beginning, and to focus it exclusively on energy infrastructure, the transmission, storage and distribution of energy.

That was declared last summer in the Climate Action Plan, and I think the wisdom of choosing that as an initial focus has only come more sharply into focus since then, as we have seen a number of infrastructure challenges.

Congressman Murphy mentioned, for example, the polar vortex. There we saw, as he

said, tremendous increases in natural gas prices in New York, New England. New England a major part of lack of energy infrastructure, in particular getting gas from here to there. Polar vortex, propane, upper Midwest, huge problem, infrastructure problem.

How do you know? The price differential between the two big hubs in Texas and Kansas not used, because you couldn't move it easily north. Oil by rail. We all know we've seen that, trying to get oil out of the Bakken shale without the infrastructure, without a commensurate level of development.

In fact, one of the major stories, and this is why I will again reinforce something Congressman Murphy said. This is really a terrific place to have this meeting focus on natural gas, and by the way, in a few weeks, we'll be having one in Bismarck, North Dakota, which will -- of course that's where the big shale oil production is booming.

But the point is North Dakota and

Pennsylvania really highlight one of the very important features of this shale, gas and oil revolution. Namely, we are seeing booming production in areas that, at least not in the recent past, have been major centers of production.

With that comes infrastructure challenges that have to kind of catch up with a whole bunch of issues about these gas and oil flowing in very different directions, from source to market. So really here this is a tremendously important area to discuss that, and indeed there are many questions to be pursued, and those will be spelled out in a few minutes.

I'll also mention that another challenge to the infrastructure comes, and again certainly in parts of the Marcellus, we see a lot of natural gas liquid production. So the Marcellus, in terms of dry gas so-called, has gone from like two to roughly 20 percent of the nation's natural gas in a period of like seven years. This is unprecedented, really, in this kind of a business.

But in addition, we are seeing enormous amounts of natural gas liquids production, propane, butane, ethane, other anes, and these are tremendously important. They are tremendously important to the economic equation.

They are tremendously important as feedstock to industry. They are tremendously important for heating many parts of our country. Our homes are heating with propane for example, and that's another challenge to our infrastructure.

How do you move it, how do you process it, etcetera. So this is another very important question to be addressed here today. I might say again, following a little bit on that, that the shale gas revolution certainly is impacting so many major sectors in our society.

For example, electricity. In New England, again to use New England as an example, we are seeing electricity supply more than 50 percent natural gas. This is raising issues, both of infrastructure and fuel diversity. So how are

we as a country going to address this issue of fuel diversity, even as we have this abundance of moderately-priced natural gas?

The two things I mentioned earlier, nuclear and efficiency may be, of course, important parts of that equation. As I said already, industry. We're seeing a huge manufacturing renaissance. The numbers are a bit hard to pin down, but we could see as much as $200 billion invented in new manufacturing capacity, pretty much directly because of the shale gas revolution. It's enormous.

We see the impact at the consumer level, home heating bills for example. Certainly again where I come from in New England, lots and lots of gas heating as well. We're seeing it there. So this is really permeating throughout our society.

Now having said that -- oh, I'm sorry. The last point I'll make is Mellanie mentioned our critical push towards lowering carbon emissions. The United States is roughly halfway to President Obama's goal of a 17 percent reduction by 2020,

and about half of that has been accomplished because of natural gas.

So natural gas, even as it has stimulated the economy in so many ways, has also been contributing to lower CO2 emissions. Now of course having said all of that, we also know that it has to be produced responsibly, and we have challenges. We have said consistently, and I certainly will continue to say that the environmental footprint issues in shale production, oil or gas, they are challenging, but they are manageable, but we must manage them. We must manage them all the time.

Now I believe there is -- we can see significant progress being made in a number of issues, more consistently well completion, etcetera, better management of flow back water to the surface. But we still have to keep pushing down on this, and we can do better.

Another issue that has just come up is methane emissions. Again, I think we're making progress, but we have to look at methane emissions

end to end. It's not only in the production side, but it is in the infrastructure of delivery of natural gas to the consumer.

Again my home town Boston, we have lots and lots of the very old cast iron pipe. We've got to work on renewing our infrastructure and doing so, capturing the opportunity to lower things like methane emissions, which as you know is also a greenhouse gas.

So there's lots of opportunity here. We're seeing the results of that opportunity. But we still have challenges that we have to meet, and certainly President Obama continues to advocate for expansion of this production, for the impacts on our economy, but also the call for us to work in all the ways we can, at the federal level, at the state level, working with companies, to reduce all aspects of the environmental footprint.

The last thing I'll say in terms of an issue that we must deal with as we look at the oil and gas revolution in the United States, is there and in other parts of our energy industry the need

for more trained people? Part of it is age demographic. There's going to be -- there is a lot of turnover in here, but also expanding opportunity.

The President often uses the phrase "ladders of opportunity to the middle class." I think one can certainly argue that the energy industry has been a premier provider of those ladders of opportunity over these last years. That will continue. We need to make sure we have the trained manpower, and that that manpower and woman power really takes advantage of all of the elements in our society.

I'll just close by saying that's, if anything, another good reason for having today's event here at the University, which is at least one major part of that training, the training programs that we need so desperately. So thank you again for your hospitality, and we're going to look forward to getting the results of today's discussions. Thank you.

(Applause.)

Q&A

MODERATOR KELLEY: So my distinguished speakers have agreed to take a few questions. Does anyone have any questions? Yes, in the back. If you could step up to the microphone and just state your name and ask your question?

MS. DEMARCO: My name's Patricia Demarco. I am visiting research fellow in the Green Sciences Institute at Carnegie-Mellon University. I have been in the energy industry since 1975, and I note that we are in a mode where the market is managing the policy direction primarily since 1992.

But the market signals are extremely distorted from a long accumulation of both subsidies, incentives and policies that favor fossil fuels over green sustainable fuels. If we are doing Marcellus shale as a bridge fuel, as a transition fuel, I would like to ask a focus on what the other pillar is, and how we take deliberate steps in building an infrastructure to actually get to a renewable and sustainable future

forever.

My concern is that we continue to build and solidify infrastructure on a fossil fuel base, without making adequate arrangements for an active transition to a renewable future.

I wonder if instead of exempting the fossil -- the shale development from the Clean Air Act and the Safe Drinking Water Act, we have instead adopted a theming tariff to unleash the innovation and creativity of this country on putting renewable systems in place, and focus on the infrastructure for doing that. So that's my challenge to you.

SECRETARY MONIZ: Should I start?

MODERATOR KELLEY: You can start, go ahead.

SECRETARY MONIZ: Okay. May I ask where you're visiting from?

MS. DEMARCO: I am semi-retired and have been the director of (name) Institute at Chatham and I've retired. I have been a commissioner of the regulated utilities in Alaska for five years,

and I was working for a utility cooperative in Connecticut for seven or eight years.

SECRETARY MONIZ: Okay, very good. So getting to your question. First of all, I think that we are doing obviously a fair amount to try to build that infrastructure for a very low carbon, photocarbon future. I'll make a few points.

Certainly, the President has not only domestically but internationally been pushing very hard on the issue of fossil subsidies. Indeed in some other countries, extreme consumer fossil subsidies have highly distorted the amount and even the international flows of energy.

But if I focus on renewables, for example, the first -- of course we are doing, I think, quite a lot to advance renewable technologies, lower their costs. One program I'll mention, for example, in our Low (ph) program, the Department of Energy provided some guarantees for the first five utility scale photovoltaic plants in the country.

They're all doing fine, and there are ten more now being supported entirely through private resources, which is the kind of thing we want to do to get something started and then have the private sector pick it up. Now and I can go on with a number of other examples.

But let me say, and this is going to be handout to my friend here, obviously there are some things that we can do administratively. There's a lot that requires statutory change. With the President's Climate Action Plan, with the statement that we can't wait, the Climate Action Plan has us pursuing what we can do administratively, while still hoping that we will be able to work with the Congress in terms of some statutory change.

One other issue that I will -- that I should have mentioned earlier, but I'll go back to now, is in the -- on the electricity side, there are now many, many developments that we will be -- that we are looking at, as we have proposals for major transmission lines that will connect major

renewables at some distance to market.

That's both domestically, Oklahoma Winds to the southeast, for example, and also for example Canadian Hydro to New England is another, and upstate New York, etcetera, is a major option. So certainly these issues of the infrastructure needs for a future very low carbon economy are very much in the forefront, and today's meeting of the QER is focused on shale gas.

But as Mellanie mentioned earlier, there are many, many different topics, and meetings in Portland, which have already occurred, and another one in New Jersey will focus specifically on some of these electricity infrastructure issues.

MS. DEMARCO: Thank you.

CONGRESSMAN MURPHY: Yeah, let me try and take a crack at that too. So I represent 705,000 constituents, and a fair number of them live in coal country, in Greene and Washington County, who are very concerned as coal mines are shutting down and coal-fired power plants are shutting down.

I'm not a believer that you simply tax for one group to their demise, and of course the other ones. I believe in an all-above energy policy which includes ways of improving clean coal technology as part of that. The idea of incentives to favor renewables I think right now they do, in terms of a per kilowatt basis or wind and solar have greater incentives there in terms of subsidies.

But we also have to recognize is the toll this has taken on America's families, in increasing gasoline costs over the last few years. It has been 2,500 to 3,000 dollars a year; increasing electricity costs that perhaps will go towards a doubling. At the time when other wages have flattened out.

I look upon these and it's something I have to be paying attention to with my constituents. The war on poverty, which was initiated with very dramatics walks from Appalachia from Bob Kennedy and from Lyndon Johnson, pointed out the phenomenal levels of

poverty there. We now have those areas continuing on in eastern Kentucky, parts of West Virginia and emerging in parts of Pennsylvania.

If it wasn't for Greene County, that county would see a full return of this. What I see we have to do is not just have increased dependency on renewables, which are dependent upon the weather, wind, that's dependent on wind and sun, solar energy has to depend on sunshine, and we shouldn't be cutting one over the other but pay attention to this in a broader perspective.

So I believe we still have to invest a great deal into research to advance more efficient ways of solar production, make them more cost-efficient, same with wind and other renewable sources there. But I don't want to get a circular firing squad where everybody says I just want to shoot the other person and make sure that my energy source continues to grow.

It can't be that way. I think we need to emerge, continue to push these forward, and have a plan of action, an overall plan of action

of energy policy which advances them all. But I will continue to pay attention to the needs of those who are losing their jobs in the steel pipe industry, the steel industry, the coal industry, railroads, etcetera, because they're real families too with real concerns.

When you're facing poverty, you don't really care about the environment anymore, and that's a serious problem. We want to make sure that these are families that are not just offered unemployment when they lose their jobs, and they can't eat we give them Food Stamps, when they don't have a house we give them housing, and then when they don't have all of those, I'm not sure what we have to offer them anymore.

We have to continue to find ways. Because America is so energy wealthy, we should continue to advance these things together.

SECRETARY MONIZ: May I just add a couple of comments. One thing on this all of the above approach, I might just emphasize that when we look at the future of any low carbon solutions,

my expectation certainly is that they will look different in different parts of our country and certainly different countries of the world.

That's why we are committed to advancing technology and advancing the cost direction across the full spectrum of fuels and demand side as well. The issue of jobs I couldn't agree more. It's critical, and that's where the changes that we are seeing in our energy landscape, and as we drive towards lower carbon, tremendous needs, as I said, for infrastructure, and that's a whole bunch of real jobs that we need to push on.

Indeed, economic estimates of the annual kind of capital outlay globally for the kind of infrastructure I'm talking about is like a trillion dollars a year. So not only is there need domestically; there's also tremendous opportunity globally, if we can stay ahead of the curve in terms of technology.

Finally, the last point I'll make, because this was clearly more central that Congressman Murphy said, is that another important

part of this QER process is looking at interdependencies in our infrastructure. So for example, the natural gas renewable interdependency is a very important one for us to examine.

MS. KENDERDINE: I just want to say that as the Secretary said, we are focusing this year on transmission storage and distribution infrastructure, and we are focusing on that because we view it as the limiting factor for both modernizing our energy systems and moving to a low carbon future.

Year 2, we are going to be focusing on generation and end use infrastructure, supply and end use. So in Year 2, we will get much more into renewable generation, efficiency end use, distributed generation, etcetera, etcetera.

So as the Secretary also said, we're taking this in discrete bites, and next year we'll have a much greater focus on renewable technologies and efficiency technologies.

MODERATOR KELLEY: Thank you. Another question? Yes. Grab your handle.

MR. CLEMENSICK: Let me just adjust this up a little bit.

MODERATOR KELLEY: Squeeze the handle on the very top. There you go.

MR. CLEMENSICK: Okay. My name is Paul Clemensick. I graduated from Carnegie-Mellon here. I worked in the oil industry for 15 years, one of the majors, and walked under the banner of former company (inaudible). I worked in the gas fields in Louisiana, Rocky Mountains and Upper California (inaudible). Left the company quite some time ago. Last couple of years I've been working on green energy sources.

Okay. I just want to follow up on the prior question, which was the energy markets themselves. You started off gangbusters by saying there's problems in the energy markets, and there clearly must be. If you oil, and the price of oil in terms of an energy contact, you're finding oil valued at around $16 per million Btus. Natural gas is around two to three, four dollars.

This price discrepancy between oil and

natural gas is historically way outside of the normal bounds. What we've seen over the last oh eight years have been wild swings in prices from both energy sources, and it seems as though these wild swings are causing problems with substitution, with development, with infrastructure, the whole nine yards.

I would really encourage you to look at the energy markets and start from that, and I disagree with your policy of all of the above. You should have a customer-focused based energy market. By customers, I mean all stakeholders.

I own land here in Pennsylvania. I have a Marcellus lease on my land. I have shale development. I live next to a Consolidated Coal Company mine that was shut down and is now the -- and I've got lots of problems with all of that.

I understand that we as land owners, we have to put up with that. But formerly working in the energy industry, I also know (inaudible). The problem is the markets are not effective, and there doesn't seem to be anybody in charge of

this. There really isn't, and I'm sorry to say I don't even think the government necessarily could do it. We need to look at way of managing those transitions, and there's nobody in charge.

Just I'm sorry, Mellanie. You said that next year you're going to get to looking at some of the generation of (inaudible) and so forth. Well I encourage you. I mean these markets are intricately intertwined by experience, oil and natural gas, coal, electricity generation even.

I can see they're intricately intertwined. I really recommend that you look at a paper, a wonderful paper from your Department of Energy. Actually, it was done by the Oak Ridge National Lab, Paul Leiby, L-E-I-B-Y, entitled "Estimating the National Security Benefits and Use of U.S. Oil Imports."

Read that paper. It was done using oil prices or OPEC might not have curtailed production. The data has to be updated. Nobody's done that, and there's a wonderful paper here at Carnegie-Mellon written by Dr. Mahalik (ph), about

the use of substitute vehicles, electric vehicles and (inaudible) electrical vehicles for substitution in the vehicle fleet. It's based on the work which was done by Dr. Leiby, and that needs to be updated.

If you look at that and you look at the energy markets, you will find that the current energy market is entirely dysfunctional, and the environmental (inaudible). This is a huge, huge problem.

MODERATOR KELLEY: Sir, did you want to wrap up your question.

MR. CLEMENSICK: My question is I'm urging you to look into markets and look at the papers I just quoted to you, and she started off great by saying oh, there's subsidies in there. The money's going to the wrong industries for the wrong things.

MODERATOR KELLEY: Thank you. Anyone care to comment?

CONGRESSMAN MURPHY: Yeah, I'll comment. Look, it's not an open marketplace, because

there's huge restrictions on supply. When we basically blocked the exploration of oil and natural gas off of federal lands in the coastal areas, we're trying to breathe out of a cocktail straw there.

As long as we maintain, I'm looking forward to reading this paper by one of the Oak Ridge Boys, I guess, that looks at reducing our dependency on OPEC. That is so extremely important. We have about a trillion point three trade deficit with OPEC countries over the last decade.

If you add to that the cost of the wars, four to six trillion, fighting an enemy that is funded by OPEC through Iran and Saudis to Al-Qaeda and Taliban etcetera, whether with direct weaponry or costs.

It's something we absolutely need to change. So I say that look, we're going to need oil and natural gas and coal and nuclear and wind and solar, and I believe we need all these. But the marketplace that tries to squeeze them out is

not an open marketplace.

We want clean land, we want clean air, we want clean water. But I also don't want blood anymore on the sands of the Middle East, of our blood and treasure going there, and somehow pretending we don't need these things now. So I say we continue to advance these. We have an open marketplace. We have the government watching to make sure that people are playing fair in this space.

I want to see us continue to use our renewables and to expand their use. But we can't talk about an open marketplace as long as we're still constrained.

SECRETARY MONIZ: And we certainly can't talk about the government controlling the marketplace. As much as I agree with that, which I don't. I don't agree with that concept, but that's fine.

MODERATOR KELLEY: We have time for one more question. Yes sir.

MR. BUJURA: Good morning. I'm Dick

Bujura with West Virginia University. I've been doing some reading lately and found information about our grid. For example the United States, the status of our grid is much lower than that of other nations. We've learned that solar energy reached a level of two-tenths of a percent of the total electricity generation in the United States just recently.

