QUADRENNIAL ENERGY REVIEW

PUBLIC MEETING #7:

Gas-Electricity Interdependencies

Monday, July 28, 2014

Metropolitan State University of Denver

Auraria Campus, St. Cajetan's Center

1190 9th Street

Denver, Colorado

Reported by: Roger Meyers,
Capital Reporting Company

A P P E A R A N C E S

Dr. Karen Wayland, Department of Energy

Peggy Welsh, Energetics, Inc.

Dan Utech, Special Assistant to the President for Energy and Climate Change

Commissioner Pamela Patton, Colorado Public Utilities Commission

Rae McQuade, President and COO, North American Energy Standards Board

Kelli Joseph, Senior Gas & Electric Analyst, New York Independent System Operator (NYISO) on behalf of ISO-RTO Council

Lynn Dahlberg, Director, Marketing Services, Williams - Northwest Pipeline GP and on behalf of the Western Gas-Electric Regional Assessment Task Force

Joe M. Holmes, Lead Energy Trader, Colorado Springs Utilities

David Eves, President and CEO, Public Service Company of Colorado

Curtis Moffatt, Deputy General Counsel and Vice President - Gas Legal, Kinder Morgan, Inc.

Clifton Karnei, Executive Vice President and General Manager, Brazos Electric Cooperative

Beth Musich, Director Energy Markets and Capacity Products, Southern California Gas Company and San Diego Gas & Electric Company and on behalf of the Western Gas-Electric Regional Assessment Task Force

A P P E A R A N C E S (Cont'd)

Arne Olson, Partner, Energy & Environmental Economics(E3) and on behalf of the Western Natural Gas-Electric Interdependency Study

P R O C E E D I N G S

MODERATOR WELSH: Good morning. I want to welcome you to the QER Public Meeting #7. We are very pleased to be here in Denver to discuss the issue of the Electric Natural Gas Interdependencies and related issues.

My name is Peggy Welsh. I'm with Energetics, Incorporated. We are a contractor to the Department of Energy, and it's my honor today to be the meeting facilitator. We have an amazing group of distinguished speakers today and we start today with a very distinguished panel of VIP's.

Before we get into that, I have a few housekeeping notes. One of the things that we want to talk about is why we are -- what is the purpose of today's meeting. And so I have a little statement that I'd like to read.

"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 Electricity Natural Gas Interdependencies and to provide a forum for

information exchange. 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 and facts regarding this topic.

The object of today's meeting is not to obtain any group position or consensus. Rather, the U.S. Department of Energy and the White House are seeking as many recommendations as possible from all individuals at this meeting."

So we want to hear from all of you. Let me remind people that we are also livestreaming this meeting, so welcome to those who are watching via livestream. We also want to hear from as many people who made the trip to attend in person. If you'd like to speak, you need to sign in at the front desk.

If you don't want to speak -- and some people are timid about doing that -- we really encourage everyone to submit comments. Every single set of comments is reviewed extensively and is considered as part of this process. And that

address for submitting comments is QERcomments@hq.doe.gov. The Department of Energy is serving as the Secretariat to the QER Task Force and so they are the ones receiving the comments.

With that, let me turn and introduce to you Dr. Karen Wayland who is the Deputy Director of the Department of Energy's Office of Energy Policy and Systems Analysis for state, local and tribal cooperation. She is leading this effort to receive input from all stakeholders.

Karen.

DR. WAYLAND: Thank you very much, Peggy. And thank you all for coming here. I know that this is not a regular part of your day job and many of you traveled quite a distance to come here.

I want to assure you how important the stakeholder meetings are here. In fact, in the Presidential Memorandum directing the Administration to conduct the Quadrennial Energy Review, there's actually a couple paragraphs

talking about the stakeholder engagement process. It is quite significant and important to both our analyses and the recommendations.

To that end, as Peggy mentioned, we are livestreaming and recording. We have a court reporter here so that we'll have transcripts and we'll also have meeting summaries. Those all get posted on the web, so for the sake of transparency the public knows who we've been listening to and talking to. But, also we'll be using that information in our analyses and recommendations and I can assure you that each one these meetings -- we've had seven so far -- we've learned something new. In fact, even the Secretary has sat through some of the panels and walked away saying, "Boy, that was a great panel." And, once again, we have fabulous panelists that have come together to help us figure out what the crux of the issues are in energy, transmission, storage and distribution.

As Peggy mentioned we have a website and a comments email. The website is

www.energy.govôQER. All of the statements of the panelists, the transcripts, the meeting summaries and presentations will be posted there either directly after the meeting or within the next few weeks. We have four more meetings scheduled -- five more meetings scheduled, actually, although there will be more following.

We've got one in Chicago and one in Bismarck. Both of those will be on August 8th. We've got one in Santa Fe on state, local, tribal Issues on the 11th. We have one in Cheyenne, Wyoming on Infrastructure Siding on August 21st. And we have a new one scheduled that will be September 8th looking at electricity issues with an Eastern focus.

It's my pleasure now to introduce the panelists. The first speaker will be the Special Assistant to the President for Energy and Climate, Dan Utech. And it is a really special pleasure for me to for me to be able to say that since we were Senate staffers together years ago. He was with the Senate Environment Public Works Committee

and then for five years as a staffer for Senator -- I almost said Secretary -- but back then Senator Clinton.

He was a special advisor to Secretary Chew and then went over to the White House and has now become Special Assistant to the President. So it is with great pleasure and honor that I get to introduce Dan Utech.

DIRECTOR UTECH: Thanks, Karen.

Can everyone hear me okay? Great.

Well, it's a real pleasure to be here this morning with Karen, with Mr. Patton and others. Really thank everyone for both the panelists and also members of the public that came to provide input today. I think, as Karen said, this is a really important part of the process that we're going through to develop some recommendations in this space under the QER and so thank you very much for being here.

Before we dive in to the QER, I want to step back a little bit and look at the big picture from the Administration's perspective.

President Obama has been committed to an all-of-the-above energy strategy and one that develops -- aims to develop a diverse portfolio of American made energy. And I think if you look at the last five years alone, our energy landscape has transformed in some remarkable ways thanks to efforts at the federal, state and local level, and also investment by the private sector. So I'm just going to hit a few highlights.

First is that U.S. crude oil production averaged 7.4 million barrels per day in 2013. That's up from five in 2008. The upward trend has continued this year. In April of 2014, production reached 8.4 million barrels per day, the highest level in nearly 20 years. And for the first time in nearly two decades, we have produced more of our oil here at home than we buy from other countries.

Along with oil production, gas production has boomed and I'll come back to that, but the U.S. is now the top gas producer in the world. You know, we were -- when Karen and I were

working together up on the Hill, everyone was frantically figuring out whether we could site enough LNG import terminals to satisfy the natural gas demands of the U.S. and now we're looking at exporting some gas along with the many other uses that we're making that resource.

Renewable energy is getting cheaper and deployment and generation are up sharply. Colorado is a huge leader in this area. But since 2008, the price of solar panels has fallen by 75 percent and solar insulation has increased by a factor of 13 in that timeframe. We've seen some of the biggest utilities projects come online, solar projects. And in addition, wind generation has more than tripled in the last five years. So we've seen remarkable progress in renewables as well.

We're making good progress in efficiency in the transportation. Specifically, we're seeing declining gasoline demand, in part due to the historic fuel economy standards that were set during the first term, which essentially will

double the fuel economy of the light duty vehicle fleet cars and light trucks between 2012 and 2025. And that will save -- it will cut 6 billion tons of carbon pollution, cut oil consumption by 12 million barrels of oil and save consumers about $1.7 trillion at the pump over the lifetime of that program.

In addition, we've seen the construction of the first new nuclear plants in decades, historic investments in carbon capture technology and record production of biofuels. So, when you put it all together, these trends should mean more affordable energy, more jobs in energy, and very importantly less pollution from the energy sector. In 2013 carbon dioxide emissions from energy sources were 11 percent lower than in 2007.

So the President's goal is still further than that. He set a goal in 2009 of reducing greenhouse gas emissions 17 percent below 2005 levels by 2020. And last June released a roadmap, The Climate Action Plan, that outlines a series of steps to take us from where we are today, which is

part way towards that goal, all the way to that goal and beyond. One of the things that's -- so I'm going to talk about two key initiatives, the second is the QER.

The first is the Power Plant Rules that EPA put forward on June 2nd and that there will be public hearings on here in Denver tomorrow -- starting tomorrow. This is the Clean Power Plan the EPA put forward. This is a proposal for the first time to set carbon standards that apply to the existing power generation fleet and this will have enormous benefits. By 2030, it will reduce nation-wide carbon emissions in the power sector by about 30 percent from 2005 levels and will include significant cuts by 2020 as well.

The proposal will also cut hundreds of thousands of tons of harmful particle pollution, sulfur dioxide and nitrogen oxides as a co-benefit. This will provide important health protections to the most vulnerable, such as children and older Americans, and by EPA testament this will lead to health and climate benefits for

an estimated $55 to $93 billion in 2030.

So this is a huge opportunity for all of us to move to cleaner power while continuing to provide safe, reliable and affordable electricity.

To realize those benefits, the plan will need to work on the ground and that's why EPA conducted an extensive outreach before putting out a proposal and that's why they're going around the country, as they are here in Denver tomorrow, to gather additional input.