We know that if we want to use natural gas, we're going to build a lot of pipeline. These are significant investments. They will take a lot of time for us to put these technologies in place, just to put the infrastructure in.

The other aspect we have seen is that developing technologies and making them economically viable takes a long time for transition. As we look to the future, I would ask that in the Quadrennial Energy Review, we make note of the fact that fossil energy is going to be 70 percent of United States electricity generation in the future. It's probably going to even be greater than that in the

world, and I think we in the United States have to show some leadership in the use of fossil fuels.

Looking at natural gas, the kind of technologies that we use there to capture CO2, (inaudible) coal as well. We now have an existing infrastructure for coal and it's viable.

I would recommend that as you look to future developments in the Quadrennial Energy Review, you include a role for coal, at least in the near term, for us to make sure that we can provide the electricity that our nation needs.

MODERATOR KELLEY: Thank you. Care to comment?

SECRETARY MONIZ: One comment, by the way, is that an interesting factoid. I want to correct that solar is about 0.2 percent nationally in terms of electricity. In May, in the CAL ISO region, it was six percent, which is quite stunning actually, and things are changing fast.

But again, that also reinforces point that when I said earlier that low carbon solutions are going to be different in different regions of

the country. We're going to see different mixes. In terms of coal, and the Congressman kind of alluded to this, we are continuing to make, as you well know, very, very major investments in trying to advance coal with carbon capture utilization and sequestration.

I mean eight big projects, and in addition, this $8 billion active loan guarantee program for any fossil technology that lowers emissions. So again, inherent in all of the above is the idea that fossil fuels can and will be part of low carbon solutions.

As with many of the low carbon alternatives, we face cost reduction challenges, and that's what these programs are about, driving costs down.

CONGRESSMAN MURPHY: I might add to that too, something you mentioned about the grid. Probably one of the most important things that we can do that does not involve any energy production is energy reduction, it's conservation. We're an antiquated grid which wastes massive amounts of

electricity.

Just our buildings, it's nice to see more and more things. I'm glad you can go see the PNC Tower. I think it's a certified building. But the amount of money and energy we waste, every homeowner, every person in this country. It's probably going to be one of the prime things we can move forward and an area we need to continue to develop.

SECRETARY MUNIZ: I'll just add -- I'll give maybe a weak defense of the grid at the moment, that you know, look. The grid has a lot of challenges, but it's also true that we do still maintain, you know, 409's reliability.

I think at least my view is that the real challenge is we don't have the grid of the future that we need to allow, for example, the integration of renewables over long distances, to integrate more distributed generation, to integrate with more intelligence to in the end provide more consumer services, which the utility of the future, whatever it looks like, is going to

have to do.

So I think, you know, I mean look. We have challenges. But the real issue is how do we evolve the grid in a quick enough time, so that it doesn't become a bottleneck, at things like introducing long-scale renewables over large distances.

MODERATOR KELLEY: Thank you. Well please join me in thanking our distinguished speakers here today.

(Applause.)

MODERATOR KELLEY: So I ask our first panelists to join me up here. We'll be getting your name tags set up.

(Pause.)

Panel 1

MODERATOR KELLEY: Okay. So while we're getting set up here, just a few reminders for folks. If you plan on providing your comments at the end of our session here today, please make sure you indicate that on the sign-in sheet at the entrance. For those again who are joining us by

live streaming, please do provide your comments. DOE and the federal government in general do want to hear from you. So please provide those comments by email to qercomments@hq.doe.gov.

So we have a tremendous group of speakers here today, panelists to join us for this first panel. The first panel has been asked to address "Natural Gas Infrastructure: Historical Overview and Current Status." Each speaker will be providing some comments. Some have presentations, some do not, and they'll be given five minutes each.

For the panelists' benefit, we have a series of lights here indicating when your time is up, and I may bring out the hook if I have to. But I think you guys will stay on target on time. Then finally, I just want to mention that the views expressed by the panelists here are their own views, and not the views of the Department of Energy.

So our first panel is made up of Thomas Murphy, Co-Director of Penn State Marcellus Center

for Outreach and Research; Peter Terranova, Vice President, Midstream Assets and Services, UGI Energy Services; Josh Nordquist, Director of Business Development at Ormat Technologies; Piotr Galitzine, Chairman, TMK IPSCO; Thomas Minney, Director, Central Appalachians Program, the Nature Conservancy; and Hayley Book, Director of Policy, Pennsylvania Department of Environmental Protection. Mr. Murphy, do you want to get us started?

MR. MURPHY: Okay, good morning. Appreciate the change to be here today. I plan to be talking for the five minutes about some of the things that we see relative to some of the opportunities that are certainly manifesting themselves in shale development across the United States.

Certainly, some of the things that we're seeing here in the Marcellus in particular, on a multi-state basis. Also talk about some of the challenges and maybe a little bit about the path as we see it going forward.

That said, we think about some of the opportunities maybe, and I think a number of these were talked about with the previous speakers, and certainly in some of the exchange for the questions, we see the amount of natural gas that's being produced, some of the estimates we're seeing from the federal government at this point, BIA, looking at numbers and shale gas.

When you look out to 2024, likely somewhere in the vicinity of about 50 percent of the U.S. dry gas supply. Commercial estimates looking maybe a little bit more than that. So we think about what that might mean over the course of time, and we think about this historic moment that's occurring with shale energy, and again we think about shale energy. We think beyond gas. We think about oil as well, though our focus here today is certainly gas.

What does that do from a country perspective? We think about this from the domestic side. We think about the energy security. I think we heard several comments about

that. We can certainly expound on some of those maybe during the Q and A. But also we think about this on a global perspective. We'll make several comments about that as we go forward.

The geopolitical piece and Congressman Murphy, as he was talking about the Ukrainian moment, and certainly we're reading about that in the press almost on a daily basis. But we see that in a variety of other countries around the world, certainly far beyond Ukraine as well.

Comments were made as well about the workforce. We see this certainly from the industry side, but we look beyond that. We think about workforce development going into manufacturing and certainly some of the other industries that would be aligned around this.

If you look at just the EMP side, we see about 150 different vocations or job titles that would be assigned from the research that we've done, when you think about the development of gas. But again, looking beyond that, there's certainly a lot of other potential going forward.

We also, as was mentioned previously, we think about the environmental aspect of this, some of the research that I know we've been involved in, certainly some that DOE is funding, looking at things like the greenhouse gas side of this, not just from the CO2 aspect, but as there was a reference made earlier, looking at methane, due to the methane issues, and some of the emissions coming from different aspects of the infrastructure, making sure that a new infrastructure is built from the wellhead right to the end user.

So all the way through the system, including distribution, that we make sure that we resolve some of the issues that have been pointed out, certainly some of the issues that the Secretary was illustrating when you think about a city like Boston and some other cities as well.

We also think about balance of trade, the value-add in those locations, and we think about the commercial opportunity and the environmental opportunities that are being found,

and the need for mitigating some of the challenges and some of the risk in those locations as well.

As you'll see very quickly in this map as it animates here in the few moments that I have, you can see a lot of development that has occurred in Pennsylvania since we think as a foundational piece. A number of my colleagues will be talking about some of the components as we go forward here, the need for an infrastructure as it's going forward, not just --

Yeah, you can see how quickly this is ramped up. So we talk about the tens of billions of dollars that are being spent to build infrastructure, in this case gathering a lot of transmission line, and all the other constituents that are up. It's going to very important as we think about again, the pace of that development.

And again, as you look at the number of wells that have been drilled there, we also think about the fact that a significant number of the wells, maybe roughly a third by some recent estimates, are not even on the -- on pipe at this

point. So again, a lot of infrastructure, and again a lot of other comments will be made about that as we go forward.

We also look at Pennsylvania. We look at Marcellus development. We think about shale development. Again, you can see the amount of ramp up that's been done and the value of that over the course of time, going from millions of units to hundreds of millions of units to billions of units to now trillions of units of gas that are coming from Pennsylvania.

I also want to mention here quickly, and we think about the global aspect, and the number of comments that were made earlier about that. But we're exchanging a lot of people, a lot of technology, certainly a lot of capital and a lot of good ideas going forward, and that's going to be a very important point for us going into the near future.

We look at this as well about some of the other shale targets, not just the Marcellus when you think about the Northeast, but certainly

some of the other shales, and the infrastructure as we think about liquids development, we think about the NGL components of that.

Lastly I also want to mention, again a lot of material in maybe just a few moments. But as you read through some of the comments that are here, we think about some of the constraints that are there, think about some of the challenges as development goes forward, as we think about infrastructure needs, you also have to think about a variety of things that might not be hard assets, might not be pipe and capital but other issues as well.

Some of the things that we mention on there, even down to aspects like social license and pushback from communities and broader education, so that a very broad sweep of the public understands what energy will look like and including some of the comments that we've heard earlier in the Q and A. We think about the whole spectrum and what that will look like over the course of time.

So again, a number of issues, and I think you can read through and see what they look like.

MODERATOR KELLEY: Thank you, Thomas. Peter.

MR. TERRANOVA: Thank you and good morning. I'm not good enough to sit with my back to the slides and know that I'm on the right one when I'm talking about it. So I'm going to skip through some of these in the interest of time. They will be in the packet, but I wanted to go directly to this slide first, and talk a little bit about, or emphasize maybe and show pictorially some of the things that you just heard about from the Secretary and the Congressman.

This is a graph that is -- compares prices to NYNEX. NYNEX would be -- that would be the posted price for natural gas. That's everything that kind of spins off NYNEX. So the zero as you see up here is NYNEX flat.

This goes back a year or so, and what you'll see as we got into last winter is that the

yellow and blue lines on the bottom, which were the prices that were being offered to producers in constrained areas in Pennsylvania, were well below NYNEX.

The prices that were being paid by the market, that's the orange and green lines on the top, were well above market. So this demonstrates that there are infrastructure constraints in Northeastern Pennsylvania and in Pennsylvania and in the Marcellus, that are causing gas there to be trapped.

Prices are very low. At the same time consumers, who are in many cases 60 to 100 miles away, are paying significantly higher prices because the gas can't get from where it's trapped to where the market is. One -- let me give you one example of how we've addressed this. This is northeastern Pennsylvania. The blue dot right here in the center, right there, is the largest Procter and Gamble manufacturing plant in the U.S.

That plant sits right on top of Marcellus. It's a significant beneficiary of

Marcellus gas. In fact, it was a plant that was slated for closing. It's now running double in size prospectively. We also, having served our plant through our utility, we built a line to bring additional Marcellus gas down into the Scranton-Wilkes Barre area.

So today, those areas of our utility are served entirely by gas that's being produced 30 to 40 miles away. Again, I think that's a great story, and that's an investment on our part to bring local gas to the local consumers. The alternative for those consumers would be to continue to pay for pipeline systems that were built to bring natural gas from the Gulf of Mexico, from Wyoming to these areas.

Going forward, this is our next -- our next thought is that southeastern Pennsylvania also suffered from very high gas prices during these periods when producer gas up in the area, all those little green dots or wells. While that producer gas is being sold well below market, the folks down in New Jersey and southeastern

Pennsylvania and into Maryland and Virginia were paying prices that were well above market.

The only solution to this is to build, and building means maybe 120-130 mile pipeline system that can get gas from those areas down into -- from the production area down into the area where people demand natural gas, people use natural gas.

So while the Marcellus resulted in significant savings, shale gas generally has resulted in significant savings to consumers, both in their electricity bills and their gas bills. In the case of our utility, anywhere from 1,200 to 2,000 dollars a year. It has caused oil, which has a strong foothold in this area, heating oil, to be replaced by natural gas.

There's still much work left to be done, and the goal is to take advantage of this locally produced resource. Thank you.

MODERATOR KELLEY: Thank you. Josh.

MR. NORDQUIST: Thank you. Thanks for the opportunity to describe our experience, a

strategy that we're employing to use our nation's gas pipeline infrastructure more effectively. My company, Ormat Technologies, based in Reno, Nevada, offers a unique waste recovery technology that allows pipeline compressor stations to generate fuel-free electricity from local grids.

This technology is an important tool for reducing the life cycle or environmental impact of the natural gas supply chain, and improving electrical grid reliability. In the early 1970's, we commercialized the organic waste heat recovery technology which now generates electricity from low to moderate heat sources for the geothermal industry.

Fifteen years ago, we adapted this technology into an application we called Recovered Energy Generation or REG. We installed our first REG power plant on a gas compressor station in Alberta, and have continued to increase installations since. The U.S. gas transmission infrastructure continues to grow and we see a tremendous opportunity for ways to the natural gas

industry to succeed together.

There are over 220,000 miles of interstate natural gas pipelines in the U.S. today. On larger pipelines, a gas compressor station is installed about every 100 miles. These compressors are driven by gas turbines, the equivalent of a jet engine, and they're needed to compress and move the gas through the pipeline.

Because of the natural gas and the fuel use, the exhaust here is about 900 degrees Fahrenheit. The reg units convert the heat to electricity in a simple process, proven over time. A heat exchanger picks up the heat from the exhaust stack and concentrates it and moves it to a power plant.

In that power plant, the heat is used to essentially drive a turbine and electrical generator, and to export power to the local grid. REG is now applied today successfully on 19 natural gas compressor stations in North America. Each REG unit, which generates between 4-1/2 to 6-1/2 megawatts of power, together combine about 100

megawatts of power, the equivalent of about 100,000 homes.

In all cases, this electricity is supplied to the local grids under standard power purchase agreements. The business arrangement between a REG and a pipeline owner is a symbiotic one. The typical REG plant includes an agreement between them and a pipeline owner, in which the pipeline owner receives a royalty for the waste heat that they supply, heat which otherwise has literally no value to them.

The operations and safety at compressor stations are unimpacted by the REG facility. In some cases, the pipeline owners have even retained ownership of these power plants and the energy they produce. The benefits of these REG units are many. They require no fuel to operate. Each megawatt hour offsets generally approximately one ton of CO2. On an annual basis, a six megawatt power plant will save 48,000 tons of CO2, 66 tons of NOx, and 240 tons of SO2, versus -- comparatively versus that same power being

generated by a coal-based facility.

The REG units are available up to 99 percent of the time, better than the U.S. average coal, gas and nuclear fleet. The REG is operable in almost every environment imaginable. From the winters in North Dakota to the summers of Nevada, the units have been running for years now, and proven their resilience.

The power is dispatchable. It's available upon demand can operate in automode, which is very difficult for some of our existing power plants to do today. The process is closed-looped and emission-free, and air-cooled. It doesn't require water to operate. It doesn't require expensive maintenance, such as turbine refurbishment or boiler operator certification, and today Ormat operates these REG facilities remotely.

On average, a single facility can generate up to 84 construction jobs, six operation jobs and over $8 million in local revenues. So what's next? There's already over 1,400

compressor stations on the gas pipelines in the U.S. today.

Most of these stations are candidates for waste heat recovery such as REG. With the recent production booms in the areas such as here in Pennsylvania, new gas pipelines will be built, and compressor stations will be brought along with them.

Each station has the potential to generate clean fuel free electricity and compounding its economic and environmental value. That's basically it. Thank you, and we look forward to any questions.

MODERATOR KELLEY: Thank you, Josh. Piotr.

MR. NORDQUIST: Thank you very much.

MR. GALITZINE: Do I just keep clicking?

MODERATOR KELLEY: He's going to get it set up for you

MR. GALITZINE: Thanks. While that's being set up, I wanted to reiterate that Congressman Murphy has indeed been extremely

supportive of the steel pipe industry. Of the figure of 8,000 jobs that he mentioned, it's actually just union workers. If you look at the entire industry in the United States, it's closer to 50,000, and we've just gotten a satisfactory result from a finding from the Commerce Department, which we hope will help attain a flood of imported pipe, especially as the United States is building out its infrastructure.

Shortly to our company, TMK is the largest pipemaker in the world. So we are extremely interested in all this construction of gas and oil drilling and production and transport. We have 28 facilities around the world. Our largest divisions are in Russia and the United States, but we are also in the Middle East and are continually expanding.

We have assets not far from here. We have one steel mill and one pipe mill and one thread shop, the first two in Pennsylvania just northwest of here, about an hour, and the last one just over the border to Ohio. Our pipe and

especially our premium connections is what made the bend underground and the drilling with hermetic conditions of the pipe possible.

First on gas, where everybody learned how to do that and then on oil. So we are very much a force in the gas and oil in horizontal drilling as well as vertical, although horizontal is already 78 percent of all drilling in this country. In terms of just a small advertisement, we are ten percent of the world's OCTG, that's oil country tubular goods. So every tenth pipe is ours.

In Russia, we're over 60 percent in seamless OCTG; in the United States over 16 percent and climbing. We are talking a lot about infrastructure here. I wanted to give you a look at one of the biggest infrastructure projects in the world.

Gazprom just signed a contract with China CMPC, which is going to be two and a half -- for a pipeline two and a half thousand miles long, requiring two and a half million metric tons of

large diameter pipe, and this is large. This is 56 inch, and over a million tons of oil country tubular goods to gas fields in the Far East there, and we hope to be part of that project.

In terms of what's happening here, we quite clearly see that there are going to be two pipe corridors. One of them, primarily a gas corridor, is going to go from the Marcellus where we are today down to the Gulf, and the other one we see as primarily an oil corridor, will go from North Dakota and the famous Bakken field down to Midcontinent and over to the Eagle Ford, which is -- continues to grow apace.

This is a fantastic development. In the 70's and the 80's, all the big EMP companies went into the Gulf of Mexico, because the word on the street was that the U.S. had no more oil, and today the U.S. the third largest producer of oil in the world, and already since 2011 the largest producer of gas.

So in terms of what the government's doing, we think that's going on in LNG exports or

is about to happen in LNG exports is great, and the Department of Energy under Secretary Moniz has done a wonderful job. When he arrived in that job, there was one LNG export project that had received all the permits. Now there are seven, totaling some just under 11 billion cubic feet per day.

On the oil exports, there is a small beginning. Two companies, Pioneer and Enterprise, have started to ship a very light condensate, and on the infrastructure, we've talked a lot about that. There's a lot to be done there, because the infrastructure in the United States for oil and gas pipelines is -- 55 percent of that infrastructure is over 45 years old, so a lot to be done there.

What's interesting is that gas is to be used in a variety of ways. It's being used in feedstock and we'll talk about that, electricity. That's been mentioned. Transportation. One of the large players in this business told me that it will be used for transportation, compressed

natural gas for light vehicles, LNG for trucks and of course LNG exports.

In terms of feedstock, we are now looking at over $120 billion that is about to be invested in over 100 projects in the United States. So you can really talk about the renaissance of American manufacturing and industry once again, and gas from the shales is a big part of it. Thank you.

MODERATOR KELLEY: Thank you, Piotr. Thomas.

MR. MINNEY: Sure. Good morning. I'm Thomas Minney. Thank you for allowing me to be part of the dialogue today. I wanted to introduce into the dialogue a topic that's often overlooked. We talk about surface drinking water, the quality; we talk about impacts to surface waters.

But the Nature Conservancy would also like to introduce the discussion of habitant fragmentation and surface impacts from shale gas development. So I'd like to start by just illustrating a few things about the importance of

the Central Appalachians. It's a global center for forest and fresh water diversity.

There we go. So it's a global center for forest and fresh water diversity, and it represents some of the best remaining examples of temper-connected impact forest, providing resiliency that's intrinsically linked to people's well-being in the Pittsburgh and the Washington, D.C. areas, providing clean water and recreation.

While we have abundant nature here in the Central Appalachians, as the Congressman alluded to earlier, we're also a center of abundant energy supplies. This overlap in the Appalachians illustrates that one of the most formidable conservation challenges in contemporary society.

This is just one example, but this plays out across the U.S., across multiple plays. TNT believes that we can work with industry and partners to meet the energy needs, while ensuring our lands and water remain diverse, connected, resilient and provide continuous benefit to nature

and people.

I'd just like to talk a little bit about the scope and scale of impact that we're talking about, and using the Appalachians as an illustration. The technologies have led to pad densities becoming less and less across the landscape, and that's a very positive thing that's happening.

But associated infrastructure is still large. A study done here in Pennsylvania by the Nature Conservancy found that for each three acre pad, 25 acres of associated impacts from other infrastructures, such as roads and gathering pipelines, is still present.

So if you look across the 50,000 estimated shale plants already developed in the United States over the past several years, that's 1.4 million acres of impact. And if you look at the rate for 2013 development of approximately shale wells, that's impacting about 566,000 acres.

If that rate continues, and there are many factors which could make that go up or down,

11 million acres over the next two decades could be impacted. And while that doesn't sound like a large number of acres across the United States, it represents some of the most important places in the United States for diversity and ecological services, where that overlaps in shale development.

If we look through the Central Appalachians lens here, in the Central Appalachians, we've predicted that up to 1.5 million acres of impervious cover increase could occur. That can lead to a 22 percent decline in watershed lands classified in their best conditions, and up to one million acres of forest habitat is at risk of development, much of that overlap in important natural areas.

This leads to forest loss and fragmentation, sedimentation change in surface hydrology, and converging from intact forest to edge forest. This impact will play out on interior forest species and rare species habitat, where it overlaps with shale development. Species

such as brook trout can see up to 80 percent overlap in development.

Though this challenge is formidable, there are steps we can take with industry, government and others to find solutions to reduce risks, and avoid or mitigate these impacts through sound science, and we can look out at the future projections to reduce how they play out across the landscape, based on this science and tools that we can put together.

The Nature Conservancy looks to policy and through improving voluntary practices as one means and methods for being able to do that, looking to expand voluntary mitigation frameworks and state and federal frameworks to avoid or minimize those impacts, and also what can't be avoided, and to look at cumulative impacts in the (inaudible) process to include landscape impacts from multiple developments, and provide incentives and where required, co-location of infrastructure to reduce those impacts across the land.

So there are solutions out there that we

can be working on together. It's not just a story of impacts. There are tools in development now that the Nature Conservancy is working on with industry and academics and others, you know. Industry was able to develop sophisticated tools for underground exploration and drilling, and we need some of those same sophisticated tools to work on surface impact planning.

The Nature Conservancy is currently working on a low impact shale infrastructure planning tool, to look at how to develop multiple development layouts to assess development costs, and give an ecological impact scores to each, so we can work with industry and others to find the least impactful and financially sound alternatives for shale development.

We're also developing recommended conservation practices that we'll release in the fall of 2014, to avoid or reduce these impacts through landscape planning, habitat buffer planning, stream crossing, road and pipeline construction and noise reduction.

So I thank you for the opportunity to introduce this topic today. The importance of the region and the challenge before us, and some of the effective solutions that we'd like to see working forward, to reduce the cumulative impacts to our lands and waters. Thank you.

MODERATOR KELLEY: Thank you, Thomas. Hayley.

MS. BOOK: Good morning. Thank you very much for the opportunity to be here today. In the role as policy director at the Department, my job is twofold. I oversee the policy and regulatory development of environmental regulations and policies, and also work closely with the governor's energy executive, Pat Henderson, on energy initiatives within the Department.

So I'll be speaking sort of from both perspectives this morning, from that of Patrick Henderson and also of our Secretary, Christopher Ambruzzo. So as Congressman Murphy alluded to this morning, energy production is not new to Pennsylvania, and in fact the first commercial oil

well was built in Pennsylvania in 1859.

At that point, Pennsylvania provided 58 percent of the energy specifically from oil needed by the nation. Moving forward, natural gas was often encountered by these early producers, and it was seen as more of a nuisance than a benefit.

So as technology has advanced, and the modern natural gas industry emerged in Pennsylvania, we've now shifted from being importing more than 75 percent of our natural gas to actually being an exporter.

We are certainly in the midst of shale revolution, and we are now the second largest natural gas-producing state in the nation. In 2004, the first unconventional well was developed in Pennsylvania, and over the next few years, a renaissance in natural gas was evident.

In January of this year, Governor Corbett published Pennsylvania's first state energy plan, which is aptly entitled "Energy Equals Jobs." It's straightforward. It reflects our diverse energy portfolio. Pennsylvania is

home to abundant natural resources such as oil, natural gas, coal, nuclear, hydropower, wind and other renewables, and we're a national leader in both energy and energy diversity.

So this array of resources paired with our competitive energy markets means that we have affordable and abundant power that we're able to deliver and a way to meet business needs. We're modernizing our infrastructure, and we need to make sure that we have a reliable grid, so we can efficiently harness all of our resources to drive our economy forward.

Shale gas underlies more than two-thirds of the Commonwealth, with development activities in nearly 40 of our 67 counties, and production has surpassed expectations. From 2010 to 2013, gas production is more than six times that of the 2010 levels. Pennsylvania DEP provides an important and vital role in the comprehensive oversight and regulation of the natural gas industry, and specifically of infrastructure development as well.

Though there are some federal statutes that oversee the development of oil and gas, most laws and regulations lie at the state level, and DEP is the primary agency for oversight of those. In 2013, DEP issued approximately 3,000 well permits for the construction of unconventional wells. Of the 3,000, 1,200 of those was drilled.

Currently, we have 7,000 unconventional wells drills in Pennsylvania, with approximately 70 percent of them actually producing natural gas. So the remaining 30 percent of those wells are not producing gas for a variety of reasons, one of which is because they're waiting for the remaining infrastructure to be able to deliver that gas to market.

Because of our history as an oil and gas producer, Pennsylvania has a significant existing network of intrastate and interstate pipelines. According to the U.S. Energy Information Administration, at the end of 2008, there were approximately 8,700 miles of intrastate and interstate pipelines in Pennsylvania.

Since then, more than 600 miles have been finished, and there are more projects in varying stages of completion. The most dynamic activity in Pennsylvania that we feel is going to have on the pipeline infrastructure is going to be gathering, the establishment of new gathering lines necessary to connect the new drilling sites with the larger pipelines.

A recent study by the Nature Conservancy estimated that 1.6 miles of gathering pipelines were going to be required for each new drilling site, to get this gas to market. In 2013, the highest-producing counties in Pennsylvania were mostly rural counties, thereby heightening, I guess, and providing an example of the needs for these smaller gathering lines, to get the gas from these rural areas to market.

Through an extensive network of state laws and implementing regulations, pipelines are being developed responsibly across Pennsylvania. State government has been able to respond quickly to the challenges and the general changes in the

energy landscape in Pennsylvania.

In response to the permitting and inspection responsibilities, our oil and gas management from 2008 has increased from a size of 88 employees to more than 200 today, and a recent increase in some of our permitting fees is going to allow us to add additional staff for the permitting and inspection, specifically of pipeline development projects.

Marcellus shale may be the most familiar shale-producing formation, but now operators are targeting the Burkett, Rhinestreet and also the Utica formations. So now with advanced technology, it's possible to extract more from one well pad. So again, these leaps in technology are going to lead to an increase in production and increased need for infrastructure.

We're fortunate enough in Pennsylvania to have these diverse and abundant energy supplies, and as the governor outlined in his energy plan, we'll use these resources to move Pennsylvania forward. We'll create jobs, raise

the standards of living, foster a business climate that rewards innovation, advance our energy independence and, importantly, enhance our environment.

But none of this going to be possible without a strong and reliable infrastructure, and as a Commonwealth, we feel we're strongly positioned to build on those current successes. Thank you.

MODERATOR KELLEY: Thank you, Hayley. So with that, before we turn to the discussion, I just want to remind everyone that the presentations that you've seen here today will be available on the web at energy.gov/qer. You can just look up today's meeting and you'll find all the presentations and the public comments.

My first question for the panel, and what we'll do is I'll start here on this end, if you don't mind Thomas, is we heard from several of you about constraints associated with the infrastructure. Lots of great projects going on. Piotr, I think you touched on these constraints

causing some pricing concerns, over, you know, long distances between the resources and the point of consumption.

So my question to the panel is you have the QER Task Force here. Is there a federal role in helping to improve upon these infrastructure constraints? Thomas.

MR. MURPHY: A couple of comments that I would make real quick. First, I obviously come from an educational institution. We do a lot of outreach-type work. One of the things that we see is we can have great regulation, we can have great technology, we can have all kinds of capital. But if we can't have access to right-of-ways to put pipe in the ground, then infrastructure won't be built in the end.

So I think an educational process, including at the federal level, with some federal direction, to show what all the above would include relative to this side of it as well, in terms of the build or the need for infrastructure. I think it's easy to illustrate, and the

illustration, I think, was made by Congressman Murphy a little bit earlier, about the dynamic of pricing with the polar vortex this past winter, and what that showed with the constraints in the system and the need for more pipeline, certainly going north.

So I think there's a lot of pieces there. But if you look at the demand even in that area right now, to put more pipe in the ground, some of that is being stopped by the fact that the access for right-of-way through landowners and the understanding of what the components of that look like going forward actually are. So I think theirs is an educational piece.

MODERATOR KELLEY: Thank you. Piotr?

MR. TERRANOVA: Yeah, I would agree with much of what Tom said. I think the issue is construction in -- to get gas to market generally goes through places that are -- where they're remote from where the gas is being produced. I think one thing that would be helpful from a federal and state standpoint would be perhaps some

more comprehensive educational effort for consumers, that would help them understand how important this infrastructure is.

I think we've all seen, and maybe a reminder that we've all seen the significant benefits of Marcellus shale gas in this area, in terms of lower, far lower bills for energy in their homes. We have, as I mentioned before, we have a huge amount of oil being consumed in placed that you wouldn't expect oil to be consumed. This would be southeastern Pennsylvania, this would be New England.

We have an opportunity to substitute natural gas for oil, which is great from an environmental standpoint. It's also great from a cost standpoint. Also I think -- so I guess if I had to put it in a nutshell it would be I can't point to any particular rule or regulation that might help, but I think maybe making this a more comprehensive -- maybe making this a more visible initiative by the government may help put the people, consumers put this in perspective.

MODERATOR KELLEY: Thank you, Josh?

MR. NORDQUIST: Thank you Chris. I would start with -- for us at FERC today, actually with both new pipelines and repermitting old pipelines requires that they consider or analyze wasted recovery from their operations. However, that's where it stops. It stops at evaluation, and I think some federal support to incentivize these projects to strongly consider the benefits of wasted recovery, either through the use of public lands or the permitting process that's required, because I think it has a nice symbiotic approach with both landowners and the transmission company.

The other side of it is on the energy side, I think for us, wasted recovery particularly doesn't get many of the incentives that other alternative energy production gets, and doesn't value some of the benefits that this type of technology provides, such as island loading and on demand energy, along with that energy security potential of, you know, for example, powering our

military bases with their own power plants essentially.

MODERATOR KELLEY: Thanks, Josh. Piotr?

MR. GALITZINE: Thank you very much. Three thoughts very shortly. The first one is that the invisible hand of the market seems to be doing a great job, all these problems notwithstanding. The U.S. is now producing 70 billion cubic feet of gas a day, and 8-1/2 million barrels of oil a day.

As regards to regulations, I would think that the loudest example of what not to do is probably the Keystone XL. As a result of that project not going forward, Canada has decided to send that pipeline to the west and to Asian markets, which is a shame and a real problem for the 37 refineries on the Mexican Gulf Coast, because they run on heavy oil and you can't just flip a refinery from one type of oil to another.

On what -- on a third thought, there is a lot of discussion about whether frack water regulation should be happening at the state level,

or whether they should be EPA mandated. There is many states, I think 28 states already have requirements to reveal what's in the frack water, and I think this only make sense because everybody wants to know what's going down whole and going anywhere near their drinking water.

But I would encourage that process, whether it be state or national, to happen a little quicker because there's a lot of uncertainty among the major players to what to do next. Thank you.

MODERATOR KELLEY: Thank you. Thomas, care to comment?

MR. MINNEY: And sir, I won't comment on market on anything like that. But I would say I'd just reiterate my points earlier. You know, as we look at how those pipelines are going to be placed on the landscape and the transmission placed on the landscape, the Nature Conservancy and other groups have been looking at critical habitats, particularly here in the Central Appalachians, and ways that we can do planning to be able to reduce

those impacts to those critical places. We are happy to begin working with industry and policymakers and others to look at that.

MODERATOR KELLEY: Thank you. Hayley.

MS. BOOK: Sure, and we are one of those partners that the Nature Conservancy is working with right now on critical habitat. We have several proposed regulations regarding well development and infrastructure development in Pennsylvania. So we're trying to keep the regulatory framework current with what's happening in the field.

Certainly, one of those items that we're debating and discussing right now with industry and environmental groups and the like are certainly impacts on the surface and impacts to threatened and endangered species and species of special concern. So it's an interesting process. The federal government is involved to a certain extent, and in some of the permitting, mostly with the pipeline permitting. But the remainder of the permitting really falls on the state level.

MODERATOR KELLEY: Thank you. So with that, let me turn to technology. So Josh, you mentioned your heat recovery technologies that you have in place. Piotr, you talked about some advanced pipeline technologies. So it sounds like lots of great progress there.

But are there other technologies or considerations that the federal government, for instance, should take into account in the future, as it relates to addressing infrastructure constraints? So I'll open it up to whoever would like to take the question to start with, on the federal government role in technology.

MR. GALITZINE: Sure. One thought would be to make a concerted effort to tape the nation's geothermal sources. California has done a great job leading the way as always. Basically all the electricity north of San Francisco is generated from geothermal, where (inaudible) are also used, and there's a lot of candidates for further development.

MR. NORDQUIST: As a large geothermal

developer, I would support that.

(Laughter.)

MODERATOR KELLEY: Did you have a comment?

MR. MURPHY: I'd make a comment as well. We think about some of the comments that have been made here today, one of the aspects or one of the challenges that's been pointed out was about future of methane emissions. I think federal government funding for additional research to solve some of those issues as they've been illustrated, I think, would be well-placed.

MODERATOR KELLEY: Anyone else care to comment?

MR. TERRANOVA: Yes. Working for a company that also distributes national gas to utility customers, I think there's been kind of an on-again, off-again effort by the federal government to fund end use technologies that would lead to greater efficiencies, and I think that that is something that should be on again if it's not.

I think, you know, in terms of infrastructure, clearly the processes by which pipelines are built today are much more -- much less intrusive than they were in the past. So I don't know that there's much for the federal government to do there, but I do know that other industry groups, such as GTI, are working diligently and in some cases getting federal funding, I think DOG funding, for some of their initiatives.