So we think it's a really strong proposal, one that achieves the core objectives of reducing carbon pollution while maintaining reliable, affordable electricity and fuel diversity and I think it's going to be an important driver for innovation and investment in a clean energy space in including a long-term incentive, and long-term signal that the private sector needs to make commitments.

So with that, I want to pivot to the Quadrennial Energy Review and I think one of the inspirations for this project is the fact that all

of the rapid change that I talked about in the energy space is presenting huge benefits. It's also producing some challenges. You know, our current energy infrastructure is increasingly challenged by transformations in energy supply, markets, patterns of end use, issues of aging and capacity, impacts of climate change and cyber and physical threats.

So this first Quadrennial Energy Review we hope will serve as a roadmap to address these challenges, but we are starting by going out and, as mentioned, we've done 7 sessions, we're also doing -- collecting input through a whole variety other ways to hear from public, from experts about how to get at some of these challenges. So that's taken us from New England to discuss gas supply issues, to Louisiana to discuss oil transport infrastructure, and today we're going to here in Denver to talk about the Gas- Electricity Interdependence.

So I just want to offer a couple of thoughts to frame up this conversation.

First is that the natural gas and electricity networks in this country are essential to our economic vitality and our way of life. Natural gas is used directly in our homes, businesses and in industry and in power plants to generate electricity. In the power sector, gas is used to generate 12 percent of electricity in 1990. In 2013 that number was up to 27 percent and it's expected to continue to grow.

There are a number of drivers for that. For example, gas compliments renewable energy in a number of states like Colorado who move forward with regional or state renewable requirements or carbon emission targets. But the biggest driver is the rapid increase in Shale production I referred to at the start. As I mentioned, today the U.S. is the largest gas producer in the world. In the Marcellus Shale Pennsylvania and other areas in the East Coast have gone from virtually nothing to being today -- they would rank as the seventh largest producer in the world if that Marcellus region were a country.

So huge changes in that space and we expect and our Energy Information Administration projects continued growth and production in the coming years, about a 50 percent increase between now and 2040.

So this rapid increase in production has changed the locations of supply necessitating investments in new pipelines and processing facilities. The market has responded. We have a system that works well in many places. Between 2003 and 2013, more than 12,000 miles of pipeline was built at a more than 86 BCF per day of pipeline capacity.

But in some regions, the combination of changing demand, both absolute demand for gas across industry and power generation and the increasing demand for natural gas in the power sector combined with the changing supply geography, has resulted in some regional constraints, most notably in the Northeast, but also in some other places.

Beyond these regional constraints, we

know that that additional capacity will be needed. The Inga Foundation recently estimated that between now and 2035 more than $300 billion of additional midstream infrastructure will need to be added.

So with all of these factors to factor up, the growing interdependence of our gas and electricity systems is the focus of today's meeting and I think it's a really important topic to discuss. We know that utilities, pipeline operators, regulators and policymakers at the state & federal level are looking at ways to strengthen the reliability and resilience of our energy infrastructure.

We look forward to learning more about planned studies that are underway, efforts to establish better processes for gas-electric coordination, what role the Federal Government can play in helping to harmonize markets and operating procedures between the gas-electricity sectors, with all that taking into account the circumstances of different regions as well as

different users of natural gas.

So in closing, I want to return to where I started. We're going through a time of rapid change in the energy landscape. That's hugely positive in many ways, but also presents some challenges such as the one we're here to talk to you about today. I'm confident that by working together we can take advantage of these opportunities presented by those changes, meet our shared objective and evolve energy landscape towards a better system.

So I look forward to terrific discussion today. Thank you very much.

MODERATOR KELLEY: Thank you, Dan.

Now, it's my privilege to introduce Commissioner Pam Patton, a fellow sheep farmer, who has a quite storied career after her time raising sheep, which I'd love to talk to you about, because I'm sure your experience in Colorado was a little different than a puny little New England sheep farm.

But after that, she spent twenty years

as an intelligence officer in the Navy, came back to Colorado and was appointed recently by Governor Hickenlooper to the Colorado Public Utilities Commission for a four-year term. She was on the La Plata Electric Association board of directors for 12 years. She's a credentialed co-op director and has a co-op board leadership certificate from the NRECA and she served on many boards around electricity and power and also active in a number of civil society.

She was awarded the Barbara Conrad Leadership Award and the Morley Ballantine Award for business leadership. So we're quite honored and privileged to hear from her this morning.

COMMISSIONER PATTON: Thank you, Dr. Karen. And we'll be talking about sheep after and that's very interesting.

Good morning, everyone.

I was really pleased to hear Dan's remarks first because it's going to allow me to shorten up some and they were outstanding. Colorado is very pleased to play host to this

forum on this critical subject of Gas-Electricity-Interdependence. Safety and reliability being mission number one for everyone in both industries and all of the regulatory commissions.

I would really like to commend DOE with the approach that they are taking with this Quadrennial Energy Review. And I will tell you at the outset that I didn't understand it was going to be as complex and effective, I believe --

MODERATOR WAYLAND: I'm not sure we did.

COMMISSIONER PATTON: That could be. That could be. When Secretary Moniz was out here for the dedication of the EISPC at Emril (ph), he discussed it and then you guys sent John Depershing (ph) on the road, at least in Colorado, to talk with a lot of people in the industry about it and we were began to see that this was this was not just going to be a book on the shelf.

But I don't think it was until we got into the public feedback and the stake holder issue meetings that we began to realize what the extent of these issues are, and as everyone has

said here, this is the seventh and there are more to come.

I was really pleased to see that you were adding another one even on the East Coast because I am particularly pleased and we are particularly pleased in Colorado, there's quite a lot of Western emphasis leaving here, Bismarck, North Dakota; Santa Fe; Cheyenne, Wyoming. It's really impressive to see the Department of Energy out here and in the West. So thank you so much.

And thank you for coming to this state. This particular state, as Dan mentioned, is a good place to talk about energy because, just like the President, this state is interested in all-of-the-above energy production and we have it. We are seventh overall in the United States for energy production. We are sixth for natural gas and it's hard to stay up there at six, but we're doing it. And ninth for crude oil.

And we're not here today to talk about Colorado, I understand that, but we're also in the top ten for wind production and I could keep going

on the renewable side as well. I'm looking out at Public Service Company CEO, David Eves. I think he'll be talking a little bit more about that, but he may mention a time in which 60 percent of Xcel's energy needs in Colorado were taken care of by wind and this didn't last for too long, but it's an impressive number.

We also have ten of the nation's top 100 natural gas fields and that counts even with the Marcellus playing in there, although you notice we had to go down to 100 now to get top -- to get our ten in. And the industry here in Colorado has created 35,000 new jobs in the last ten years, so very, very significant industry for us.

And as has already been mentioned, we see ourselves and we are leaders in addressing the environmental impacts of the electricity sector in Colorado. Starting back in 2004 when Colorado's voters and then legislature adopted the very first in the nation renewable portfolio standard, and that standard has continued to become more robust over the years.

But I think it's in 2010, the activity that took place here that's perhaps most germane to what's going on here today and that was a bipartisan effort that started with industry -- the gas industry, the electricity industry, the environmental community working together to decide what to do about the aging coal fleet and ozone issues and pollution issues on the Front Range and that eventually resulted in a bipartisan effort in the state legislature called the Clean Air, Clean Jobs Act that closed out 900 megawatt production of coal and created some very, very serious fuel switching to natural gas here.

I think, David, you're probably going to talk specifically to that in your panel. So pretty impressive effort.

And over on the rest of the environmental side, because of our oil and gas production, we really understand the environmental impact of oil and gas here as well. And last year Colorado became the first state in the nation to work with the industry and with the environmental

community to come together on the first ever rules for methane emissions in oil and gas production here in the state. It's working for us and it's going to work for the nation.

So while I just said that the Department of Energy picked the right place to come to talk about this topic, I'm not so sure that that's true when it comes to regional gas and electricity interdependence, at least for the state of Colorado.

Our natural gas production increased 38 percent between 2007 and 2012, and even though we heat three-quarters of our homes across the state with natural gas, and as you know we use natural gas in our industries here, as well for our increasing electricity and for integrating renewables, we just simply don't see the significant problems that are seen elsewhere regionally.

And in fact we, of course, have the Eastern Terminus of the Rocky Mountain Express Interstate Gas Pipeline here, which when it was

originally termed I think they called it the Shale to Shining Shale Project. And now we will see how that -- what direction that pipeline ends up going.

But, it's interesting to me that -- so we're just a little tiny piece of the WECC, but the WECC is working very diligently on Gas-Electricity- Interdependence and it was just over the weekend hot off the PDF press came the executive summary for the second phase of a DOE sponsored study on Gas- Electricity-Interdependence. It's excellent and they've narrowed it down at this point I think to six case studies.

And only one of those case studies is in effect on the front range of Colorado and I haven't had an opportunity to read that yet. I'm looking back, I think it's Wednesday, but I think we'll be hearing more about that soon along.

So it's a very big pleasure for me to be sitting next door right here to Dan Utech personally, because the last time I saw him was by

video- teleconference when he had to video-teleconference with the regulatory utility commissioner in Dallas, could not get away from Washington that day, so we got to see him on the big screen instead and I think we're very, very fortunate that he came to Denver.

So here we are in Denver. This is a typical, beautiful day in the Rocky Mountains. This is the way it always is here in the summer and it's frequently like this in the winter. But at that same conference when I saw you on the big screen, I got to see and hear and listen to FERC Commissioner, Tony Clark, in person talking about these Regional Gas- Electricity-Interdependency Issues. It was an enlightening day. And I think everybody in this room knows that perhaps not all of the students here watching, I know we have at least some students from the Auraria Campus watching, the FERC Commissioner Tony Clark is from North Dakota. And North Dakota, like Colorado, has a real understanding of the perspective of the needs for natural gas and electricity in the

winter and we don't call it all polar vortices out here, we call it winter. And we are prepared for winter and -- but what we would say for everyone across the United States -- and I don't want to tell you that I watched the Game of Thrones -- but winter is coming and we're all going to need to be ready. This is not a trivial topic today and so I look forward to spending the rest of the morning learning with all of you. Thank you very much.

PATTON: Thank you, Commissioner.

Before I turn this back over to Peggy to run the show for the rest of the morning, I do want to acknowledge two people who are in the audience today.

We have a staff member from Congressman Tipton's office and I'm not sure if there are any other Congressional staff here. We thank you very much.

Are you with?

MR. MacARTHUR: Thomas MacArthur.

Great, thank you very much both for coming and --

CONGRESSMAN DEGETTE: Congressman DeGette.

COMMISSIONER PATTON: And Congressman DeGette. Wonderful.

Another one in the back?

CONGRESSMAN PERLMUTTER: Perlmutter.

COMMISSIONER PATTON: Congressman Perlmutter.

SENATOR BENNETT: Senator Bennett.

COMMISSIONER PATTON: And Senator Bennett.

Great. Thank you very much for --

UNIDENTIFIED SPEAKER: And Senator Udall.

DR. WAYLAND: I think it's an election year.

COMMISSIONER PATTON: Yeah, I think we got them all. All right. And I want to also introduce -- or I don't have to introduce Alice Madden. I just have out point Alice Madden, who is a -- you know, the daughter of Colorado is on loan to us at the Department of Energy working on

state and local issues from there as the Principal Deputy Secretary of errant (ph) governmental. So, thank you, Alice, for coming. She did come out here, probably not just to see her family, but on business, so thank you.

And I will turn this back to Peggy.

MODERATOR WELSH: Thank you. Well, I think that we have the opportunity to learn greatly from Mr. Utech and Commissioner Patton and I want to thank you both for sharing your time with us today. We are not going to take questions at this point because we've got a very full day, so please join me in thanking this very stellar, VIP panel.

For those of you watching livestream, give us a few minutes to set up for Panel number 1 and I'd like to ask those panelists to please join me here in front. Thank you.

(Pause while panel sets up.)

MODERATOR WELSH: Introduce our first panel. They're going to focus on coordination efforts, regional issues and remaining challenges

of Electricity-Natural Gas interdependencies. And I'd like to introduce the panelists by their names and titles.

First, to the left of me is Rae McQuaid, President and Chief Operating Office of the North American Energy Standards Board.

Kelli Joseph is next to her, Senior Gas and Electric Analyst with the New York Systems Operator known as NYISO. She's appearing on behalf of the Trade Association, the ISO-RTO Counsel.

Then Ms. Lynn Dahlberg, Director of Marketing Services of Williams-Northwest Pipeline Group and on behalf of the Western Gas-Electric regional Assessment Task Force.

And finally, Joe Holmes, Lead Energy Trader for Colorado Springs Utility.

Before I ask Ms. McQuaid to start, let me just say that the views of the views of the panelists are their own and not those of the Department of Energy or the White House.

Ms. McQuaid.

MS. MCQUAID: Thank you so much.

MODERATOR WELSH: Yes. Oh, and one other thing, panelists, if you'll please pull the microphones in close to you and there is a timing machine over here, we ask you to summarize your comments in five minutes. So if you'll watch the timer, when it goes to red your time is up. Thank you.

MS. MCQUAID: Thank you. I want to thank everyone for having me here today to talk about a topic that our organization has been working on for 20 years. The Gas Industry Standards Board was our predecessor organization, as Peggy well knows, she was helpful in creating the organization, as was the Department of Energy. The Department of Energy had a key role and in fact, helped us name the organization. So that should give you a sense of how the DOE supported this effort.

We today have more than 2,000 standards supporting the wholesale electric market. We have 1,200 or so standards supporting retail energy

market. And we have about 700 standards supporting natural gas. If you look at the types of standards we have they range from contracting, all the way through to the ultimate sale of the product with everything in between, with business practices and the electronic communications and transaction type standards and cyber security. We do not do reliability standards. We leave that up to NERC.

So if you look at the kind of work we've done, in 1994 GISB began to develop the gas transportation nominations deadlines and all the related standards. About 100 plus standards are related specifically to nominations timeline. Since then the -- we and the market have undergone considerable changes. You jump forward to 2000 and we became NAESB. We were approached by a number of groups to broaden our standards development to support wholesale electric standards and retail energy standards.

Now, if you skip forward to 2004, we had some issues in New England with Gas-Electric

harmonization and then Chairman Pat Wood sent us a letter saying, You need to look at your standards to see what kind of changes are needed to better manage the business transactions. As such, we ended up coming up with a number of standards to support communications between power generation facilities and pipelines, particularly in situations of unanticipated demand.

If you jump forward then to 2011, in the Natural Gas Council through the request of then Secretary Chu put out a prudent development Report and in that report the NAESB, as well as a number of other organizations, including the ISES, NERC and FERC were all asked to continue efforts to harmonize interactions between the natural gas and electricity markets. And I was fortunate enough to be part of the counsel when that report came out.

So we took that suggestion to heart and at the end of 2012, NAESB used the NTC report as a catalyst and produced a Gas-Electric Harmonization Report. And in that report we had three

primary recommendations that could impact NAESB: looking at standards that would provide greater flexibility in scheduling, looking at standards that would address issues of unsynchronized market clearing times, and looking at standards promoting the availability of information to specific market entities.

So we issued that report and we said we're not going to do any of these standards yet. We need to hear back from the regulators on what it is that they want us to do. Well, be careful what you ask for. So we got a notice of proposed rulemaking in March of this year and we were off to the races.

The notice of proposed rulemaking is Docket RN142000, and it came out on March 20th. And in that NOPR the Federal Energy Regulatory Commission proposed a set of nomination timelines and asked NAESB with the rest of the industry to determine if those timelines were acceptable or if they had other timelines and adjustments that they would like to offer to the Commission. And we

were supposed to do all this by late September, so we were given a very short timeframe.

As a result, we created the Gas Electric Harmonization Group and that Gas Electric Harmonization Group called "The Forum" ended up looking at the timeline and ended up proposing some different aspects of it.

They ended up recommending a smaller number of intraday nomination periods where you could adjust your nominations. They did not recommend a specific gas day start and if you read the order the way that I did and the way that many other people did, the Commission set forth a 4 a.m. gas day. Because the Forum and NAESB could not come up with an alternative to 4 a.m., we ended up pulling out the 9 a.m. gas day that we had from our standards. So now if you look at our standards, they are being developed and we are on schedule to make the September deadline.

Thank you.

MODERATOR WELSH: Thank you.

Ms. Joseph.

MS. JOSEPH: Hi. Good morning, everyone. My name is Kelli Joseph. I'm with the New York Independent System Operator, although. I'm actually here today also on behalf of the ISO RTO-Council.

For those of you who don't know, the seven independent system operators and regional transmission operators operate the nation's bulk electricity grid, administer wholesale electricity markets, and conduct system power planning. And two-thirds of all electric consumers in the United States are served by an ISO or RTO.

As we're discussing, natural gas has become the fuel of choice for electric generation. In the last few years all new installed capacity -- over 50 percent of new installed capacity has come from natural gas. And about half of all of the installed capacity in the ISO and RTO regions currently comes from natural gas as well. In some regions this number is actually quite high.

The locations of these plants vary. So

in some ISO-RTO regions, gas fired generators are directly connected to interstate pipelines, whereas, in others the majority of gas fired generators are connected behind a local gas distribution company or on an intra-state pipeline and we can talk later about maybe why that might be significant.

A couple of important issues to understand regarding some differences in how these two markets are structured and the implications for gas and electric system reliability.

The gas and electric markets have different marketing days and different scheduling times. And currently one of the things that this means is that in some ISO and RTO regions, generators receive their day-ahead electric schedule after the close of the day-ahead gas timely nomination cycle.

In addition, because of the different operating days, as Ray mentioned, the gas system currently operates with a 9 a.m. to 9 a.m. gas operating day, whereas, on the electric system it

runs from midnight to midnight. What this means is that generators are purchasing gas and nominating gas over one gas operating day, but over two electric days. And again the schedule for that second electric day is not yet known.

These scheduling and operating differences matter because while the electric system is scheduled day-ahead, real-time electric system conditions can change from what the day-ahead assumptions were. So when responding to either an unplanned outage in real- time or perhaps low forecasting differences, this can require immediate system operator reaction in order maintain electric system reliability.