Then finally, as I said before, you know, it's not so much technological change, but let me back up. The technology improvements that need to be made to make natural gas a motor fuel more accessible to large fleets, the so-called Pickens plan, I think, has a lot of potential to reduce this nation's dependence on oil.

That would be liquefied natural gas technology, which has improved greatly, but I'm sure it can improve to an even greater extent.

MODERATOR KELLEY: Thank you. Any other comments? No. So Hayley, you talked about the

role of the state of Pennsylvania and the involvement of regulators at the state level. I'm curious, I guess, for the rest of the panel. Are you seeing any complex as it relates to regulations at the federal, state or local level, and if so, what actions would you recommend? Any thoughts on that.

MS. BOOK: Sure. So as I mentioned, the majority of the regulations are at the state level. But the federal government certainly plays a role, specifically the Army Corps of Engineers, in terms of permitting for erosion and sedimentation control for the development of pipelines.

Pennsylvania has a little bit of a different permit. It's what's called the State Programmatic General Permit, and it's a joint federal and state permit. So instead of having a company be required to get a state permit, and then in turn receive a similar federal permit, we have a joint permit, which is supposed to help streamline the permitting process for pipelines.

Some groups are debating whether or not that has streamlined the process. We're having ongoing conversations with industry and the Army Corps of Engineers to kind of advance, advance that permit, to make it a little bit easier to apply for. Equally as protective, but streamline that process a little bit.

Then recently, the Commonwealth has passed in 2012 Act 13, to revamp, for the first time in more than 30 years, the Oil and Gas Act in Pennsylvania. We've encountered a little bit of difficulty in some of the court systems, in regards to some provisions of that Act. But we'll continue to move forward and ultimately the court's decision was that some of the decisions about local zoning, about placement of wells and pipelines and such, would remain at the local level.

So there's still some discussions that are ongoing about that. But for the most part, we feel at the state level, the regulatory framework is pretty strong.

MODERATOR KELLEY: Great. Anyone else care to comment? Yes.

MR. MURPHY: Yeah, I would make a comment too. One of the things that Hayley had talked about earlier was a number of fuel-based inspectors that have been hired in Pennsylvania. We see that in a variety of other states around the nation.

Certainly, a program in place that would increase the credibility of those same inspectors, sort of a certification process that could be done at the federal level, to certify across all the states where natural gas is being developed, we think would be a real asset and certainly would go a lot further again in the credibility aspect of the programs out in the field.

MODERATOR KELLEY: Great. Anyone else? Okay. Well, let's do one more question. You have the QER Task Force before you, and my question is simply this. They want to hear from you. You're given the opportunity to provide one final comment here, and if you had one comment or suggestion to

make to the federal government, to this QER Task Force, what would it be? We'll start here with you again Thomas.

MR. MURPHY: Actually, I'm going to circle back where I started in one of the comments that I made, and that was about the educational process. I just feel very passionately about that, and we see that not only here within the state of Pennsylvania or North America as a whole, you know, thinking about certainly the U.S. as the big part of this focus, but on a global basis.

So it really is a big part of the dialogue that we see out there. It is one of the bigger constraints. As I mentioned before, a number of the constraints or a number of the challenges. A lot of those go back to some of the softer side of those conversations and the soft science side of this, and to make sure that we get that part right, and we get that -- we put a sense of urgency in that process on a collective basis and on a national basis.

MODERATOR KELLEY: Thank you. Peter.

MR. TERRANOVA: Yes. I tend to believe that the Department of Energy is uniquely positioned within the government to bring some rationality and some fact-based discussion to this whole issue of energy, energy use, energy development in certainly the country. That to me is sorely needed. I think there are a number of voices out there who are, you know, making statements about energy development that hurt us all, because they're inaccurate and they're built, they're made in order to scare people.

But once again, I think if we as an industry knew that there was a part of the government whose function is to be fair and to be fact-based, and to be the keeper of the truth, if that's a phrase to be used, I think that would stand us all in good stead.

MODERATOR KELLEY: Thanks, Peter. Josh.

MR. NORDQUIST: I guess I would say that we need to stay focused on what we're trying to do here, is figure out how to use our own resources effectively, and those resources being a whole

multitude from our renewable resources, from geothermal wind and solar to our non-renewable, because it's all -- they will all be needed in the future, whether or not they're used here or used worldwide.

So I continue to stress that our own resources need to be used as effectively as we can here, and we still have a lot of room to grow.

MODERATOR KELLEY: Thanks. Piotr.

MR. GALITZINE: Thank you. Until we get to an alternative energy-fueled future, which is going to happen when we have network scale batteries, which by the way, the Japanese are making some considerable progress on, we are going to be combusting hydrocarbons. My wish would be that the United States revisit the 1975 law forbidding exports of oil, and open that up to the market's hand.

MODERATOR KELLEY: Thank you. Thomas.

MR. MINNEY: So I would just emphasize again that this focus on landscape fragmentation and habitat impacts be brought into the dialogue,

but also emphasize that we do have the science and tools to look out into the future and predict where those overlaps would happen and be proactive about what planning and tools we put into place to ameliorate those impacts, or to avoid or mitigate those impacts.

We do have already science and solution in the work, to look at planning tools that will help produce those impacts. I would just encourage the continued look at the science and impact planning.

MODERATOR KELLEY: Excellent, thank you. Hayley.

MS. BOOK: Sure. I guess my one request of the Department of Energy would just be to continue the public discussion, and make sure that as they move forward with the national energy policy, they're well-informed and they've plenty of stakeholder input, which certainly they will get through this process.

So while it's important to have a national state energy policy -- national energy

policy, excuse me, we're just thankful that DOE looks to their states and their individual needs and individual resources as they move forward with planning.

MODERATOR KELLEY: Great, thank you. Well I know I've learned a lot here with this first panel. So I thank you very much for joining me up here, and please all of you join me in a round of applause for our panelists.

(Applause.)

MODERATOR KELLEY: We're ready for the second panel. So if you're speaking on the second panel, please join us up in the front.

(Pause.)

Panel 2

MODERATOR KELLEY: So once as we're getting settled, for those of you in the audience, if you'd care to comment at the end of this session, please do make sure you indicate that on the sign-in sheet at the front, and for those who are joining us by live streaming, do send in your comments to qercomments@hq.doe.gov.

And once again a reminder as we get started here with our second panel, that the comments by the panelists are those of their own, and do not represent the sentiments of the Department of Energy.

So the second panel here is focused on How Prudent Infrastructure Investment Could Help Maximize Resource Potential, and joining me here at the front are Shelley Corman, Executive Vice President, Interstate Pipelines Energy Transfer Partners; Rory Miller, Senior Vice President, Atlantic-Gulf Williams; May Va Lor, Lead Research Analyst, Laborers' International Union of North America (LIUNA); Kris Evanto, Manager of Development, Access Midstream; and Jim Sullivan, Member-Public Gas Policy Council, American Public Gas Association.

So once again we will go ahead and just start here with you, Shelley, with your comments.

MS. CORMAN: If I can stand up, because I've got a map.

MODERATOR KELLEY: Do we have the

clicker for you?

MS. CORMAN: Thank you very much. I'm speaking today as a representative of Energy Transfer, one of the largest and most diversified investment grade master limited partnerships in the United States. We have a couple of slides through maps. Pipeliners like their maps.

On a consolidated basis, our partnership owns and operates more than 72,000 miles of natural gas, natural gas liquids, refined products and crude oil pipelines. Personally, I've worked in the Interstate Pipeline Division of Energy Transfer. Our legacy pipeline systems shown on this map include pipelines in some of the traditional basins of the United States, not too much of what we've been talking about this morning, the Gulf Coast, the Midcontinent, San Juan and the Permian Basin.

Those pipelines have operated safely and reliably for many years, but now have challenges with some of the gas/oil pattern changes that we've been discussing this morning. Starting in

the mid-2000's, the sorts of new gas supply from shell formations has exposed the need for changes in our natural gas pipeline structure.

Many of the producers in the nation suffer when their shale supplies cannot economically reach markets. Companies like Energy Transfer have grown and developed pipeline projects to help those supplies reach new markets, to reach liquid spots where the producers can sell their gas.

So for example, a couple of the pipelines on this map are pipeline projects that we have put in service in response to the shale play. Energy Transfer first grew up -- slide back here a second -- with the rise in the shale supplies in the Barnett shale, one of the first shale regions in the United States.

But then, I think you can see it more easily on this map, some of our other pipeline projects were the Tiger pipeline system, which allowed the Haynesville shale to reach markets, the Fayetteville Express Pipeline, a joint venture

with Kinder Morgan, that allowed us to transfer Fayetteville shale gas out of Arkansas, and the Midcontinent Express pipeline, which was also built to serve the Burnett and the Midcontinent gas producers.

Each of these pipeline systems is supported by long-term transportation contracts. It's not possible to build the scale of pipeline project and to make the billions of dollars of investment without contracts and without predictability in the rules and regulations that we face.

In the Haynesville shale, for example, production in the region grew by 70 percent in the year after the Tiger pipeline project went into service.

Although new pipeline infrastructure has allowed producers in specific areas to enjoy better market access, there are enormous shale plays out there that still require development, and there are a number of changes. I'm not going to rehash the changes that other folks have

already described.

Some of those market conditions in summary are just that low gas prices have really shifted development in the United States towards the natural gas liquids area and the development of the basins where there are the most liquids, and also into the Marcellus and Utica area.

We've talked some this morning about the other phenomenon industry, the demand phenomena. Those have quite frankly not kept pace with supply development. Some of the low prices are causing resurgence in our gas intensive industry such as steel and petrochemicals, and in power generation as well. Also, increasing exports to Mexico and in the LNG export arena as well.

So what is a pipeline company to do with all of those types of changes? Well, I thought what I would do with my couple of minutes of remarks is just talk about in my company. I think it's much the same in other pipeline companies across the United States, is how those dynamics that we've discussed are directly impacting what

pipeline companies are working on.

For example in energy transfer, we have undertaken an extensive build out of midstream and natural gas liquids infrastructure in the Eagle Ford shale area. We've spent $3 billion in that area since 2010. We're also working on pipeline projects to export gas to Mexico.

We're in the middle of building an export facility in Lake Charles, a trunk line LNG site. We currently have a facility there to import LNG, but the market conditions today dictate a completely new export facility be built in that same area.

We're making modifications to our pipeline systems, such as reversing the flow of portions of our system or abandoning systems, to convert them to other uses. For example, one of the lines of our trunk line gas system is currently being abandoned and put into crude oil service.

And then, most relevant to the area that we're talking about today, is the huge resource

base in the Marcellus and Utica area, and the need for producers to have new infrastructure out of this region. Energy Transfer is developing a new pipeline system called the rover pipeline, that will provide access from the Marcellus and Utica gas production areas for our producers, transporting gas westward to the Midcontinent, where it has market access, and in Michigan, up to the Canadian border and also connect in the Midwest to pipes that go to the Gulf Coast for some of the demand growth that we've discussed there.

We already have gap commitments to the project, 2.6 Bcf a day, and the pipeline project we believe will be sized around 3.2 Bcf a day. We're running an open season right now to finalize our commitments and the sizing of the project, and it's a project we hope to bring in service in the fourth quarter of 2016.

We're in the midst of the stakeholder processes. I think that's relevant to the conversations about what can be done to facilitate

infrastructure, and participation by all the stakeholders early in the process is really what makes these projects a success, and helps us deal with landowners and other issues that you encounter in building pipeline projects.

So in quick summary, I agree with the comments of the panelists before about the changes in the industry and all of the great opportunities in natural gas, and hopefully this is an example of what one pipeline company is doing to meet those.

MODERATOR KELLEY: Thank you, Shelley. Rory.

MR. MILLER: Good afternoon. Looks like we're just past the lunch hour. My name is Rory Miller. I'm the Senior Vice President for Williams, handling our eastern interstate pipeline systems, as well as our Gulf of Mexico, midstream and deepwater assets.

I'm going to focus on some of the challenges facing the construction of new interstate pipeline projects. I want to use a few

examples as I go through that. There we go. I'll see that. I'll try to limit the commercials as I go along, maybe just provide a little bit of context of how Williams operates and serves 24 states and Canada.

We've got 4.8 billion dollars' worth of projects that are in some stage of the regulatory process today, and we -- I've got a rough calculation. We believe that over the course of the time frame that the QER applies to, that we'll be investing upwards of $30 billion.

So making some progress on this front is of utmost importance to us at Williams. A lot of things have already been covered. I think Shelley mentioned some of that too, and so I'll try not to be too repetitive. We're in a very fortunate supply situation right now, with all the new shale gas, and we're seeing very strong demand for clean energy. We're certainly taking advantage or trying to take advantage of that.

The polar vortex provided, I think, a snap shot of where some of the constraints are and

some of the bottlenecks are, and I've got a slide similar to the one that was shown earlier, and I'll just touch on that for a moment. Then I'm going to cover a little bit about our Rockaway and Constitution projects.

But at the end of the day, what we're really after is regulatory certainty. If you don't have that, if you miss an environmental window by a month or two, the results and the in-service of the pipeline is easily 9 to 12 months. So meeting these deadlines and sticking to the schedule is of utmost importance.

This graph shows the price differential on our Leidy system, and just real quickly, you can see the spikes there. Congressman Murphy mentioned that $120 price. That was the New York City gate price, and that red line there is what the price the producers are receiving just a couple of hundred miles away from the city gate.

You can see that price differential of about $117. Now the pipeline doesn't get that. Our rates are all regulated. So we get the same,

regardless of what the price is. But the consumers are the ones that pay that bill. Not all the gas is bought on the spot, but the gas that is bought on the spot is paying a pretty heavy toll.

I mentioned talking about the Rockaway project just a bit. Let me just set the stage for you. This is less than four miles of pipe, and it serves the national grid system, mainly the gas would be going into Queens and Brooklyn.

The siting for the landing point, even though most of it's offshore, is International Park. It's the gateway National Recreation Area. This project actually took an act of Congress to move forward, and the process has taken almost seven years.

In-service date, since we're constructing right now, will probably be by the end of the year. Total construction time, maybe seven-eight months. You know, we've been at this a while. So the question I ask here was the seven years required to get this project built, was that

really in the best general interest of the public? Again, I think this is just maybe just a tell-tale sign that we don't have the process quite right.

So what's a typical FERC timeline look like? Just really quickly, the two big -- the green bar there, the orange bar, you can see the average months, and on those little bubbles it shows what the timeline has been for Rockaway and Constitution. So as opposed to seven months, they were 9 and 15 months, and as opposed to 10.7 months in the Seven Sea Island application, we're looking at 16 and 18 months.

At the end of the day, what we need, we need better communication between agencies. We need stronger working relationships between agencies, and we need consequences when the agencies don't meet deadlines. I know the FERC is really burdened right now, because they've got so much more activity than they normally do, and they're trying to proceed in a workman-like manner.

But there's a lot of cooperating

agencies, and there's a lot that's been delegated to the state, and those things really get bogged down. Again as I mentioned, if you miss a window, a key window, one or two months, it delays you a year.

Talking about the Constitution project, this has been a little bigger problem here, and I'll wrap up right here. This is a project to take gas out of northeastern Pennsylvania, up to Iroquois and Tennessee. This project has been attacked, I would say, by narrow interest groups, and also we've been bogged down in the state here.

We've already been delayed one year on this project, and if we don't get cooperation, it could potentially be delayed another year. So again, we need a process that has accountability in the time lines, and it would be nice of there was one lead agency that really had the power to make the other agencies and the states abide by that time line.

So I'm going to finish up right there. Final statement. We got the hard part solved

here. We've got very ample supply. We've got a lot of clean energy markets. We just don't have a practical and efficient process in place to get this infrastructure built. Thank you.

MODERATOR KELLEY: Thank you, Rory. May Va?

MS. LOR: Good afternoon. My name is May Va Lor. I am energy analyst for the Laborers International Union of North America. So let me tell you just briefly a little bit about the Laborers, and why they care about energy infrastructure. The Laborers represent half a million workers, primarily in the construction industry throughout the United States and Canada. Our members have been working on some of the pipelines that have been talked about here.

Our union is the leader is the leader in advocating for more infrastructure investments, from the (inaudible) to the Keystone XL pipeline. Our members construct and maintain nearly type of energy facility, solar facility, as well as nuclear facilities, as well as transmission

pipelines.

Additionally, through our pension plans, we invest in companies and equity funds that directly finance energy infrastructure. Through our labor-management training funds, thousands of members are trained annually in construction jobs in the energy industry. But most importantly, through our local hiring halls, we focus on including and placing local folks for construction jobs in the energy industry.

On behalf of our half a million members and our general president, I want to thank you for giving us the opportunity to participate on this panel, and to offer our thoughts on this important topic. So as many of you know, the construction industry was hit hard by the economic recession in 2010. Unemployment rates in the industry were above 27 percent.

But the one bright spot for our union was energy jobs related to Marcellus shale gas extraction in this region. Infrastructure investment, you know, folks have talked about how

it's unleashed the resource potential of the Marcellus shale. But it also unleashed the labor resource potential in this region. Members got off the bench and back to work, back to the work of supporting their families, feeding their families and paying for their mortgages, etcetera.