Most generators in the wholesale organized energy markets are relying on what's called Secondary Capacity Relief or Interruptible Transportation Contracts. And moreover, they're often purchasing gas through marketers. So what this means is that even though gas can be nominated and scheduled every day, it can be difficult sometimes to purchase gas outside of

normal business hours. These are the times when has markets tend to be less liquid. So on weekends, holidays, evening, and overnight hours, it can sometimes be challenging for gas -- or, for generators to purchase their gas.

In addition, relying on the secondary or Interruptible Transportation Contracts means that generators could be at risk of not being able to transport gas on days when the pipelines are constrained.

Now, on most days when the pipeline is not operating during peak conditions, there is quite a bit of flexibility on the pipeline system. In fact there are some gas pipelines, interstate gas pipelines that actually allow hourly nominations. This is not all pipelines, however.

But during times of operational flow orders, when the pipeline system is either constrained or there's another system condition happening on the pipeline system, this flexibility is very limited and if these operation flow orders turn into hourly flow restrictions, this further

limits flexibility for both the gas system and then how generators may be able to respond.

As has already been mentioned. the Federal Energy Regulatory Commission, FERC, has taken a number of steps toward better coordinating the gas and electric industries. They held technical conferences over the last few years specifically looking at these issues and as they mentioned put out two notices. The first was an order actually allowing the ISO and RTO's and interstate pipelines to share operational information about both systems, and then the second was this notice of proposed rulemaking, actually looking at these market timing and scheduling differences that I outlined earlier.

The ISO's and the RTO's are also individually working and working collectively. We have an effort underway to come up with some shared communication procedures as to how we'll communicate and share operational information with the gas -- between the gas and electric systems and some of the ISO's and RTO's are looking at

potential scheduling changes they can make to put out their day-ahead schedules prior to the close of this day-ahead gas cycle.

I'll just mention that the ISO's continue to support the earlier start to the gas day. We believe that this would help to allow generators to purchase gas in this day-ahead cycle in order to cover both the morning peak and the evening peak of the same electric day and this is especially important during winter conditions when pipeline system conditions can change drastically from one day to the next.

I can talk later about the EITC effort that's underway, this is a DOE funded assessment to look at the Eastern interconnect and look at the gas and electric system infrastructure adequacy, but I can talk about that later. Thank you.

MODERATOR WELSH: Thank you so much. Sorry to cut off what are excellent comments, but we can get into a discussion.

Next, Ms. Dahlberg, the floor is yours.

MS. DAHLBERG: Thank you. Northwest Pipeline is a primary natural gas transportation artery in the Pacific Northwest and in the intermountain region. And as has been mentioned here today, the reason we're talking about gas-electric integration is that natural gas is being used increasingly for power generation. And there's many reasons why that's true and I think Dan has already covered those.

So consequently, the Federal Energy Regulatory Energy Commission, FERC, initiated a proceeding to ensure that the outages and reliability problems are not the result of a lack of coordination between the gas and electric industries. So FERC has chosen to address basically two items on the national front.

One, they want to encourage communications between gas and electric. And two, they want to reconcile the mismatch that occurs that Kelli was just talking about between the electric day and the gas day.

And both industries want the same thing.

They both want natural gas to be a reliable fuel source for electric generation and they both have demonstrated a willingness to collaborate.

FERC addressed the communication protocol in a final rule last November and in general both industries agreed with the final rule and both industries agreed that it was a good idea. As to the scheduling timelines, FERC -- there is now a majority consensus in NAESB for the scheduling timelines. Both industries think it's a good idea.

When it comes to the national gas day, there is no consensus that it's a good idea to change it. Northwest Pipeline's customers believe that starting the gas day at 4 a.m. Central Time could hurt their longstanding reliability and impose significant costs with little or no benefit. FERC should consider how these changes will impact all pipeline customers not just electric generators. FERC should also consider the regional differences that occur.

Northwest Pipeline's experience is far

different than our sister organization, TRANSCO, that delivers gas on the East Coast. In organized electric markets, generators are dispatched based on the low cost basis. And there's little to no incentive to contract for firm pipeline transportation, which is often more expensive than interruptible transportation. In bilateral markets, the seller agrees to deliver a product to the buyer. The reliability is clearly delineated.

The Pacific Northwest has a bilateral electric market and Northwest Pipeline has 24 power plants that have the potential to burn a billion cubic feet per day. Twenty-three of the 24 power plants have firm pipeline capacities. The power is owned by integrated electric utilities that can recover the cost of holding the firm pipeline capacity through rates approved by their State Commissions.

It appears that there is an incentive for gas buyer generators and bilateral markets to hold firm pipeline capacity and there is a disincentive for generators and organized electric

markets. One could argue that this disincentive is frustrating the ability for regions like New England to build the necessary pipeline infrastructure. In New England and Northeast, pipelines often run full during peak day periods and there isn't enough interruptible capacity for electric generators.

In contrast, Northwest customers have firm capacity. Regions with an electric market, organized market, that wish to rely on natural gas fired generators to provide electric support -- or support electric reliability must find a way to ensure that the electric industry subscribes to the firm transportation necessary to ensure pipeline expansions.

Another regional difference is the hours of daylight, 4 a.m. is 2 a.m. Pacific Time. Some infrastructure in the West is not fully automated and pipeline customers are worried that having to go out in the middle of the night to make manual adjustments is -- they're worried about safety and operational concerns.

Pipelines also believe there is a reliability risk due to the fact that producers, gatherers and processers which are not regulated by FERC and thus do not have to abide by a change to the gas day may not choose to go out in the middle of the night and make the necessary manual adjustments.

Some customers believe that the East -- this is an East Coast solution that may make things worse for people in the West.

In closing, changing the gas day will not address the primary problem and it could create problems that don't exist today. The primary problem is FERC should look -- should make sure that the electric industry subscribes -- find a way for them to recover their costs for subscribing to firm pipeline capacity. Thank you.

MODERATOR WELSH: Thank you.

Mr. Holmes.

MR. HOLMES: Good morning.

My name is Joe Holmes and I'm Lead Energy Trader for Colorado Springs Utilities. CSU

is a municipally owned full-service utility providing electricity, natural gas, water and waste water services to businesses and residential customers in the Pikes Peak region. CSU is the second largest utility in the state of Colorado. I very much appreciate the opportunity to participate on this panel today.

I am here today as a representative of Colorado Springs Utilities and the American Public Gas Association. APGA is national association for publically owned natural gas distribution systems. There are currently approximately 1,000 public gas systems located in 37 states. Publically owned systems are not for profit retail distribution entities owned by and accountable to the citizens that they serve. Public gas systems primary focus is on providing safe, reliable, affordable service to their over 12 million customers.

The issue of Gas-Electric Interdependency/Coordination is important for the public gas systems since it will, among other things, change the manner in which interstate

natural gas pipelines provide services to local gas distribution companies and potentially raise the cost of these services. Given that 95 percent of the public gas systems, including Colorado Springs, are captive to single natural gas pipelines, the importance of this issue to public gas systems cannot be over stated.

The current system of nomination cycles has worked well for our public utilities. However, APGA members are very concerned that efforts to improve gas-electric coordination should not resolve in unintended adverse consequences. These prospective consequences include daily operating difficulties and cost increases.

In short, the current gas transportation system works well for existing long-term customers and any mandate to significantly change this system to accommodate substantially different customer requirements should also include protections for existing customers and operations and costs.

As it came up during the FERC technical conferences, a lack of adequate gas pipeline infrastructure can create market challenges to accommodating the needs of gas-fired power generators as well as other customers. Many of these concerns expressed that at the FERC conferences are due to problems associated with generators inability to secure gas pipeline capacity in a constrained capacity market. In other words, there is insufficient pipe in the ground to serve all the willing customers.

However, with a robust physical infrastructure in place, many of the operational and even scheduling concerns raised would likely be resolved. One problem, especially in New England, appears to be a missing capability for generators to collect the cost of firm physical gas pipeline capacity in their service charges.

APGA recognizes that some electricity generators could benefit during their morning wrap up period by an early start in the gas day. However, changing the gas day from 9 a.m. Central

Time to 4 a.m. Central Time, all else being equal, will have adverse impacts on many gas systems. These impacts include hiring additional employees and potential pipeline imbalance penalties, as well as one-time costs associated to IT systems, field equipment, reprogramming gate stations, meters, SCADA, and even contract free negotiations. These impacts need to be fairly considered.

Ultimately, the gas system customers can be burdened with these costs while receiving no benefit from the changes, if the changes are simply implemented to benefit one customer class at the expense of another.

Public gas systems have maintained that solely focusing on the natural gas industry changes will not solve operational and cost recovery problems in regional power markets and ultimately stands to deflect from the central issues that could be addressed in those markets.

That said, it does appear that FERC, via their Dockets in EL14 22 through 27, initiating an

investigation into ISO and RTO scheduling practices, is attempting to follow up on their changes to gas market regulations with conforming changes by RTO's and ISO's.

For example, regional electric transmission organizations currently have a wide disparity in their electric scheduling deadlines and appear to have made no uniform effort to synchronize with existing natural gas pipeline schedules.

However, FERC order EL14 appears to be designated to promote scheduling conformity, subsequent to the gas pipeline changes currently under discussion in FERC's March NOPR. This would be most helpful. The APGA and its large membership of public gas systems recognizes the need to prepare our natural gas pipeline systems to meet the needs of all the customers.