From 2010 to 2013, our members worked on -- worked over 15 million hours on building transmission pipelines in this region alone, and in Pennsylvania, we've completed about 900 pipeline jobs since 2011. We're starting now to see comparable growth in Ohio as well. Last year, pipeline hours increased seven times compared to the prior year.

So for our members, energy infrastructure investments are a lifeline to good union jobs, the good pay that supports families, and all the health care and retirement benefits. For many, you know, Secretary Moniz was talking about opportunity ladders, career ladders.

For many, it's been exactly that. It's been a path of harmony. So we've been very

privileged to work with a number of leading energy companies, who value a well-trained local workforce, and who value using local tradesmen and tradeswomen who will spend their earnings here, to boost and support their communities.

So as part of the QER process, we'd ask you to consider a couple of issues that are important to our members. The first is that we don't believe energy infrastructure is a partisan issue. It's expected that everyone wants energy, but no one wants a pipeline in their backyard.

These dynamics make it even more difficult -- I'm sorry, even more important that pipelines and other energy facilities be judged based on their individual merits, using objective, consistent and transparent standards. Recent cross-border permit applications show how uneven the process has become.

That is why we supported House Bill 3301, the North American Energy Infrastructure Act. This bill is not perfect, although it does provide a framework for timely review. We also

believe that cross-border permit applications should increase their focus and have an explicit focus on meaningful job creation, because we believe that supporting American workers and their families is in the nation's best interest.

The second area of interest is identifying opportunities to improve the quality and efficiency of pipeline construction through skilled workforce development. So we know that there is a tightening of skilled labor in the oil and gas industry. But it's important that we not take shortcuts in training.

So we believe that the use of a highly trained local workforce, in conjunction with reputable contractors, is the best way to meet our nation's needs. So our members have built some of the biggest pipelines and most of them are well-trained. So we believe that experience positions us to be effective advocates for skilled workforce development.

So the DOE has the opportunity or the QER has the opportunity to initiate a

collaboration on this issue, and we'd like to be a part of that discussion.

Another area that we'd like sort to be investigated is just greater public disclosure on gathering pipelines. So we believe that, you know, it's true that pipelines are the safest way to transport natural gas and hazardous liquids, and gathering pipelines in themselves carry low risk.

However, there is growing concern about the expense of unregulated gathering pipelines. So some states like North Dakota are exploring novel ways to track construction problems. So it's our belief that greater transparency helps build public confidence, and has the potential to raise construction standards. Therefore, we would encourage the QER to review how greater disclosure could be achieved.

I think I'll just close my comments. I believe I'm running out of time. So in closing, LIUNA members live and work in every corner of the U.S., and we've represented workers in the

construction industry for over 100 years. We've built pipelines for over half a century.

So to us, these are not temporary jobs, but families supporting careers. We are invested in the success of this industry, because domestic energy development supports both working families, in terms of lower energy costs and in terms of jobs. But development must not come at any cost.

So we hope the QER sparks a discussion that improves safety standards for all pipeline workers, increases collaboration on workforce development and training needs, and promotes the overall quality and security of our vital energy assets. Thank you.

MODERATOR KELLEY: Thank you May Va. Chris.

MR. EVANTO: Thanks. Access Midstream operates over 5,600 miles of gathering pipeline, deploying over five billion cubic feet in natural gas per day. We have a significant midstream infrastructure in most active shale plays across the country, including the Burnett, the

Haynesville, the Permian, Eagle Ford, Niobrara and locally here in the Marcellus and the Utica.

Industry has installed significant amounts of pipe and compression, of which Access Midstream has contributed 1,238 miles of pipe, 214,000 horsepower of compression, and 1,192 wells to drive 3.4 billion cubic feet of production per day here in the Appalachian Basin.

Similar to gathering and compression, significant cryogenic processing of fractionation investments have occurred here in the region, of which Access has contributed 700 million cubic feet per day of processing, and 135,000 barrels per day of fractionation. We're a little unique. We are focused on the upstream side of the midstream sector, if you will.

So we depend on interconnectivity through pipeline, rail, storage and other downstream midstream folks such as Williams and Energy Transfer. I can get the gas to market. We do have existing interconnects to interstate and local markets through Kinder Morgan, Dominion

Transmission and Dominion East Ohio.

Some of the new pipeline projects that will give us access to get the product to market are the Energy Transfer's Rover project. We do have a receive point, a plan for that our Leesville cryogenic plant, which is located in Ohio.

Currently, we do have access or excuse me a tap on the Atex ethane pipeline. So we can deliver ethane to market in the Gulf through there. Proposed propane/butane, mixed butane pipelines that are supposed to come on line 2016 and give us access to markets in the south as well.

Long-term constraints that we see, like I said, we're sort of in the upstream part of the midstream business. So some of the constraints or risks to us would be residue gas takeaway. So some of the larger projects that were spoken about for making sure that those projects do come to fruition to give us access to those markets.

NGL takeaway is obviously something that

we're watching as well, whether the pipeline or local consumption. I definitely agree with that Mr. Miller had to say as far as permitting regulations. That can have a huge effect on the amount of capital that we spend, and the amount of time associated with the project.

We've seen permits taking 13 to 18 months to get approved, which again can have significant effects to our ability to serve our customers in the upstream markets. It would be great to have some clear guidance and consistency. You know, we operate in Ohio, West Virginia and Pennsylvania, but even within those states, depending on which district or region you're in, there can be considerable difference in how the local folks interpret the regulations or what they demand in the permitting packages and what-not.

Again, just related to the involvement of, you know, state, local or federal governments, we do have a lot of issue too with Townships that require much more significant, you know, demands when it comes to road crossings, things like that,

going beyond what the state or federal regulations require.

So it would be nice to see some consistency across that band, not necessarily, you know, one way or the other, but just some predictability would be appreciated. That way we can spend the capital as efficiently as possible. Thank you.

MODERATOR KELLEY: Thank you, Kris. Jim.

MR. SULLIVAN: My name is Jim Sullivan, and I'm the chairman of the board of Norwich, Connecticut Public Utilities Commissioners. Norwich, Connecticut is a town of about 42,000 people located in eastern Connecticut, and we operate a four service utility in electric, gas, water and sewer, and we're the only municipal gas company in the state of Connecticut, and one of the very few in New England.

In addition, I serve as the chairman of the board of the Connecticut Municipal Electric Energy Cooperative, which is a consortium of six

municipalities and an Indian tribe that buys energy at the wholesale level and distributes that to our member communities.

I'm here today as a representative of the American Public Gas Association. Our entire organization is at our annual conference in Lake Tahoe, Nevada, and I was the closest one to Pittsburgh, Pennsylvania, so I got this assignment today.

APGA is the national association for publicly-owned natural gas distribution systems. There are currently approximately 1,000 public gas systems located in 37 states. Publicly-owned gas systems are not-for-profit retail distribution entities owned by and accountable to the citizens that they seek to serve.

Public Gas Systems' primary focus is on providing safe, reliable and affordable service to their customers. The APGA represents the homeowners and small businesses that rely on affordable natural gas to heat their homes, cook their meals, power their restaurants, operate

small manufacturing entities and service businesses.

APGA has long maintained that natural gas, and in particular the direct use of natural gas, can play a critical role in meeting our energy needs, reducing greenhouse gas emissions and increasing overall efficiency.

It is APGA's position that national policy should facilitate the use of natural gas instead of other more carbon-intensive fuels where appropriate. For example, using gas-fired water heaters for homes instead of electric resistance water heaters ultimately reduces greenhouse gas emissions by one to two-thirds. Simply put, increasing the direct use of natural gas is the surest, quickest and most cost effective avenue, in our view, to achieve significant reductions in greenhouse gases.

In terms of infrastructure issues, there are two items that I would like to briefly address. The first is the issue of tax exempt financing. The primary way in which municipal

local distribution companies raise capital is by issuing tax exempt municipal bonds. APGA strongly supports the continued tax exempt status of municipal bonds, as they are an efficient, stable and effective means of building new public gas system infrastructure.

However today, we see that some members of Congress, as well as the administration, have proposed altering or eliminating all together the tax-exempt status of these bonds, and APGA adamantly opposes such alteration.

Beyond tax-exempt financing, public gas systems can raise capital by requesting that local officials raise natural gas rates for customers, or requesting that local elected officials raise taxes or cut other services to pay for upgrades, and we think that those alternatives are not acceptable.

The second infrastructure issue is related to just and reasonable rates. Under the Natural Gas Act, the charge for transporting energy across state lines is required to be just

and reasonable.

However, current law does not provide the Federal Energy Regulatory Commission the authority to protect natural gas consumers from paying unjust and unreasonable rates to pipelines, in contrast to the manner in which just and reasonable rates are maintained by FERC under the Federal Power Act for consumers of electricity.

Under current law, if a customer files a complaint at FERC to address excessive rates, and if at the completion of the proceeding the customer has been found to have been charged an unjust and unreasonable rate, FERC can only adjust the rate downwards prospectively.

That is to say, FERC can only change the rates going forward from the completion of the complaint proceeding, and cannot provide refunds to overcharged customers. This lack of refund authority stands in contrast to the standing of electric customers, who do have FERC protection that includes refund authority under the Federal Power Act, Section 206.

If electric customers are found to have been overcharged, FERC can require interstate electric transmission companies to provide a refund back to the date of the filing of the complaint at FERC, known as the refund effective date, as well as the charging of rates prospectively.

This refund authority removes the incentive for interstate electric transmission companies to charge unjust and unreasonable rates, and to delay the complaint proceedings, as delay simply means enhanced refund obligations to customers resulting from rates that are found to be unjust and unreasonable.

This is an important issue for public gas systems, since 95 percent of them are captive to one interstate pipeline. I again thank you for the opportunity to participate in this panel, and look forward to the upcoming conversation.

MODERATOR KELLEY: Thank you, Jim. So with that, let's turn right to our discussion. I just wanted to touch on some of the points that I

heard in your opening comments here. So I've heard quite a few of you mention the need for regulatory improvements, process improvements. But at the same time, I also heard folks talk about safety and security, which is sometimes manifested through regulation.

So do you see that -- do you see those two concepts at odds, and if so, how would you recommend improving the regulatory process? Rory, actually you started this, started us off with that conversation. So why don't you start?

MR. MILLER: Sure, yeah. Well, when you start one of these large infrastructure projects, part of the challenge is to get out with the stakeholders, and there are a lot of stakeholders, and you want to get out early and you want to get out often. Typically, we have a series of open houses, and we're trying to extract out of the community, very much on the front end, what those issues are.

What are the areas that we need to avoid? What are the sensitive areas, and in fact

I loved hearing from Thomas with the Nature Conservancy about some of the tools that they're building, which again I think could be useful. If people are bringing issues forward, either individual concerns or bringing environmental issues forward and they're truly looking for solutions.

That's very productive. Those are things that we want to hear about, and we want to incorporate those into our project, because then we're more likely to get through the process quickly, and that has huge economic benefits, and it means we won't miss another heating season without additional gas in the northeast, for instance.

So that's important. On the safety side though, there's a lot of regulation that governs how we manage physical risk, and we have all of those regulations kind of inculcated in our own internal processes as well. So I don't necessarily put kind of the safety and integrity issues in the same boat with the permitting

process, although it's part of it.

I think that's all synched up fairly well, and we're very knowledgeable about what we need to do and we want to do that, and I could tell you if you're in this business for the long haul, the last thing you want to do is build anything that's not in full compliance and meets the highest safety standards that are out there.

So I really -- I think some of the environmental issues are big issues, and those can be kind of inflection points on a large project. I think there's also a lot of -- maybe for lack of a better term "not in my backyard issues." Those are always big, and I understand those.

But at the end of the day, if you're really targeted something that's for the greater good, it's got to be in somebody's backyard, and so trying to find the least bad path is the exercise, and that can be a bit of a juggling act. So anyway, I'll stop there and let somebody else comment as well.

MODERATOR KELLEY: Shelley, I skipped

you. Did you care to comment?

MS. CORMAN: Well, I agree. I have made some notes along those same lines. I think that there's not really anything wrong with the FERC certificate process. There's a lot of opportunities for early stakeholder participation and for early comments. I think it's really just continuing to focus on how to make those things more productive.

You know, whether it's landowners, whether it's state agencies. The more information the pipeline company has early in the process, the better, the more successful the process, the happier all the stakeholders. So we really need to -- you know, pipelines already have those activities, and we really need to focus on what gets that information brought into the process early.

I do think there's a bias now for people that have an agenda against the infrastructure, to kind of sit back in the weeds and throw zingers into the process later on, and we need to figure

how to really reward the participants, whether it's someone with environmental issues, landowner concerns that come forward early, early when you still have the time to reroute the project early, when you can make accommodations.

The processes, the FERC process requires you to consider alternative routes. That's a more effective part of the process early in the stakeholder, and I think that going forward, this is a more of a concern with social media, with blogs, with other things that create folks that don't want to help have productive infrastructure stakeholder processes.

You know, it's really -- it behooves everyone in the industry to figure out how to give the voice to the folks that meaningfully want to participate.

MODERATOR KELLEY: Thank you.

MR. MILLER: And maybe another comment. One last thing to build on Shelley's comments there, and I mentioned this in my overview. But it's an extremely complex process, and we just --

we absolutely need to have those kind of rules of thumb, kind of the FERC issue some rules of thumb on projects.

When they don't really call the shots, it's hard to keep everybody on that time line. The current time lines that we have, those rules of thumb, those are fine. If people are coming forward early, we can get the right work done within those time frames, and then these projects can get done.

Really, it's an issue of -- from a consumer standpoint, it's an issue of missing heating seasons, and there's been a huge outcry about hey, we need more infrastructure in the Northeast. But we have billions of dollars of projects, not just the one that I showed you here. We've got a long list of projects that we're pursuing, to address those very issues.

But we don't have everybody playing from the same rule book. So I know the FERC has their hands full, but I think that if there's a lead agency that's got rules of thumb, and there's some

accountability for the other parties to live up to the time line, then I think this whole thing works.

Then it's easier -- it's easy to explain, like I just did. It's really hard to implement it. So I'm not saying it's simple but --

MODERATOR KELLEY: Thank you. May Va, did you have a comment?

MS. LOR: Just one. The partnering process that we were talking about and that I was talking about specifically is the cross-border permitting process, and we know that it has taken a very long time. Not as long as Rockaway. I didn't know that that took five years, but we may actually go past, keep them maybe past that time line.

So I think that we think that it just makes sense. It's good, it's prudent (inaudible), it's prudent policy and that it makes sense to (inaudible) when that process is transparent, when it's consistent, when it's equitably applied. So

that's -- we believe that path is one that can be improved, should be improved immediately.

Secondly, I don't think that having a clear process and a transparent process is at odds with safety at all, because the more transparent the process is, the more -- first the more likely you are to have some public, you know, input. You're more likely to build public confidence, and you're more likely to troubleshoot from the issues that you may not have known about prior to permitting.

So and it seems like the pre-filing process and the FERC process has actually helped facilitate that. So we would just urge greater transparency in all sort of permitting and siting applications.

MODERATOR KELLEY: Thank you. Kris.

MR. EVANTO: Yeah. I don't really see a big connect between safety and permitting per se. Safety is our number one concern, but we generally operate in an unregulated sector. I mean our -- I'd say less than four percent of our pipe across

the U.S. is regulated, and as a proven operator in this country we decided that we're going design and construct all of our facilities, you know, to meet DOT standards.

With regards to permitting, again being an unregulated by FERC, jobs are something we deal with. It's more of the state permit, you know, related to (inaudible) sediment control and then, you know, federal permits related to crossings. So you know, again time line commitments would be great for us. Again, it's the unpredictableness behind, you know, when you file, when you're going to get it back that really affects us.

And then just some other things too. You know, when you look at endangered species and there's guidance, but they're not requirements. When those come out in say in the middle of a year, that makes it very difficult to -- you know, we've made commitments for, you know, 2014 and 2015, and then some recommendations come out.

It makes it difficult to, you know, manage those expectations, you know. We want to

do the right thing and follow those. But when they come out, like I said, sort of mid-year recommendations and then you may or may not have to do this towards the end of the year, that uncertainty makes it difficult for us to plan our development.

MODERATOR KELLEY: Thanks Kris. Jim.

MR. SULLIVAN: So you know, no one here wants to sacrifice safety, but you know, as just a little consumer with a little company in New England, and there's been so much conversation here this morning, let me just add a little bit of a fine point to it, and why someone like me wants to see the process sped up with regard to regulation, and whether that's an initiative of the administration, the FERC, the Department of Energy, the Congress, the idea of the polar vortex, and it's been discussed here this morning three times.

It's that date you had up on the slide there, $120 gas. I think that was somewhere between January 21st and January 27th of this

year, and that led to market prices on a megawatt hour for energy in New England were over $400. At some points, they reached $800 a megawatt hour. That same kind of thing happened on July 2nd. Gas was at an elevated level, and energy was about $375 a megawatt hour.

This year, the peak on the Algonquin system in New England was not in January; it was in March, and yet in our little distribution company in Norwich, Connecticut, there were no curtailments that we experienced at any point in those times.