We are prepared to be flexible; however, we are also compelled to aggressively represent our customers with respect to challenges to system operations and cost increases not fairly allocated

to the benefitting customers.

Again, I thank you for the opportunity to participate on this panel today and look forward to the upcoming discussion.

MODERATOR WELSH: Thank you very much.

Well, we've heard a lot of concerns addressed by these panelists today, particularly, regional concerns, the disconnect between the natural gas day and the electric day.

So I'd like to go down the panel and ask you all what further coordination efforts can industry and Government do, beyond the FERC NOPR, beyond the NAESB standards. What's missing, is there a gap, and how do we fill the coordination to answer this disconnect?

Rae?

MS. MCQUADE: All right. Okay. And this is Rae's answer, not NAESB's answer, so I want that on the record up front because I represent both sides of this discussion.

I think more discourse is needed, but to be honest, the discussions we've heard, the

remarks we've heard, we've been hearing these remarks for ten years. These are not new. You could in the NAESB meetings, depending on the remarks that were made, identify the person, identify the segment of the market they were in. A lot of those issues are already relatively well understood.

The problem is, we don't have the silver bullet to answer all of this. And I do agree that a lot of this is regional. When you do hear about the issues in New England, they are not the same issues you hear about in Arizona. Arizona has its own set of congestion issues that cause problems with gas- electric coordination.

These can be handled by a number of different ways. I mean, it's not a one answer for everything. You're going to have to look at regulatory change. You may have to look at contractual changes. You may have to look at the business transactions that are going on, and some operational changes. I don't think it's an easy answer, or we would have done it by now.

So I think we still have a lot of work ahead of us, but it's clear that the markets are shifting in this direction. The statistics that Dan gave earlier point to that, and we need to address it.

MODERATOR WELSH: Ms. Joseph?

MS. JOSEPH: As Rae said, I think in the discussions that we had at NAESB, there were actually a lot of really interesting concepts that came up, things that I wasn't aware of until these meetings. We had a ton of discussion on this issue. It's very complicated. It's very challenging, but, honestly, every time we do get into a room and have the discussions and new ideas come up, and new potential solutions, I think, come up.

You know, we talked at t NAESB some very innovative ideas that included maybe having two different gas days, so a western day and eastern day. We talked about having a common energy day. We talked about how some things worked in the gas market, how they were designed years ago, and

maybe some changes that could happen today.

And, you know, I think one of the things that doesn't get discussed a lot is what we can do with gas storage and some things we can do with gas storage markets that might actually help, perhaps, gas storage can operate somewhat like ancillary services do on the electric system. There has really not been a lot of discussion about that, so, you know, I think, again, it's challenging. There's a lot of issues that I do think that there are some potential ideas out there that could help.

MODERATOR WELSH: Ms. Dahlberg?

MS. DAHLBERG: Thank you. I think the bottom line for me is that if there were adequate infrastructure -- natural gas infrastructure, all around the country, we probably would not be talking about the gas day as a scheduling timelines.

MODERATOR WELSH: That's true.

MS. DAHLBERG: And I think there needs to be, you know, I guess, I'm a business major,

Economics 101, you have to have the incentives in place to make pipeline infrastructure happen. And I know that's the topic of Panel 2, so I won't get into that, but to me, we wouldn't be talking about the issues if there were the infrastructure in place. The incentives really need to be there.

MR. HOLMES: This will be just me. Like Rae, this will be Joe talking, not surely Colorado Springs Utilities or APGA, but we -- the problem seems simple sometimes when you look at why generators have problems making electricity when they're called on. It's because they don't have a firm fuel supply.

And it seems to me that maybe an entity like NERC or someone should describe what is the difference between firm power and intermittent power, because it's hard to have a dialogue -- which kind of gets to what Lynn is talking about -- it's kind of hard to have a dialogue if you think you have a firm power plant, and it's just ready to go. The only problem is that we can't -- you know, we can't get pipeline capacity and we

don't want to buy it.

If you build the power plant, and you don't have fuel for it, it's not firm. And so I think we need to get to that point in the dialogue, and maybe there will be, you know, dual fuel power plants which don't need firm fuel on either side, which can -- which, you know, will be some level of firm, but I think we need to get some definition of what we're talking about there.

The other thing that I would suggest is that we work to look at the difference between structural issues and financial issues. When I look at ISO New England, for example, or at least up to a year ago or so, it seemed more like a financial issue, not really structural issues. I mean, they don't have enough pipeline in the ground, but the pipelines are willing and able to put that infrastructure in place. They're ready to do it today. I haven't met a pipeline representative yet that doesn't want to talk about expansion.

The other side of the coin is the

revenue side. The revenue side, the RTO is not going to pay for it. The generators are not going to pay for that capacity. It's you and me in our homes when we flip the lights on that are going to pay for that pipeline capacity. And I think everything in the middle, between the revenue-paying customers for the electricity and the pipeline, is causing noise that we can't quite get this revenue to travel where it needs to travel, because I for one like firm -- I like flipping my light switch and having the lights come on. I don't want to question whether or not there is any fuel available because it's a cold day outside.

So, I think those two things, kind of defining what is an intermittent resource and a firm resource, that distinction; and then separating the physical and financial issues.

MODERATOR WELSH: I'd like to follow up on that a little bit, and ask you all, and maybe start with Kelli, what kind of reforms do you think might be useful in an RTO region that can answer these structural and financial challenges?

MS. JOSEPH: So one thing I think is important to point out, while it is important for generators to have fuel. I like Peter Rundin from ISO New England. You know, he said it very well, generators need fuel, he said on -- and it is challenging to think about how we've set up our markets and how we can structure our markets given the increasing nature of just-in-time resources, that that's a challenge across the country, whether it's from gas or from renewable, it's an ongoing challenge.

I think it's important to recognize, however, that firm transportation doesn't necessarily mean, (1) that you have no reliability concerns on the electric system and, (2) that it is necessarily easy to have, you know, one of these end day changes that you might need on the pipeline.

So, one of the things that's a big effort at all of the ISO's and RTO's is to really get a handle on both the electric system and the natural gas system, and thinking through potential

contingencies on one system that could impact the other.

So, if all generators had firm contracts on the gas system, if there was an issue on a handful of pipes, then there would be issues on the electric system regardless of the type of -- transportation contract generators had.

And, you know, vice versa, there can be issues on the electric system that can impact gas system reliability as well.

A lot of the ISO's and RTO's are looking at making some market design changes, to think through fuel assurance, and think through all types of fuel, not just gas, and thinking about, you know, have we structured our markets and created rules that incent the kind of behavior we want from generators. And that's something that we're all looking at.

MODERATOR WELSH: What about in the non-RTO regions like here out west?

Ms. Dahlberg or Mr. Holmes, you want to take that?

MR. HOLMES: Yeah. I'd like to follow up on what Kelli said, too. She said -- we totally agree. We have some -- we have a large power plant, gas-fired power plant, in Colorado Springs, and my group actually manages the natural gas supply for both the LDC and the power plants, and one thing you realize about power plants is that they can trip, so they can go off in the middle of the night. Doesn't matter what the gas day is, or all the regulations that are around it. It just trips because there's a problem with the plant.

We could have another power supply trip, and run a plant up to full load as quickly as possible. And that produces -- these events produce huge swings on the pipeline. And just having transportation capacity to serve, say, a base load type environment is not sufficient to balance the loads on the pipeline or to make the electric resource firm.

We really need to talk a lot more about balancing and balancing products. We have a no-

notice transportation agreement with Colorado Interstate Gas Pipeline, and we rely on that heavily for both our LDC load and our power plants. And so I think there is a lot of work to do on that.

I forgot the second part of the question.

MODERATOR WELSH: I think you covered it.

MR. HOLMES: Okay.

MODERATOR WELSH: I wanted to know about reforms in an RTO -- non-RTO region.

MR. HOLMES: Yeah. Okay.

MODERATOR WELSH: Ms. Dahlberg, do you want to add to that?

MS. DAHLBERG: No, I think basically in the non-RTO region, flexibility can -- you know, I agree with Kelli. There are -- having firm pipeline capacity isn't a 100 percent guarantee, but it's pretty darn close.

I think at Northwest Pipeline, we rely on gas storage. We have a significant amount of

storage, and we use that when there -- if there is an, you know, an upstream pipeline fails to get us that adequate supply into our pipeline, we'd use pipeline storage.

We also rely on other pipelines. They're very accommodating when one has a problem, and no one wants the lights to go out, so I think there's a number of avenues that we pursue to maintain our flexibility.

MR. HOLMES: Can I make one more comment?

MODERATOR WELSH: Sure.

MR. HOLMES: The follow-up that I was thinking of is that at Colorado Springs, we actually have firm transportation for our gas-fired generation that we consider to be firm. So we have a hundred percent sufficiency.

We also have storage agreements so that we could use storage for balancing, specifically for our power plants, and we have balancing through the no- notice sharing of no-notice storage, as well. And our rate payers pay for

that. And they've always -- you know, the plant has always been firm. We've never had a fuel problem there at this point.

MS. DAHLBERG: I do want to add one other thing. Northwest Pipeline is part of a group called PNUCC, Pacific Northwest Utility Commission Conference. And they did a study, and they assumed no natural gas was available to serve any of the gas- fired generation in the Pacific Northwest, and they did this on a peak day, and they assumed that the gas- fired generators that have diesel backup were running, and then, of course, hydro is a huge, huge contributor to electric generation in the Pacific northwest, and they were able to say that they could meet their needs on a peak day.