What's being lost there is a whole lot of economic activity, because the adverse economic impact in New England over the last two years has approached $10 billion. You can put a lot of pipe in the ground for $10 billion, and that money is going out the window in terms of increased gas prices and increased electric costs, and none of us can explain it, other than to the extent that we're trying to deliver gas in New England in a garden hose, and we need to speed up the process

to get more infrastructure in the ground.

MODERATOR KELLEY: Thank you. So in the last panel, I asked a similar question. I'll ask this one. Kris, I think you touched on this, that the differences between state, local and federal government regulations and I'm curious to know. Do you have specific recommendations for the federal government here, relative to this particular challenge?

MR. EVANTO: I don't know if it would be a recommendation, I mean just -- you know, just the knowledge or the awareness that it happens, you know. I might, you know, in one county in Ohio, you know, cross 13 or 14 townships, of which each require something different.

A lot of those meetings, you know, they only meet monthly and if not, if that advisor sets something and they cancel. So it may be two or three months before you can even get your opportunity to speak. So again, it's really to me the predictableness of this situation.

MODERATOR KELLEY: So being aware of the

challenges?

MR. EVANTO: Yeah.

MODERATOR KELLEY: Anyone else care to comment about the role of the federal government relative to those disparities in regulation?

(No response.)

MODERATOR KELLEY: No. So I'm curious. In previous QER discussions, we've dealt with the electric grid, and one of the topics relative to security is cybersecurity specifically. I'm curious on the natural gas infrastructure.

Is that something that's being addressed? Do you see it as a challenge, and do you see again a role for the federal government, as it pertains to cybersecurity for the gas infrastructure? Shelley, you want to start us off?

MS. CORMAN: Not my area of expertise, but certainly within our trade association, we have a group of folks that's very focused on cybersecurity, and yes, it is very much a concern in our industry as well. Whether it's our control

system, securing our control systems; whether it's access to our compressor facilities and equipment there, either remotely or even on a physical level.

I mean we face those same challenges and attacks, and know, you know, our pipeline companies across the industry are in communication of the kinds of challenges that they're facing. So yes, it's an area of focus, but I don't have a specific recommendation.

MODERATOR KELLEY: Sure. Rory, any thoughts? I see you nodding.

MR. MILLER: Yeah, I agree with what Shelley said. But I will tell you, that is a deep subject, and if you're not extremely well-versed in the minutiae of it. As Shelley said, and I was at the INGA (ph) board meeting last week, and there was a joint meeting with the NGSA as well, and it was a big topic.

Each of our member companies have got our kind of subject matter expert teams plugged in. We're trying to share across member

companies, and really take the benefits of the lessons learned and spread them around to all of the companies. I know that the attacks come daily, but we've got really good shields and the statistics are a little daunting if you actually start to look at them.

But if you have good defenses, I don't know of any penetrations we've had. But there are a lot of things that are pinging on your system every day, that --

MODERATOR KELLEY: So but do you see the federal government as having a role in some way?

MR. MILLER: I don't know. It seems to me to being address fairly well. Almost related to the last question, what could -- and the last question, what could the federal government or the FERC be doing? Right now there's a lot of focus on the gas day issue, and it seems to be, you know, we've got a little bit of a cold in the Northeast on the gas day issue, and we're going to give penicillin to the entire country.

That's sucking up a lot of time and

resource right now. I don't know that that's going to really drive a huge change for our industry. If you look at something like the permitting issue and siting issues and how do we handle getting gas to people when they need this, this call for more, particularly in the Northeast for more infrastructure, that would be a lot more fruitful thing to be spending the FERC's time on right now.

Some other people would disagree. Maybe some of the ISOs and things think that that's a really important topic, and I know there's some legitimate issues there. But it's a localized issue and we're trying to solve it, I think, with a nationwide answer.

MODERATOR KELLEY: Thank you.

MR. MILLER: Sorry for dodging that question and answering another one.

MODERATOR KELLEY: May Va, did you have any comments on this one?

MS. LOR: Again, I don't have an area of expertise in this particular area. But one thing

that I did want to address is security of existing pipelines, and for those, we know that damage by third parties is the single largest cost of pipelines today. So I think, you know, perhaps there could be more of that, just in terms of public education, in terms of maybe promoting (inaudible), or promoting efforts to ensure that all pipelines, including those that are unregulated, are encouraged to (inaudible) with those services.

So I think that that helps build, again public confidence about the security and safety of pipeline infrastructure.

MODERATOR KELLEY: Thank you. Kris. You're going to pass on this one. Jim.

MR. SULLIVAN: It was my understanding that the Department is engaged in a pretty extensive effort with regard to cybersecurity, and far be it from me to make any suggestions beyond

those that are developed in the process.

MODERATOR KELLEY: Thank you. So we'll go ahead and wrap it up with one last question. Again, I'll use the same ones we used last time. Again, you have the QER task force before you, an opportunity to give one final suggestion, and we'll start back with you again Jim at the end there.

MR. SULLIVAN: Probably some urgency to the effort, at least for those of us in New England. What you're doing is important. I'm amazed at times at the lack of outrage, especially on the part of some of the elected officials that I see throughout my region of the country, because at the end of the day, we can sit here and talk about reliability and safety and good business practice.

There are Americans that need access to cheap energy to fuel their lives, in every component of it, all across this country. We need to figure out a way to deliver this bountiful resource to those people, so that economic

activity in this country is enhanced.

MODERATOR KELLEY: Thank you. Kris.

MR. EVANTO: Yeah, I'll just go back to my original point, you know, the predictability. You know, we're willing to do whatever we have to do to safely build these assets and put in this infrastructure. It would just go a long way if we had some clear guidance on how to go about that.

MODERATOR KELLEY: Thank you. May Va?

MS. LOR: I don't want to sound like a broken record, but I would really encourage the administration to pass and expedite the process of approving of the Keystone XL pipeline, and I think that sends a message to both construction unions and (inaudible) that there is an appetite to build that type of infrastructure.

MODERATOR KELLEY: Thank you. Rory.

MR. MILLER: Well I'm maybe sounding a little bit like a broken record too, but I think from Williams' perspective, we're involved in so much new construction right now, and a lot of the cries is really to get these new pipelines in and

we're trying to do that. Producers are signing up, markets are signing up.

Pipeline companies are stepping forward to build the assets for regulated rates of return, and yet the FERC jurisdictional projects are part of the federal process. But I can't really say that it's totally federally controlled, because parts of it are delegated and I'm sympathetic to the states needing input.

I'm just less sympathetic to maybe a lack of urgency. If you're not that lead agency and there aren't maybe any penalties of some sort. I know there have been several bills brought forward with penalties in them, and there may be instances where a project is so controversial that having hard deadlines and penalties, maybe that doesn't make sense.

But maybe there's a situation where there's a lead agency, and that lead agency, like the FERC, governs schedule. If the other parties aren't abiding by that, then the FERC has a chance to, you know, kind of assume where we're at is

what we got, so we can bring some urgency to the process.

It's very easy if you're just looking at one narrow part of the project, to dig your heels in and say no. Yet, you know, we might have another polar vortex next winter and the one after that. I can guarantee you the result won't be better than it was this year, because the projects, particularly in the areas that are constrained like the Northeast, there's nothing changing right now.

The projects are there. The parties have all stepped forward to underwrite them and to make those commitments. But we've not -- we're not clipping through the regulatory process in a workman-like manner, and the customer is going to be the party that is left holding the bag, and that's basically because the process hasn't done its job.

So I think that's big issue. It's the one that customers are going to notice because their prices are either going to go through the

roof, or heaven forbid, maybe there's even some shortages. We can't get enough supply there. The one thing that we haven't talked too much about today is this huge change in the fueling of -- fuel for power generation.

It was touched on a little bit earlier, but that is a situation that is very much an Atlantic seaboard issue. That's where some of the oldest coal-fired generation plants were, and they are dropping like flies. On the Transco system, for instance, we get calls, one or two a week for new connections, new load.

The mix is changing a lot, and so it's imperative, I think, that we get this process streamlined, that we get control of it. One party has control of it and the rest of the parties feel that urgency to get this done.

Otherwise, we're going to be left with egg on our face, all of us in this industry. So there's -- we've kind of got a weak link there. The hard stuff is already happening. So many countries don't have the luxury of having all the

supply right close to the biggest markets in the country. We have that, and yet we still haven't got the job done, to get consumers what they need.

MODERATOR KELLEY: Thanks Roy. Shelley, you want to wrap us up here?

MS. CORMAN: Yep. I think the focus is on how do we get involvement early in the process, to develop the best pipeline projects, and that can be looking in the QER, looking at things like in some states, pipelines have automatic survey permissions, in some states they don't.

You want a pipeline to do all the pre-investigative work they can, because that's going to allow them to avoid sensitive areas and avoid environmental concerns and so forth. You want to promote involvement. I think that that really gets to a dialogue in the QER of are there statutory time lines necessary? Are there time line commitments by different agencies?

I don't know if that's the right idea. I mean certainly, you know, the FERC's felt like that is actually an impediment. But you've got to

figure out what, if you want the process to move more quickly, how do you engage the people that are willing to roll up their sleeves and work on solutions, and how do you tell the other people if you aren't going to participate early and seriously, then you know, your comments are not going to be weighed as much in the process.

MODERATOR KELLEY: Thank you. So once again a great group of panelists here. Please join me in thanking them.

(Applause.)

MODERATOR KELLEY: Okay. So for those of you here in the stands still, we do have a lunch break. We were originally scheduled for half an hour. We're going to stick to 15 minutes, because we're running a little bit behind. So for the third panelists, if you could be up here in the next 15 minutes, I'd appreciate it. The lunch is provided by the school, by Carnegie-Mellon. So thank you for that, and we'll get started here in 15 to 20 minutes.

Panel 3

MODERATOR KELLEY: Once we will, after this panel discussion, we will turn right to the public comments. So if you haven't already, please sign up at the front to be a public commenter. And for everyone's benefit, we do have a court reporter here today who is transcribing the events. That's how we're capturing the comments.

So every word and comment you make is recorded and the Department does it take it seriously. So I appreciate your understanding, and if you're joining us by live streaming, please make sure you send in your comments to qercomments@hq.doe.gov. So we have our forum here. It looks like the gang's all here.

MP One down.

MODERATOR KELLEY: Oh, we're one down?

MP Yeah.

(Pause.)

MODERATOR KELLEY: I'll tell you. In the interest of time, why don't we go ahead and get started, and if we need to do a separate

introduction we can. Again, must a reminder that the views expressed the panelists that are joying me here are their own views and not the views of the Department of Energy.

So our third panel, the subject is "How Public-Private Partnerships Can Produce Sustainable Economic Development Out To 2030 and Beyond." Joining me here are David Peebles, Vice President of ASCENT and Senior Director, the Odebrecht Group; Tom Conway, International Vice President, United Steelworkers; Dr. Andrew Gellman, Lord Professor of Chemical Engineering and Co-Director, W.E. Scott Institute for Energy Innovation, Carnegie-Mellon University; and is it Jeff that we're missing?

And Jo Sexton, Director of the Cambridge, Ohio Area of Chamber of Commerce, and Jeff Herholdt, Director of West Virginia Division of Energy. So we'll go ahead and get started right here with David Peebles. Mr. Peebles.

MR. PEEBLES: Good afternoon. In the interest of time, I'll be very brief and I think

what I would like to bring out and I'll repeat it four times is the ethane value chain, ethane value chain, ethane value chain.

We have been talking a lot about shale and gas, and we pointed out that one of the elements called C2 that is found in the area of the Marcellus is ethane. Ethane is the feedstock for the plastic industry, and when we think about the impact on the economy and the impact on what we call the manufacturing renaissance, ethane is going to be an essential part of that.

The ethane value chain, as you go downstream, in this region of Ohio, Pennsylvania, Indiana, West Virginia, we have 60 percent of our nation's downstream manufacturers of plastic products, whether they be diapers, medical devices, plastic bottles, etcetera.

So we see a very important element here in the value chain as infrastructure, and why is that? Everyone previously has shown maps of pipelines. They are the circulatory system of the United States energy system. But many of the

pipelines that you look at are more superhighway pipelines, that are delivering product to the Gulf, delivering product to the east coast, delivering product to Canada.

In the area of ethane pipelines, we have the same phenomenon taking place, where some of the ethane pipelines are delivering product to the Gulf, delivering it to Canada and delivering it to the east coast for export. If we are to have a regional renaissance, if we are to have a strengthening of the manufacturing capabilities here in this area, we need what I call off ramps.

If we built the interstate highway from Boston or Washington or New York to California and had no off ramps, we would not have a developed country. So we need to think in terms of our infrastructure priorities, and I'm not sure that this can be managed or directed by the federal government.

But we do need to have attention to the ethane pipeline situation, where we have de-ethanizers who are able to deliver within the

region. Where do they deliver their ethane to? They deliver it to crackers. Crackers are very important. They are the thing that transfer the ethane into ethylene and to polyethylene, which would be the feedstock for these industries.

From a policy point of view, this is certainly a challenge, and I think it is a challenge from what we call a public and private cooperation. We have had extraordinary cooperation from the states of West Virginia in our projects. We are building a stronger understanding among the downstream stakeholders in Ohio and Pennsylvania, as to the potential of crackers, whether they be built in Ohio or in Pennsylvania or in West Virginia.

But if we do not have an understanding of the need for the off ramps or the need for the local infrastructure or regional infrastructure and not just manage, whether it's through a regulatory point of view or through best practices, the ability to have delivery into the region, we're going to miss a big manufacturing

opportunity.

I personally am very optimistic. I was reflecting today on the role of the federal government in policy initiatives, and I'm sure everyone has a list of the top 15 or top 10 or the top 5. But I would certainly start with the Bill of Rights. I would start next with the Louisiana Purchase. I would think about the Homestead Act, I would think about the Morrill Act that created land grant colleges.

I would think about the Intercontinental railroad and certainly the Emancipation Proclamation. These last four were all under the Lincoln administration. I would jump forward to the Wagner Act of Roosevelt, which allowed the labor unions to really interface with private sector and come to consensus on labor practices.

I would look at the GI Bill of Rights, I would look at certainly the Marshall Plan. I would look at Eisenhower's interstate highway system, which was done under the National Defense Act. I would certainly put in the NASA program

and the civil rights legislation of the Johnson administration.

I would put in the EPA of Nixon and I would put in the NAFTA of the -- I don't remember whether it was the Carter or Clinton administration. All of these were significant events in our nation's history, and they were a result of policy initiatives by the federal government.

If you look at the Intercontinental railroad, many people thought it talk about railroad barons who put this through and grabbed land and just built however they wanted. But that foundation was laid by the Corps of Engineers and a lot of topographical studies and route alignment studies.

I think what we can hope for from the Department of Energy would be, as one of our panelists said here before, this fact-based approach to all of this. We do have, to create consensus among public and private stakeholders, we have to have dialogue. We have to have some

level of consensus, and if we don't get into the fact-based world, we simply remain in rigid positions.

So again, our point of view for regional development, and I think of the Midwest, and it's God's gift to -- Napoleon gave to the nation, because of his war-like need for money. He sold us at a very low price the whole Louisiana Purchase, which if you reflect on it, it's from the Rockies really to the Appalachians was French territory at one time.

We had inherited -- that's where our shale plays are, and hopefully we can optimize this resource that we have before us. Again, if we think about in the particular case that I'm advocating some attention, is the ethane value chain. Thank you.

MODERATOR KELLEY: Thank you. Tom.

MR. CONWAY: Well David, I had never thought of Napoleon as the father of the shale gas revolution. Let me tell you a little bit about steelworkers, and then I want to talk about just

really two issues. We're the largest manufacturing union in the country, and our focus is not just in steel.

It's a name we've kept through a series of mergers, and so we've merged with the old oil, chemical and atomic workers and we represent workers in all the refineries around the country, do all the pipeline work, a lot of pipeline work.

We represent the workforce at companies like TMK, who was on the earlier panel, as well as pipe companies across the country. We have the metals and the mining industries, glass, aluminum and it's a broad spectrum that we sort of look across, and spend a lot of time on trade issues.

They're difficult issues, they're difficult particularly in terms of energy issues, and the trade things that we're faced with. This morning you heard Congressman Murphy and again the panelist from TMK talk about this issue of the pipe, and the controversy that's sort of currently going on. But there's a bit of a longer back story to it, and I think it's important for the

QER and actually a lot of people understand how this story comes together, and how much opportunity the U.S. is missing, because we have not coupled up our energy policy and our trade policies and a lot of other policies.

And particularly in trade, you can have Department of Commerce, Department of Energy, Transportation, all off doing something, but trade sort of sits out on the side, and no one pulls it together and links it in with what's going on. If you're going to have a comprehensive energy policy in America, you ought to know where your products are coming from.

Frankly right now, the U.S. isn't very smart about where it's coming from, or we're always playing catch up. So when the shale play first takes off, and in 2007-2008, that period of time, even given the depths of that recession, the Chinese step into the energy market in the form of pipes, what you heard referred to this morning as oil country tubular goods.