So, I think oil backup is another important thing, but again, the rate payers pay for that. So they pay for their reliability.

MODERATOR WELSH: So you all have talked about scheduling difficulties, and NAESB is a standard-setting organization. One of the things

that we at the Department of Energy are thinking about, and I'd like all of you to address, which is a little broader than the specifics, is the electrification of the natural gas industry.

We've heard a lot over the years about how the natural gas industry is relying more and more on natural gas, but we're now learning, through scheduling issues and standards and some of the FERC NOPR's that the electrification of the natural gas industry is emerging as a huge challenge.

And so I wondered if you all had any general comments on that new development, shall we say?

MS. MCQUADE: Sure, I'll start.

If you look at what NERC is doing with ensuring reliability, I think they're clearly focused on -- they see both sides of the coin. They see the need for the power generators to get the natural gas, but they also see the reliance of the natural gas industry on electricity as well, because you couldn't really operate a lot of your

compressor stations --

MODERATOR WELSH: Right.

MS. MCQUADE: -- without the electricity being there. And I think that at one point in the late '90s, we actually had a blackout because of some of the gas compressor stations not getting the electricity they needed to move the natural gas. So there actually has been some situations where that's happened.

NERC has taken a very strong role in this. I think it's important to look at this not just as an operational issue. And I understand the need or want to separate the financial issues from the operational issues, but I don't think you can.

If you look at how gas pipelines are built, they're built based on firm service. Firm service requires price signals. Those price signals are financial. So you're not going to get all of the expansions that you might need in infrastructure if you don't have the right financial incentives that were mentioned. And if

you look at financial incentives, that means you actually do need to look at how people buy firm service, and can they actually use firm service.

Because, what Kelli said earlier is absolutely correct. There are situations where you can have all the firm service in the world, but in unanticipated demand, with the way the rules are set up, you may not be able to get it. The priorities may have shifted. You may have missed the bumping cycle.

So, all of the sudden, while you've paid for firm, you don't actually have the gas you need. So, it's -- you have to look at both sides of this, and realize that they are intertwined. And I think that NERC is doing that. We do that. We think pretty much everybody in the industry realizes they've got to do both of those. It's just that now we have a term for it.

MODERATOR WELSH: Right.

MS. MCQUADE: And it's called electrification.

MODERATOR WELSH: Kelli?

MS. JOSEPH: I think I answered what you're asking, and I mentioned an eastern interconnect planning platform as a big study, fuel refunded study that we're doing. A lot of the ISO's and RTO's in the eastern region are involved in this, and other planning authorities as well. And one of the contingencies that we're looking at -- so this is a big study doing a baseline assessment of all of the gas infrastructure and all of the electric generation currently in the eastern interconnect, looking out five years, ten years, assessing the adequacy of both sectors, you know, going forward, with the anticipated additional gas demand.

And then one of the big parts of the study is actually looking at contingencies on both systems. So really understanding how electric system contingencies might impact the gas system, currently and looking forward, and then vice versa.

I'm, you know, specifically going through and identifying where there might be

stated locations on my gas pipeline system that are electric dependent.

But, you know, I won't speak for the pipelines, but my understanding is that there is a lot of redundancy built in, and the recognition that, you know, you still need to operate the gas system even if there was no kind of an electric system failure. So, I won't speak for them, but that's my understanding.

MODERATOR WELSH: Ms. Dahlberg?

MS. DAHLBERG: Thank you. As far as this being a new development, I think, in the Pacific Northwest, each integrated electric utility --

MODERATOR WELSH: Can you bring the mic up close to your mouth? The court reporter is having a hard time hearing you all.

MS. DAHLBERG: Each -- as far as natural gas being a new development, the increasing use of it, each integrated electric utility will determine their needs going forward. There is no central planning commission, if you will, or

planning arm.

And, I think there are also, I think, a difference between the Pacific Northwest and say the Midwest is the amount of coal-fired generation. There is only two coal-fired power plants in the Pacific Northwest. They are scheduled for retirement in 2020 and 2025, so this is not a huge opportunity that all of a sudden gas is going to be, you know, a perennial fuel source. Basically for us, I think, how much gas is used year to year largely depends on the hydro year.

MODERATOR WELSH: Mr. Holmes?

MR. HOLMES: If I understand your question correctly, I'm not sure that I totally do. When you say electrification, are you talking about actually having electric compression on gas pipelines?

MODERATOR WELSH: Yes, I think Rae mentioned, you know, the reliance on electrified compressors and transformers --

MR. HOLMES: Right.

MODERATOR WELSH: -- and other pipeline

equipment that rely on -- they can't produce if the electricity goes out.

MS. DAHLBERG: I didn't understand. I didn't answer correctly.

MR. HOLMES: And I don't know how much I really have to add to that other than I think as the -- as we put these very large and volatile generation units online, and as we look at the system as a whole to, you know, to all of the changes that are going to occur to it, the gas pipeline system itself, I think Lynn would agree, was basically developed for thermal load over a long period of time, for an LDC-type of load, you know, for heat load in the winter, and in the summer we could inject into storage.

The other thing is the load, the thermal loads, don't move nearly as quickly as the generation loads. You're not going to have a cold day in Denver and then, you know, have it minus ten today and 80 degrees tomorrow, or 90 degrees tomorrow. We come close sometimes, but with a big generator, they can literally fall off.

So I think there is the balancing part of that is a big part of the equation, and how we actually power the entire system, I totally agree with you. I mean, we have gas-powered compressors on the pipeline. We have electric compressors now. I think they're more environmentally friendly, so we really need to ensure as this system grows that we take care of it, you know, completely.

MODERATOR WELSH: Anybody want to comment on each other's answers?

MS. DAHLBERG: The one thing I would like to add now that I better understand the question. One thing that we do in the Pacific Northwest is we get together and we have, I want to say maybe a couple of times a year, and we get all of the electric and all of the gas participants in the room, and we talk about "what if there is a failure," and we actually do a kind of a round table mock emergency, and we say, "let's -- today's scenario is that we don't get any Canadian gas across the border in Washington.

What are we going to do?"

And there are parties that can, for example, switch. Maybe they can use their oil backup, and so then other parties in the room can identify and say, "Hmm, on that day, I could actually contract with that party and pay them to use their oil backup so that I can have their gas since I don't have an oil backup."

And so we try to encourage that these commercial transactions take place up front, so that when the emergency does occur, you know who to call, who can back off the gas needs, who can provide you, you know, with different commercial alternatives.

MODERATOR WELSH: Thank you.

So, the Quadrennial Energy Review Task Force is grappling with what should the Federal Government's role be in all of this. It's a topic of high concern. So I'd like for each of you to think about, if you have the ability to give the Task Force one specific recommendation to look at in the issue of gas and electric interdependency,

what would your primary recommendation be?

And why don't we switch it up. Mr. Holmes, you start, and we'll come down the opposite direction.

MR. HOLMES: This deals with maybe the financial part of this. The one thing that the Government could definitely help with is ensuring that we don't have cross-subsidies, that we ensure the customers coming onto the gas pipelines systems pay their freight because -- well, for obvious reasons. That's one role that they play as a regulator.

Another one would be it -- and this is just me talking. I've been to one panel discussion at PERC, and it seemed like panic is too strong of a word, but there is really a lot of anxiety to get something done sooner rather than later.

And the one mistake, I think the Government could make is by imposing unilateral solutions across the entire United States, because as some of the panelists have already talked

about, we have individual issues and individual solutions in different regions. And so I think the Government, the Federal Government, needs to be careful that they don't impose a one-size-fits-all that actually ends up making us all less efficient.

MODERATOR WELSH: Excellent. Thank you.

Mr. Dahlberg (sic)? Ms. Dahlberg, excuse me.

MS. DAHLBERG: I guess I would say that regions with an organized electric market that wish to rely on natural gas-fired generation to support electric reliability must find a way to ensure that the electric industry subscribes for firm transportation capacity to ensure timely expansions.

So it really is just giving -- I mean, the generators are making rational decisions. They just need to have the incentive to make their product more reliable.

MODERATOR WELSH: Ms. Joseph?

MS. JOSEPH: One thing I think is

important to recognize that one of the -- so Rae mentioned and others have as well, so the typical way interstate pipelines are financed are through these long-term contracts that typically a local gas distribution company takes out, you know, 20- and 30-year transportation contract on a pipeline, and then one of the interested markets that FERC created years ago where a capacity really funded, and so most of the time the pipelines are built to withstand, you know, a peak winter day, and it's most of the time not a peak winter day, so that would be really underutilized pipelines most of the time.

So these capacity release markets help to ensure that the infrastructure on the gas system is used, you know, most of the time. And that's typically what generators are buying.

And I think, very interestingly, a lot of producers are starting to finance some of these pipelines. So you're starting to see producers who really want to get the gas out, and want it to be in particular markets. We've seen at least one

mostly producer-funded pipeline in New York, and there's another producer-funded pipeline that's, you know, slated for development.

So we are seeing some pipelines built out, not necessarily from the traditional ways that we've seen it in the past.