That's really just a bunch of pipes,

large diameter, small diameter, pipe transmission, gas and oil transmission, down hole piping, and they flooded the market with it and caused thousands and thousands of layoffs in America, and the shutdown of pipe mills from Texas to Pennsylvania.

Americans are out of work, and the pipe that's coming in and not all exclusively China, but largely China and in particular China, because where they reached agreements with the U.S. to join their WTO and ascend into a partnership, a trade partnership, they continually cheat at it, and they've dumped their product.

They dumped their product at a cost that's cheaper than it takes them to make it, just to gain the market share, to gain a toehold. So we are forced to go into the courts, file petitions, go through the Department of Commerce, go through the International Trade Commission, finally prove our case, that China is cheating, and tariffs are put on the Chinese pipes.

It sounds quite protectionist, but

you've got to remember, they're cheating. That's not what they said they would do, and they go off and do it and they capture a big portion of the market, and cause a lot of pain to a lot of Americans, and particularly to a lot of companies who have invested billions of dollars to prepare for the shale plays, and now the market's gone on that.

So as soon as the tariffs go in place, so do the Chinese and their pipes, and within a year, it pops up again in Korea. So now in the last year, Korea has flooded the market. No one in Korea is using one inch of oil country tubular goods to drill in that country. But they have put up mills solely for export base.

So into this energy market now come all these Korean pipes, and the week before last Friday, we finally got a determination out of the Department of Commerce that has a range of tariffs on it, from 10 to 16 percent. Sixteen percent is real money when you're in business, trying to supply equipment to an industry like this one.

So it will go through another process. But from the time that -- I mean here's sort of the tricks that happened. We filed that case in February, and until the determination a week and a half ago, this market got flooded with pipe, because they knew the determination would be coming.

So you have to sort of unload your pipe and get it into the market and get it into warehouses and get it into inventory here in the U.S. So now the inventory ledge, the overhang, will take a long time to burn off.

We see this happen a lot in energy policy. We saw it happen in the early days of the wind industry, where the U.S. wasn't prepared to do much other than stand up and erect wind farms. It didn't really have the capacity to build the supply chain and build out the infrastructure to build the equipment.

We saw it in solar, and it took a long, long time for the U.S. to sort of bring itself up to speed, to have a structure in place, to really

add value into jobs and communities with strong manufacturing bases, and instead -- and so we're here to sort of urge the QER that you've got to find a way to couple these various entities together, the Office of the USTR, some sort of policy on manufacturing supply chain, particularly on public-private partnerships that are going to go together in --

Where U.S. taxpayer dollars are going into projects, and Americans are losing their jobs because America's trade laws aren't being enforced, really just seems so counterproductive and just so wrong at so many levels.

So the other only topic I'd comment on while we're here is we hear a lot of discussion, we've heard a lot today about the growth of the potential for export of LNG, and we understand that, and we understand the delta between the prices, between what can be gained in other parts of the world and what natural gas is trading at here.

But you also heard the Secretary say

that there's a potential $200 billion growth in manufacturing as a result of the work that's going on here, and that liquid natural gas export in a way is our resource. Under our current rules, under our current laws, we are compelled where we've reached a free trade agreement with another nation, to export that LNG.

There's nothing new about that. That's been on the books forever. Our union is not so sure it's a great idea, at this point in time, to expand that export potential and ship that resource that we now have a comparative advantage off to other countries, so they can make something and ship it back here. We think that needs to be a thoughtful discussion.

MODERATOR KELLEY: Thanks, Tom. Andrew.

DR. GELLMAN: Let me follow up a little bit on certainly what David Peebles talked about, and that is the value of ethane and the wet components that are in natural gas.

So let me start by sort of going back a little bit and figuring out how did we get here,

and pointing out that the reason that we're here today is because 20 or 30 years ago, a lot of people who were very visionary and decided to invest their careers and their time into the development of technologies that allowed us now to reap the reward of shale gas.

So these are the people who believed the fractionating could be used to get or extract methane and natural gas out of shale, people who developed horizontal drilling that allow us to access it. So those people were visionaries; they took risks. We have to do something the same.

We have to be visionary, we have to think long term. We have to be willing to take risks, and ultimately in order to reap the greatest benefit of this natural resource.

So what is the path forward that might lead to that? I think, as clearly my colleagues here do, that the use of the wet components in natural gas as the basis of natural gas-based chemical industry is one of the methods or pathways that will lead most probably to the

greatest reward to U.S. society.

Natural gas, the wet components, can be used to make plastics, rubbers, textiles, fuels, solvents, all the things on which our modern day life depend. They all have far more value than natural gas. So we're in this enviable position of deciding what to do with natural gas. We can burn it to make heat and electricity; we can sell it to make money, or we can think long term and try to use it to make chemicals.

The way this works is that the ethane and the propane that are in the natural gas, especially the natural gas that's here in the Marcellus shale field, are quite plentiful and they have much higher value than the methane itself. You can take ethane and propane and convert them to ethylene and propylene, and those are the feedstocks for the chemical industry today.

The conversion process is cracking. It's well-known, the technology exists, it's practiced all across the planet, and we could

practice it here. Extract natural gas clearly is creating jobs in the U.S. already.

Converting the wet components to chemical feedstocks will create even more jobs. Taking those feedstocks, using them to create chemicals will create even more jobs, and in allowing the U.S. manufacturing industry access to cheap energy and cheap locally-produced chemicals and materials is a win for everybody.

So what are the infrastructure needs? So they're clearly quite different from the infrastructure needs that have been talked about so far. The upstream and the midstream infrastructure needs have been covered. The infrastructure needs for a downstream processing of wet components of natural gas really begin with the crackers, that have been discussed already.

As I mentioned, the technology exists. The problem is they're big, they're expensive. IN order to facilitate their creation in the U.S., maybe in this region, we need industry partnerships with the government or with the

public sector in general, to incentivize the building of crackers here.

Once that's done, the rest of it is almost easy by comparison. What is the path to the long-term benefit? Well, it's quite clear that we could seize the opportunity to use natural gas as much more than just a cheap source of energy. What we need to do is to recognize that shale gas exists around the world. Wet shale gas exists around the world.

We have competition. We're in a position where technology and methodology developed in the U.S. put us in this enviable position of having options. We need to recognize, such as was just mentioned, and we need to be the first to market with these technologies that improve natural gas processing to produce chemicals.

But then in the long term, we always need to stay ahead of the market, and that requires technology development. It requires research into developing improved processes for

natural gas conversion, through use of state-of-the-art modeling and optimization, process optimization methods.

As I mentioned, ethane and propane are easy to work with. Methane by comparison is a tougher nut to crack and we need to figure out how to do it. It can be done, but not efficiently.

Finally, we need to invest in research, not just into the economic processes or the ways of making money, but into state-of-the-art environmental monitoring, processes and methods for minimizing human health impacts of natural gas and all the processes that are incumbent or that arise from it.

Ultimately, though, this resource can be used to underpin the renaissance in manufacturing in the United States.

MODERATOR KELLEY: Thank you, Andrew. Jeff.

MR. HERHOLDT: Good afternoon. I'm Jeff Herholdt, Director of the West Virginia Division of Energy. We're part of the West Virginia

Department of Commerce, and these are comments related to the partnership theme.

West Virginia is an energy state with a population of just 1.8 million. We contribute significantly to our nation's energy needs. We are number two in coal production, number four in net electricity exports, and are number ten in natural gas production. When we speak of electricity, the state of West Virginia exports 60 percent of the electricity we generate.

We're also, interestingly enough, number three in forest cover behind Maine and New Hampshire. For more than 80 years, the world's leading chemical companies have focused on West Virginia. The West Virginia chemical industry directly employs 10,000 individuals, our largest manufacturing sector.

Only the coal industry, with 17,000 employees, is responsible for more jobs in the state. With 8.2 billion in annual sales and $714 million in local wages, the value of the chemical sector to West Virginia's economy is easily

appreciated.

With the liquids-rich shale content of West Virginia's Marcellus and Utica shale plays, West Virginia is returning to its chemical industry roots. The first commercial ethylene plant was established in Clendenin, West Virginia in 1920. This has been regarded as the start of the petrochemical industry. The production that several ethylene-based chemicals was begun by Union Carbide in South Charleston in 1923.

This industry, under Union Carbide's leadership, fostered a world class technology park in South Charleston, West Virginia. After Union Carbide's merger with Dow, the technology park was discontinued. With the support of the principal researchers at the park and state government MATRIC, the Mid-Atlantic Technology, Research and Innovation Center was formed.

MATRIC was established to preserve the science and engineering talent recruited to the Charleston area by the chemical industry. Another industry-government partnership is the Chemical

Alliance Zone or CAZ. CAZ was created in 1999 to channel and leverage efforts to strengthen West Virginia's chemical industry.

CAZ is a non-profit collaborative of citizens, labor leaders, educators, government officials and chemical industry executives and business leaders.

A third business-government partnership focused on the chemical and related sectors is the Polymer Alliance Zone. PAZ was created in 1996 to recognize and advance the polymer-based industries located in West Virginia. This industry association was established by the state of West Virginia through executive order.

The multi-county recognized as the Polymer Alliance Zone has one of the highest concentrations of polymer production in the world. Considering our history, expertise and established partnerships, the liquids-rich shale development in West Virginia was quickly recognized as a tremendous job and value-added opportunity.

Government Earl Ray Tomblin and the West

Virginia Development Office launched a concerted effort to attract ethane cracker plants to West Virginia. West Virginia has received multiple responses from our recruitment efforts. The progress that has advanced the furthest is a tentative commitment from Odebrecht, on our panel here today, to build a petrochemical complex in Wood County.

This complex would consist of an ethane cracker, three polyethylene plants and associated infrastructure for water treatment and energy co-generation. This project is term ASCENT, Appalachian Shale Cracker Enterprise. Though Odebrecht has not formally committed to the project, they have purchased a property for the site and are receiving ethane supply commitments.

In economic development, the public-private partnership that is most important is the partnership between the host state and the corporation that selects it. We are committed to walking the mile in their shoes to understand the requirements of businesses wanting to locate in

West Virginia.

Projects as large as those being discussed here today are complex. They have a lot of moving parts. Are issues are resolved, we move closer to a former project announcement. Shell's Appalachian cracker project in Pennsylvania and West Virginia's ASCENT project represent departures from the traditional ethane clean government projects.

Since the early days of Union Carbide's presence in ethylene, our regional ethylene market has migrated to the Gulf Coast. The employment and value-added benefits of polyethylene production accrue at the southern end of the pipeline. The unprecedented production levels of natural gas and associated natural gas liquids from our regional shared sources want valuated economic development in our backyard.

Diversifying the location of the polyethylene industry will benefit more local economies, and make the U.S. chemical industry more resilient. West Virginia has committed to

Odebrecht to assist with ASCENT as needed. With the recent declines in our nation's manufacturing sector, and opportunity to add significantly to West Virginia's workforce is treated as the highest priority.

Adding increased value to West Virginia's natural gas production is also a driving force to make this project happen. America needs good jobs and a secure energy future. Economic development fostered through fossil energy resources is not replicable in all states.

But the states that are gathered here today can capitalize on fossil energy resources within their borders for the benefit of the local economy and our nation as a whole. Thank you.

MODERATOR KELLEY: Thank you, Jeff. Jo?

MS. SEXTON: Good morning or good afternoon, and thanks for inviting me. I'd like to give more of a micro perspective from Cambridge, Ohio in Guernsey County. I'm glad to see West Virginia's here and now we've got Ohio.

I'm the director of the Chamber of Commerce in our county, 40,000 people. Our town has about 11,000 and for the last three years we have been working diligently to embrace the gas and oil industry, and I'd like to tell you a little bit about how we've done that.

We are in the Utica. We have some Marcellus there, but we're primarily Utica, and we have a pickle shape of the Utica in southeastern Ohio. So we say we're in the pickle, and we have many counties who are -- that are involved in the Utica and have well over 100 wells permitted, and the background of our area is really glass production, which was brought there to produce glass with the coal-fired ovens.

The first thing we did when we learned three years ago what was coming our way was work very closely with Williamsport, Pennsylvania and some people involved in the industry there, both on the Chamber of Commerce and in local companies, to learn really what was going to happen and how we were going to be able to deal with it.

So we spent a lot of time, per their request or per their advice, educating ourselves. So we formed a Guernsey County energy coalition, and within about six months we had 200, over 200 members. We have met every month for three years, and I bring in speakers on the industry, who really instruct and advise and educate our chamber members on the gas and oil industry and with different components of it.

We held some conventions in Cambridge, some seminars, and really spent a lot of time on the educational component. We felt that that was really valuable for our Chamber members to be a part of, and they are the only ones that attend these meetings.

However, we've partnered with our local media, and the local media records every one of these sessions, and plays them on local television for the general public. We think has had a huge impact in our county, because we know that in order to make this successful for our economy, we need to embrace the industry and understand it and

have a deeper knowledge of it.

And so we feel that it has reduced the controversies that sometimes come with it. It's helped everybody understand how the industry works and how we can make the best out of it.

We also have partnered with the media, and they present some gas and oil publications, some articles in the paper which educate also. One of the most recent things that has been huge for us is the Ohio State University extension has contacted our county, and we have about 40 people who are working on a long-range plan.

We've been through enough booms and busts in our country, that we want to make sure that we have long-term sustainable growth with this industry. So the extension has offered put a template together using our people, that they can then go sell and promote in other counties and communities around the country.

So we are in the midst of putting that long-range plan together right now, and we have all the key leaders in the community working on

this. We think that this is the right way to go, and we can leave a template for how other shale plays in other communities handle the shale plays in their areas.

We think the biggest component of this is education, and we feel like we've really learned a lot about the industry, and we've seen a lot of growth and partnerships because of that. We have partners with local colleges and universities also, to develop workforce development.

MODERATOR KELLEY: Thank you. So once again, let's turn to our discussion here for the panel. My first question, I've heard some conversation about the crackers and the technology there. But there's been little investment in crackers, because using the local feedstocks from the Marcellus shale. It's sent down to the Gulf for processing.

Can you talk a little bit about the market influences locally here or nationally that could affect this and expand maybe a little bit

upon the role of the federal government in influencing the market, in a way that might make this a little bit more efficient.

MR. PEEBLES: Well, the market is influenced by strategic decision, and I want to go back to the fact-based issue. If you look at a lot of national studies from Wall Street, there's a Gulf-based prejudice. They have a bias. We're talking about the infrastructure in place, the labor situation. They say there's no skilled labor here in the Northeast. They say there's no infrastructure.

Now this influences in a very subtle way banking and investment decisions. So but from a positive point of view, if we look at what the shale revolution has done here, we ourselves are investing in a cracker in Mexico. There will be a first wave of crackers coming in 2015 and 2016. The most modern facility will be ours in Mexico. A modernization strategy in the Gulf by four or five of the majors will bring on the first product wave of ethane-based polyethylene and

polypropylene.

The second wave is going to come from those that are now investing in crackers, in new crackers in the Gulf, and hopefully here we have two or three groups looking at it. Now what do you have to do? You have to look at the market and say where, this is a long-term asset play. This is 40 years, this is 50 years.

So you have to look at supply, you have to look at reserve capability. You have to look at market, and that's where I get back to the market. The Department of Energy here can help a lot by fostering research.

We have an enormous talent base here in Ohio and Pennsylvania and West Virginia, and our national labs and our universities, and we have to somehow or another coordinate and focus this talent base on the R&D necessary, that will lead our product developers in the industry to say hey, what can I expect? What are the new formulas? What are the new methodologies that I can put to practice in an applied way, and this gets back to

extension and education.

So if we're going to take advantage of this market opportunity, I think we need clear information about the assets we have here. There are people in the industry who claim that we do not have asset reserves sufficient to maintain a cracker and a commitment for 20 or 30 years. What they do is they pull out a well profile and say that a production profile is like this, and then it tails off, and they don't count the tail. They just count the hump.

When you look at the new technologies of horizontal and vertical drilling, and you look at all the maps you saw today of where things are being drilled. We are confident that there are reserve levels sufficient. But that's not the national information being cultivated and promulgated within some of your research groups.

Now are they prejudiced? Maybe. Or are they ignorant? Maybe. Or have they just not broken out and delved into the particularities in this area? You should go to some of the

conferences in the Gulf, and they will tell you there's a labor situation, you can't build.

When we do our own analyses here in the Northeast, we probably have a better skilled labor force than the Gulf. We are building in the Gulf. We have to retail recruitment. Here, we work with unions and we say we want 40 welders, you get 40 welders. They're drug-free. They've been processed, and so the message that I would say in regard to the cracker is the cracker is going to come.

The investment decision is going to come from good information about your resources, good information about your labor force, good and solid information about the research and R&D that you have available, and let's try to focus and foster what we call a cluster development.

We do not want to develop this asset, the same way we've done in the past, of an extractive model. We have to develop a downstream. That's why I went back to the ethane value chain. We have to develop and maximize and

optimize what we have here for the benefit of the people in this region, not somewhere else.

MODERATOR KELLEY: Thank you, David. Tom, any comments?

MR. CONWAY: I know that it's good to have a drug-free welder. Look, I think --

MR. PEEBLES: My friend in the Gulf, we hire ten people, and we lose four because they can't pass the drug test. It's big deal. It's a big deal.