I think it is important to recognize that there are some regional differences, but I also think, you know, really looking at the way that these capacity relief markets have worked, and really looking at the way that traditional financing for interstate pipelines have worked, and sort of, you know, evaluating and looking at how it's worked in the past, where we're at now, and really looking, you know, at some of those mechanism, is really important.

MS. MCQUADE: Okay. I'm going to take a slightly tack from everybody else.

When we look at how our markets -- how we anticipate our markets changing, we're using more renewables, we're retiring coal, we're depending more on natural gas, not just for

peaking but also for load, for power generation, yet we still also need to meet all of the requirements of the gas users that aren't power generators.

The Department of Energy is in a unique position to coordinate all of that so that we could come up with solutions that would be more inclusive. I think we have to stop looking at what is the solution for natural gas, what is the solution for electricity, what is the solution for coal, what is -- we need to look at it overall. And the Department of Energy is in a perfect spot to pull all the SOT's together and encourage them to sit down and come up with some solutions.

Because our market is changing. I mean, you can't deny the numbers that Dan said before. And when you tack on what 2015 may look like, it's going to be even more different then.

So I can understand the concern that we might be reacting a little too quickly to some of this, but I do think it's important for the country to look at it, and the Department of

Energy is in a perfect spot to do that.

MODERATOR WELSH: You know, that brings up a good question, which we've talked about in other QER public meetings, and that is the importance of public- private partnerships.

MS. MCQUADE: Yes.

MODERATOR WELSH: You all are involved in a plethora of groups and coalitions and organizations, but talking from the Federal Government's perspective, what I hear you saying, Rae, is that there is a convening role for the Federal Government.

Talk to me a little more, any of you, about your vision for public-private partnerships in this area of bringing the electric and gas industries closer together and understanding each other better to form solutions that benefit all. Yeah, go ahead.

MS. MCQUADE: Well, having just gone through a GEH forum that had more than 300 participants in each meeting, we held all of these meetings in a one- month period of time,

basically. We had over 8,000 electronic votes taken on decisions. Most of the people sitting at this panel have cast votes in those decisions. And they led on to each other.

I think it's crucial that the federal agencies, and I'm not -- it's -- not looking just at the DOE, but there are a number -- the Department of Interior, a number of different federal agencies, work with trade associations, work with NARUC. They really, really -- NARUC has just a -- in fact, Peggy and I were talking. That's where we run into each other all the time now. NARUC just has an immense ability to pull everybody together, and to have NERC involved in all of this.

Then I think you're actually going to start talking the same language. You're going to stop looking at siloed solutions that only may support one company or one segment of the industry, and start looking at it more holistically. And I think you have to do that.

MODERATOR WELSH: Terrific.

MS. JOSEPH: So, for those of you who don't know, in ISO New England, there is an effort. The New England governors got together, and they are really looking to think about how they can encourage additional infrastructure build-out on the gas system, and really link that to the electric system.

So that's an ongoing effort. They are really looking at, you know, the role that the ISO can play, and ensuring and making, you know, purchasing capacity on the transportation pipeline, and making sure that adequate infrastructure exists. So there's one example that's an ongoing effort, and, you know, I don't -- I can't tell you exactly what's happening there, but it's very interesting.

MODERATOR WELSH: Anybody else?

Okay, well, I'm going to take the privilege of changing topics, and want to solicit your advice and counsel on gas storage and efficiency. We have not talked about gas storage and efficiency efforts can provide more natural

gas, and may, in fact, eliminate the need for new pipelines. May or may not. You may have comments on that.

So can we talk a little about that, and how efforts are going forward with gas storage and efficiency, and the impact there on the electric system and the coordination between the two?

Kelli, you want to start?

MS. JOSEPH: Sure. So, I -- one of the things that I mentioned earlier, I think, that there is a role for thinking about how we can better utilize gas storage and thinking about potentially developing markets around storage and making that more accessible.

You know, my understanding of how it works is most of what's in storage is, again, for local gas distribution companies. You know, perhaps others who also buy some storage space on the pipeline. And, you know, generators, some have access to it and some do not. It really, I think, sometimes depends on their marketer. So if their marketer is working with a local gas

distribution company that has storage in their region, then that's something that's available to them. That's, as many of you know, a challenge in New England. There is no gas storage in New England, and that's part of the challenge.

I think one of the interesting things that came out, actually, through the NAESB process, was a discussion on, you know, this no-notice firm and utilizing storage in that way.

And one of the very interesting things that came out was that it's not necessarily another, you know, valid safe solution because even if you have -- you do have that kind of transportation, (1) you need storage. You need to actually have storage in your region to take advantage of that. And then (2) you still, if you take gas out, you still need to be able to put gas back into the pipeline. So again, it's scheduling, timing, differences matter, and how often you can actually schedule and nominate on the pipeline also play a role.

So again, I think there is a role to

look at how we can better utilize gas storage, and, you know, thinking about how generators might be able to use that.

MODERATOR WELSH: Mr. Holmes or Ms. Dahlberg?

MS. DAHLBERG: Kelli is right in that the majority of the storage, at least on Northwest Pipeline, is contracted for under long-term storage agreements.

However, Northwest Pipeline does have two billion cubic feet a day of storage that it utilizes for balancing. So we put that into our rates, and all of our customers, whether they utilize it or not, pay, and it's less than a half a cent, in fact it's a very, very small portion of our rate, but we use it for balancing. And, you know, I think pipelines could work in different regions and hold different amounts of capacity for balancing. It's basically what the shippers are willing to pay. So there are some creative alternatives out there for storage.

And as far as efficiency, if I'm

understanding that question correctly, our Northwest Pipeline, our market in 2008, because of the recession, we lost a lot of market's demand, but we also started really seeing a lot of the effects of efficiency of, you know, the lightbulbs, the -- everything, I think. And so we are just now catching up to market demand from 2008. So we have not been growing. We've just -- gradually have been keeping steady.

MODERATOR WELSH: Mr. Holmes, any comments on storage and efficiency?

MR. HOLMES: Just quickly. You know, clearly storage is going to be an important part of the solution for gas-electric interdependency. There is -- and it is really interesting to think about the different ways that that might happen. I was thinking the other day, and Lynn may tell me that this won't work, but what I did maybe, if you actually have firm storage available, as an end user, say as a power plant, I think maybe you could work out a separate scheduling cycle for that.

If there was certainty on the pipeline that you had receipt of gas, and there was certainty on the pipeline that you had delivery of gas on the other side, I think the pipeline would be more comfortable than having -- I mean, you could -- and I'll just say this, maybe you could have an hourly nomination cycle of some kind, if there was certainty on both sides.

And if there was certainty, you know, maybe there could be higher penalties if for some reason what was supposed to happen didn't happen, but, I -- another route, which is also expensive, as LNG heating units, but you can get a lot of gas out of those units, but you can't gasify it or liquefy it very quickly, so they're kind of like a one-way storage, but, again, that, as a supplement to other resources on the pipeline could be really helpful.

I think there's a lot of good creative discussion to have around that.

MS. DAHLBERG: Uh-huh. No, I agree with Joe. And basically, on our pipeline, because

storage is such a certainty, gas generators can call our gas control 24 hours a day and say, "I'm going to come on. I'm going take some supply." And we don't require a nomination cycle. We just say, "Fix it in the next cycle." So, yes, we do that.

MODERATOR WELSH: So we've talked a lot about scheduling, and standards, and the FERC NOPR. What other operational -- and I'll throw in financial, since you raised it -- issues does this emerging interdependency bring up, and do you have any -- beyond scheduling and nominations and those things, are there some other operational solutions that this task force should be thinking about and considering?

Ms. Dahlberg, do you want to take that first shot?

MS. DAHLBERG: I know -- I think I probably stand by my answer about creating the economic incentives for, you know, like Joe said, the rate payers are going to pay in the end for the electricity reliability. How do we get those

costs attributed to them? Who is going to pay? I think fixing that is the single biggest fix.

MODERATOR WELSH: And not a small issue, who is going to pay.

MS. DAHLBERG: No, it never is.

MODERATOR WELSH: Anybody else?

MR. HOLMES: I'll comment. Would you like to --

MS. JOSEPH: You go ahead.

MR. HOLMES: So we go with this on the trading floor every day. We live in different worlds, gas and electric, and it's something that could use some improvement today, even without the onslaught of big power generators.

So in Colorado, we're on Mountain Time, the gas day starts at 8:00 a.m. here. The electric day starts at midnight. And so, for example, if we're surplus power capacity -- and I'll try not to get too far in the weeds, but just so you can feel our pain a little bit -- when we buy gas for a 24/7 sale by our -- for fuel for our gas generators so that they can make an electric

sale, we buy gas today starting for 8:00 a.m. tomorrow, when their sale may start at midnight tonight.

And not only that, but just pre-scheduled through the weekend, for example, we buy gas -- natural gas today for tomorrow, every day, except on Friday, we buy gas for delivery on Saturday, Sunday, and Monday.

In the electric world, they schedule -- pre-schedule power on Thursday for Friday and Saturday, and on Friday for Sunday and Monday. And the gas market doesn't trade that way.

So, we are constantly looking for ways to manage our storage efficiently and things like that to make all that sync up.