MR. CONWAY: No, I'm making light of it. I'm serious. It's good to have a drug-free welder. Look, I think this is exactly the issue we face. We had a problem here in Pennsylvania two years ago. We had a major refinery in Philadelphia going down, and everybody had concluded it's a lost cause. It's just going away.

We were able to get a good partnership together between the administration, the governor here, a private equity group and the refinery owner who was sort of working hard to find a way

to step back, and we've got a plan to bring Bakken into that refinery and it's running fine now.

It's doing good, and I think the next step there can be how do we take care -- take advantage of sitting on top of this shale play and doing more in that refinery, and all the discussions up here with Shell and the cracker up here in this region too. That was a skilled worker facility that went down, that is under discussion of where it's going.

So it's incremental. All the discussion about is the resource here, not in -- you can read it both ways all the time. But I think step by step and successes, we've done are successes, and a refinery we did on the east coast has done it. Really a grand one for Pennsylvania and I think they'll be more.

MODERATOR KELLEY: Thank you, Tom. Andrew, any comments?

DR. GELLMAN: Well perhaps to rephrase a little bit what David said. I would look at it as an infrastructure problem. So to create the

chemical industry here requires not just crackers but all the other infrastructure, and infrastructure action includes people.

So it's people and it's consumers of the ethylene produced by crackers. It's the entire value chain. The other point I guess that needs to be said or should be said is that whereas this morning we heard people imply that they didn't like the regional solutions to their problems, this one requires a regional solution.

So it really does require local states and municipalities to get behind this whole development project, and you know it's the case that on the Gulf Coast, you have most of this infrastructure. But you have to make a case for reinvesting and reproducing that infrastructure in this region.

MODERATOR KELLEY: Thank you. Jeff.

MR. HERHOLDT: I think probably the most important thing the federal government can do with these kind of developments is just let it happen. We saw with the Supreme Court ruling on the

Tailoring Act. I mean we were unable to back away from a requirement that our major industries have some kind of a CO2 limit.

We need to be appreciative of the relevance of major economic developments in our economy. We need to husband those assets, you know, to be kind of frivolous about where our energy comes from is not in the long -- it's not in the best interest of the economy of our country.

MODERATOR KELLEY: Thank you. Jo.

MS. SEXTON: I'm going to take the opportunity to talk about drug-free welders, because I can't address the other issues to that extent. But one of the partnerships that's been very valuable for us locally in southeastern Ohio is a partnership between Pioneer Pipe and a local career and technology center, and some other things that are going on.

We like the idea of getting people excited, getting the youth excited about manufacturing again, and that many youth think

that manufacturing is dirty, all greasy, dark, dingy places to work. We realized that that's not the case.

So we're trying to, and understanding the drug challenges and actually the challenge of a lot of young people who don't want to work very hard, and trying to get them into the gas and oil industry, and understanding that they're going to have to work hard.

Trying to start a little earlier, like in the junior high school level, getting them into manufacturing firms, getting them exposed to those areas and how much fun it can be to be in manufacturing, getting them exposed to the idea that they can't be on drugs and that they're going to have to work hard, and try to instill that work ethic in them early, so that when they get to the point of being able to have one of these well-paying wonderful careers, that they're ready for it. So I just wanted to add that component.

MODERATOR KELLEY: Thank you, Jo. So thinking back to your original opening comments, I

was intrigued and wondered if maybe you guys were in cahoots a bit, because I heard a history lesson, and then I heard that turned into an opportunity for us to be visionary in the future.

We heard about some of the technology that's needed, but my question is is there a role for the U.S. federal government or other public-private partnerships? I mean you've touched on that a bit, but on specific future technologies, beyond what we've heard so far, if you recall the panel really is focused on economic, sustainable economic development out to 2030 and beyond.

So can you maybe expand a little bit on that, technologies that could help us expand economic development?

MR. PEEBLES: Well, if we look at the polymer industry, and that's a big word but it's basically plastic, in that it infuses all of our life from medical devices to diapers to automobile parts, and there's all sorts of new material combinations. I would really put the focus on R&D. The federal government can help in R&D.

If we optimize our existing institutions, and we give them incentives to collaborate, we have extraordinary -- this complex we're in now. If you go over into Ohio, the Case Western Reserve, the Ohio State University, Battelle, some of the things that were mentioned that were happening in West Virginia.

We need to optimize this, and I think you as a federal government representative in the Department of Energy, you hand out grants. You hand out research. If we focus this on a regional basis, and focus it on the polymer industry, I think that would be an extraordinary facilitator for the manufacturers that are in place now, and some of whom don't know what could be.

They need to be in an extension model. I'm not talking about basic research necessarily. I'm talking about applied technologies, where they are shown and helped. We have -- we have a young gentleman here. We have an R&D facility here in Pittsburgh, where we bring a client in and we say let's prototype what it is you think you could do

and what is your market.

Now let me give you an example. Everybody goes to Starbucks now. You grab that cup of coffee and your hands get hot, and then somebody goes and sues Starbucks. So now they put that brown cover on it. Now why are they putting two pieces together? What we're trying to do is to do a research that would give the thermal capabilities of a cup, so that you wouldn't need to add on. So that's an economy of materials.

So there's a lot of things in R&D. I'm not going to get into the list, but if you prioritize the polymer industry in this region and you optimize the assets you have in place, and you start to sprinkle around research that is relevant to these areas and begin inter-institutional collaboration, we'll have a great deal of payoff.

We as the manufacturer and those in the downstream will benefit. We need to create a market here. The market that we have now, what we're selling to the advantages is a logistic advantage. We're selling the fact that we can get

ethane without shipping it to the Gulf, the fact that we can deliver it to the market without bringing it back from the Gulf.

But the big advantage, the big advantage is going to be on the new products. If we can take some of the things that will be developed and take them out to the field, and show the manufacturers, they may -- we can say hey, we're going to charge you five cents more, but you're going to make 50 cents more.

This all has an R&D basis, and it all has an extension approach to the dissemination of knowledge. We have to have both.

MODERATOR KELLEY: Thank you, David. Tom, any comments?

MR. CONWAY: Yeah, look. I would agree with David. I think predominantly research and development is driven -- in the U.S. is driven by the manufacturing sector, and that innovation, that development is crucial to everything we've done. The problem with it from our perspective many times is that it leads.

So you know, we can all pull one of these out of our pocket. This technology was all developed here. There's very few jobs in the U.S. as a result of this telecommunication boom, and you know, you can say well, it's small tedious work. We don't want to do it. That's nonsense. We have a lot of people who would be happy to make this glass, making these products, assembling these things.

So if we're going to incentivize an industry to make something, we shouldn't let them then put it on the boat and ship it somewhere else to send back to us. I think we miss those principles a lot.

MODERATOR KELLEY: Thank you. Andrew?

DR. GELLMAN: So I would, as an academic, agree with research being an important component of what we need to do. But maybe go above and beyond that, and maybe address Tom's point a little bit. You have to do research and you have to convert it into products and get it into the marketplace faster than the other guy.

Sooner or later the other guy will -- everybody catches up, right? So you need better technology. It's probably derived from R&D programs somehow, and then you need better mechanisms to translate that into products and market value.

MODERATOR KELLEY: Thank you. Jeff.

MR. HERHOLDT: Sure. There is a research consortium, I guess Carnegie-Mellon, Pitt, West Virginia, Penn State, others, excuse me; I don't know them all. But that seems like that group could be a good way to put this research agenda into play. I mean certainly, the whole issue of what West Virginia had with the Marcellus, with the Utica, how to make more jobs out of that.

It's a stepping stone and it sounds like it could be a stepping stone to those jobs. It's more research associated with the production of materials from the wet gas constituent, and certainly that seems like a logical way to go.

MODERATOR KELLEY: Thank you, Jo.

MS. SEXTON: Really, I don't think we can underestimate the value of visionaries. We have a visionary in our area, Dr. Paul Brown at Zane State College. He really has driven a lot of the vision in the things that we're doing in southeastern Ohio.

Dr. Brown is envisioning a technology corridor in Appalachia to take Appalachia from poor Appalachia to progressive Appalachia, and he talks about this technology core or corridor being very similar to what Research Triangle Park is down in North Carolina.

So his vision really kind of inspires a lot of us to look at some innovative ways to get people involved in the industry. One of the things they've done at their Cambridge Campus that they just built, completed this past year, they have a land lot there where they actually put a well on it and they drilled and got a pump jack out there now, and they're really doing some innovative things.

I think there's a lot that can be done

locally. It doesn't always have to be done on a large scale nationally or federally. But local visionaries can really change the landscape a lot for the workforce development and economic development.

MODERATOR KELLEY: Thank you. So for the last question, we'll stay with you Jo. Again, just like with the other panels. You have the QER Task Force here. They're anxious to hear what you have to say. What's your one suggestion, recommendation to this group?

MS. SEXTON: Well, I think providing the funding and helping with grants and that type of thing for allowing the visionaries to do what they want to do locally would be the biggest request we would have.

MODERATOR KELLEY: Thank you. Jeff.

MR. HERHOLDT: Yeah. I think we need to really be serious with this all of the above discussion of our energy resources. I mean without caveats, I mean we are a nation rich in energy resources. We are a nation that's short on

jobs, you know. We could certainly use our energy resources to stimulate a more engaging economy for our nation's populace. Thank you.

MODERATOR KELLEY: Andrew.

DR. GELLMAN: I think I would say that, and it's been mentioned a few times here before, but public education is key to allowing many aspects of the opportunity that we have to evolve as smoothly as possible, to make sure that the public has a solid understanding of the realities around developing industries based on natural gas.

MODERATOR KELLEY: Thank you. Tom.

MR. CONWAY: Just that as you're developing energy policy going forward, you find a more collaborative, closer way to coordinate with both ITA, USTR and other agencies and departments who impact this tremendously.

MODERATOR KELLEY: Thank you. David, final comments?

MR. PEEBLES: Focus on R&D opportunities in the ethane value chain, to create a cluster of economic development in this region.

MODERATOR KELLEY: Very succinct. Thank you. So with that, please join me in thanking this panel. Thank you very much.

(Applause.)

Public Comment

MODERATOR KELLEY: So now we're going to turn to our Public Comments portion. So just give us a moment to get set up.

(Pause.)

MODERATOR KELLEY: For those that are speaking, I'm going to call you in the order in which you signed up. You do have five minutes, up to five minutes. Please do hold your comments to five minutes, and I ask that you join us via the microphones that are here in the aisle. So just step up to the microphone, provide your name, and then make your comments.

If you do have a written comment that you'd like to submit in conjunction with your comments, we'll be collecting those as well up at the entrance to the auditorium, and those will be included in the record.

So just like the speakers here today, you get the benefit of our little color light system. So you'll see it turn red when your five minutes is up. It's working. Okay. So joining me up here are the representatives from the QER Task Force. We have Karen, Dr. Karen Wayland. Kate Marks will be joining us shortly, Matt McGovern and John Richards, and they're very anxious to hear what you have to say.

So our first commenter is David Hasseck (ph). David Hasseck?

(No response.)

MODERATOR KELLEY: No? Next is Patricia Demarco.

(No response.)

MODERATOR KELLEY: It's a long day. Next we have Sam Taylor. Sam, are you here?

(No response.)

MODERATOR KELLEY: Next on the list is Bryant Shields. I'm not sure if I'm saying that right.

(No response.)

MODERATOR KELLEY: Next is Paul Clemensick. Paul, your five minutes.

MR. CLEMENSICK: (off mic) I think you heard from me this morning already, because I got a question this morning, five minutes. I just want to reiterate that since the topic here is natural gas development, and the infrastructure involved with natural gas, the pricing in the natural gas markets should be driving a lot of this.

I think unfortunately the natural gas pricing, we need some type of control mechanism. For those of you who are unfamiliar with natural gas in the past, the control is basically done by the Texas Railroad Commission. The Texas Railroad Commission put in place well spacing requirements and pro-rationing agreements on major natural gas deals.

Those regulations were adopted by other states, and they worked fine for traditional natural gas deals. But in shale gas and oil (inaudible), not so much. There is no pro-

rationing, no acreage development restrictions, nothing to for any kind of control. You can have no surplus capacity.

So what you end up with is a lot of wild swings in natural gas prices. I think it would be helpful to review what has happened before the natural gas industry, to look at the way pricing was controlled so that it wasn't -- we didn't go through these wild swings in pricing, which really doesn't help anyone.

It really doesn't help the customers over the long haul. It doesn't help the producers, and it's a really frustrating experience.

I just want to add one last thing. I have personal experience on this. I helped bring up some big natural gas deals in southern Louisiana when we would go after the fixed price (inaudible) contracts, and the minute we got them.

I worked (inaudible) for weeks, and as soon as we brought the plants up and we put the gas into the pipeline, it was Texas Eastern, a big

pipe that goes up to the New York City, they basically said look, we can't pay the price. It was $10 per million Btus in 1980.

They immediately turned around and they said you run the company. They threw the keys across the desk. They said no, we don't (inaudible). So the price went to $3, and you just get these swings, where you go from one extreme to the other, and it's been -- anybody who's been in the industry for the last 40 years have experienced these swings up and down, and you just end up with a great deal of loss.

And somehow, if you're going to continue doing Marcellus shale development, you've got to settle out these price swings. That's my comment.

MODERATOR KELLEY: Thank you. Next is Neprune Huffley (ph). Neprune Huffley.

(No response.)

MODERATOR KELLEY: Next is Costa Samaras. Costa.

(No response.)

MODERATOR KELLEY: Next is Leila Murphy.

MS. MURPHY: (off mic-not transcribed)

MODERATOR KELLEY: Thank you. (off mic) Next we have Daniel Slater.

MR. SLATER: I'm Daniel Slater. I teach at Carnegie-Mellon, the School of Computer Science. I guess I want to know the context of this. I talked to Kate earlier, so I just noticed the complete lack of any discussion of the issue of climate change, an issue of leaving it in the ground, and Professor (inaudible) stated explicitly that (inaudible) --

We've got -- most of the reserves that have been discovered in fossil fuels have to be left in the ground or we're going to destroy the planet. I believe Professor (inaudible) stated that. So when I read the agenda for this meeting, again (inaudible) context because I don't know the big picture of all of these different meetings you're going to have and so on.

Maybe climate change is going to be addressed. But I just found it odd that that wasn't even on the agenda at all, and this

particular panel, the one we just had, they said that well, we're talking about 2030 and beyond. Well, we've got to get a plan in place to stop using the fossil fuels we have in the ground by 2030, and yet the panel, all of whom have left, I think, and irrelevant to talk about at this point since they're not even here anymore.

But you know, the plan should be to figure out what's the plan for using this stuff and for not using it, okay? So I just don't understand how we can talk about fossil fuels like this, without having that foundation. That's the main elephant in the room here, is that we've got to leave most of this in the ground, okay, and figure out other ways of supplying the energy needs for this country. So that's my comment.

MODERATOR KELLEY: Thank you. I just want to circle back to the first folks on the list, to give them a chance in case they came in the room. David Hasseck. Patricia Demarco. Sam Taylor. Brian Shields. Okay. We have some time. Did anyone else care to comment or provide a

comment here today?

(No response.)

MODERATOR KELLEY: No, okay. With that, let me turn it over to Dr. Wayland.

DR. WAYLAND: Thank you. I want to thank Carnegie-Mellon for hosting us. This is -- we are surprised by the quality of the venues that we find. We're sort of taking them sight unseen and this has been quite wonderful. So thank you very much.

As people have mentioned, as the Secretary mentioned this morning, the stakeholder input is a vital part of the work that we're doing in the Quadrennial Energy Review. In fact, the Presidential memorandum had directed the Secretary to lead this effort, actually spends quite a bit of time talking about the importance of the stakeholder engagement piece.

We will be doing 16 or 17 of these meetings around the country. You can find all the information about those meetings, past and present at www.energy.gov/qer.

I want to note that not only are the panelists' comments to us very important, but this public comment period is also very important to them, and you'll see that we continue to have a court reporter here who's been taking notes, and that will become part of the public record.

So all of your comments today will not only be used by our analysts and by our policymakers, but also will become part of the public record, so the public aware of who we're listening to when we're going around the country, learning about your views on energy policy and infrastructure.

So I want to thank you again. I'd like to also thank the Department of Energy staff and Energetics staff for helping to put together this meeting, and with that, I think we'll conclude.

MODERATOR KELLEY: The meeting is adjourned. Thank you.

(Whereupon, at 2:24 p.m., the meeting was adjourned.)

CERTIFICATE OF COURT REPORTER

I, MICHAEL McCANN, the reporter before whom the foregoing hearing was taken, do hereby certify that the witness whose testimony appears in the foregoing deposition was duly sworn by me; that the testimony of said witness was recorded by me and thereafter reduced to typewriting under my direction; that said deposition is a true record of the testimony given by said witness; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this deposition was taken; and, further, that I am not a relative or employee of any counsel or attorney employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.

MICHAEL McCANN

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I, PEGGY HOLMES, do hereby certify that this transcript was prepared from audio to the best of my ability.

I am neither counsel for, nor party to this action nor am I interested in the outcome of this action.

PEGGY HOLMES