I -- you know, you bring up the scheduling. Whatever we come away with at the end of this long integration process, I hope that we have some scheduling that really makes sense on both sides. I really think there are inefficiencies built into the system. I can tell you, if we try to buy gas on Sunday, it's very

expensive because the producer representative already sold that gas Friday, and he's gone. And so they're not going to wait around for us. So I think there are some really inefficiencies in the system that we could smooth out right now.

Thank you.

MODERATOR WELSH: Thank you.

One final question. I want to give each of you a chance to give some thoughts and recommendations to the task force based on these issues. Any final thoughts? We have the White House and several other important people in the room, and we'll take your comments back, so I want to give you a chance for some final comments to the task force.

Who wants to start? Rae?

MS. MCQUADE: I don't mind.

MODERATOR WELSH: You're next to me.

MS. MCQUADE: Thank you. Well, I do think that -- while I do think that scheduling is a critical issue for the recognition that the gas and electric markets need to be better harmonized

than they are now, that cannot be an only issue to be addressed.

I think that Lynn's remarks about the need for infrastructure and the need to have the proper incentives to show where infrastructure is needed is crucial, but these are all intertwined. You can't pick one apart from the other, which I think is an important recognition that everyone should make, and that everybody has to be involved in this. That it has to include the states, the munis, the co-ops, the trade associations, the pipelines, the intrastate pipelines which we haven't talked about much, and are also equally critical to getting gas to where it's supposed to go.

When you look at these issues, they're not simple, and it's going to take -- I hate to say it takes a village, but I think it's going to take a village to figure out the best way to move forward.

MODERATOR WELSH: Thank you.

MS. JOSEPH: Let's see if I can

summarize --

MODERATOR WELSH: And can you pull close to the mic?

MS. JOSEPH: I'll see if I can summarize three major concerns, or three major issues.

I think one of the things that's really important to recognize, as Rae just mentioned, is that -- and I started out saying this, but there are essentially two kinds of generators. There are those that are directly connected to an interstate pipeline, which is FERC's jurisdiction, and then there are those that are located behind a gas LVC or an intrastate pipeline, which are state-regulated. So I think right there the, you know, big issue there.

Secondly, I think, you know, some of these issues related to market finding, the scheduling differences, the operating day differences, these aren't just, you know, small concerns. These are -- these tend to be big concerns, because generators have difficult end-day nominating gas outside of typical scheduling

times that are set on the pipelines, or generators are looking to purchase and nominate gas over multiple days that can be a challenge.

And then thirdly, I don't know who can help with this, but, you know, one of the big concerns, is thinking through how liquid the gas markets are and what we can do to further encourage liquidity there, because generators are typically purchasing through marketers. There is an exchange that is set up. That exchange is really Monday through Friday, and outside of those hours, generators are relying on whoever they know and how much, you know, their marketer has access to gas.

And, you know, if the scheduling times on different pipelines are different, then if a marketer does have gas and get it to a generator, if the two pipelines don't have the same nominating schedules, then maybe that gas can't flow.

You know, there's a lot of challenges thinking through how we can make these markets

more liquid, more transparent so that we understand, you know, who is buying gas, where they are buying gas, and how easy it is to flow that gas. Even though you can nominate gas every day, purchasing can still be a challenge.

MODERATOR WELSH: Thank you.

MS. DAHLBERG: Yes, I would like to say that --

MODERATOR WELSH: Close to the mic, please.

MS. DAHLBERG: Sorry. I would like to say that this is a collaborative effort, and I think, you know, Kelli and I might disagree about whether 4:00 a.m. is better or 9:00 a.m. is better, but in the end, it has to work for everyone. And I think that, again, the incentives are the number one thing that needs to be accomplished. I guess I'll just have to stand on that. I think that's the number one thing.

I think spending time on the gas day. I realize, you know, there are problems, that can be addressed in the East with a 4:00 a.m. gas day,

but it doesn't work in all parts of the country. It's not an improvement there. I think that's probably all I would like to say.

MODERATOR WELSH: Thank you.

Mr. Holmes, final word?

MR. HOLMES: A couple of things.

I think Kelli mentioned something that we hadn't talked a lot about that is really important. And that is the commodity gas market following along with whatever these scheduling changes are and operating changes are. And that's a market that will follow the money.

And I know in our trading floor we've talked a little bit about moving the first timely cycle from 10:30 in the morning deadline to a 1:00 p.m. deadline, which is probably going to happen, and we're wondering if gas is going to be held off the market because they -- you know, there could be a difference in the demand over that period.

And so it's going to cause us some new dynamics. And so that was a really good point, I thought, that she made, too. That needs to be --

we need to start talking about that.

The other thing I'll just say quickly, too. In just looking at equity in costs and operations. I can tell you, Colorado Springs is a member of the American Public Gas Association, so -- but, for us, right now, the gas day starts at 8:00 a.m., in the morning, Mountain Time, so that's -- you know, 6:00 to 9:00 is about our peak load, and so we're right in the middle of our peak load when the gas day starts.

So we buy gas today -- we would like to buy gas today for tomorrow's peak load, but we really end up buying it -- some for tomorrow's load, and some for the next day's load. And so it's not as efficient.

If we move the gas day up to start actually forward of our peak, then we could buy gas today for tomorrow. And we get a forecast of what that would be every day at 6:00 a.m. And it can get pretty cold here. And it can get pretty cold pretty quickly here. And so it's really helpful to us to have that extra time.

With that said, I would say the majority of the APGA members that I've talked to find it a hardship to move that gas day from 9:00 a.m. Central. A lot of them are on Eastern Time zone, and they come in at 6:00, 7:00 in the morning, and their gas day starts at 10:00. And so they're able to work with their natural gas pipeline to reconcile their balances prior to the start of the next gas day, and that saves them imbalance penalties on the pipe. And they really don't want to move that because they'll be facing -- that gas day start, because they'll be facing penalties.

So, if we change it, then we've got -- we have to look at the impact on them and how that's going to be managed. In fact, they said if you're going to -- don't do -- don't start the gas day at 3:00 a.m. Eastern Time. If you're going to move it that far back, move it to midnight. Because they're going to have to try to get people in at 2:00 in the morning, or 1:00 in the morning, to start their day, and try to balance with the pipeline.

And so, I don't know if that problem doesn't have a solution, but we can't just let people -- and there will be a lot of examples of the same thing. We just need to remember to take all of those issues into account when we develop this new gas day and new scheduling regimen.

Thank you.

MODERATOR WELSH: Wow. We have learned so much this morning from all of you. I want to thank you on behalf of the Department of Energy and the QER Task Force. This has been truly informative. We hope you all are going to file comments on behalf of the organizations that you represent today. And please join me in giving these stellar speakers a round of applause.

(Applause.)

MODERATOR WELSH: Thank you all.

Now, we'll take a minute to set up for Panel 2. While we're doing that, let me remind you of two addresses that you must write down. The QER address is www.energy.gov/QER. All of the speakers' presentations and other very good

information regarding this meeting are on the website, and you can find it under today's meeting.

Also, we encourage all of you to file written comments, and that address is QERComments@hq.doe.gov.

(Pause in proceedings.)

MODERATOR WELSH: Okay. Will everyone please take their seat?

Let me remind everyone watching and attending that the panelists' views are their own, and not of the Department of Energy's and the White House.

Before I introduce the panel, I wanted to recognize a dignitary in the room, but he just walked out. Mark Gabriel, the director of the Western Area Power Administration, is here.

Mark, do you want to give us a wave? Thank you for joining. We appreciate it. Thank you. Karen apologizes for not recognizing you sooner.

Let me turn to our distinguished

panelists now. The title of this panel is "Infrastructure Needs Through 2013." So our first panel talked about the coordination needs of the two industries. We're now going to talk about the infrastructure needs.

To my left is David Eves, President and CEO, Public Service Company of Colorado.

To his left is Curtis Moffatt, Deputy General Counsel and Vice-President for Gas, for Kinder Morgan.

Clifton Karnei, Executive Vice-President and General Manager, Brazos Electric Cooperative.

And Beth Musich, Director, Energy Markets and Capacity Products, Southern California Gas Company and San Diego Gas and Electric Company, on behalf of the Western Gas-Electric Regional Assessment Task Force.

And finally, Arne Olson, Partner, Energy and Environmental Economics, on behalf of the Western Natural Gas-Electric Interdependency Study.

So, with that, I want to welcome you

all.

And, Mr. Eves, the floor is yours. Remember that you have five minutes, and the time clock is to your right.

Thank you.

MR. EVES: Thank you, Peggy.

I would like to join Commissioner Patton in welcoming you all to Colorado. I was going to tell you that the weather is always like this, but she -- I can no longer do that. She already said winter is coming, so...

I appreciate and my company appreciates very much the opportunity to participate in this QER meeting and to provide input to the Department of Energy.

We're an investor-owned integrated electric and natural gas utility serving eight states, including Colorado, which is where I work. We're the sixth largest natural gas LVC in the country, and here in Colorado we serve about 1.3 million customers through Public Service Company of Colorado.

In the electric side of our business, we have a very strong track record of emissions reductions by incorporating very significant amounts of renewable energy, energy efficiency, emission controls, coal plant conversions.

We've been the number one wind energy utility in the country for the last decade. I think we're one of the five strongest utilities for energy efficiency, and in the top ten for solar, and have had a number of industry-leading and, at the time, quite controversial -- we talked about clean air, clean jobs. Commissioner Patton mentioned that earlier -- but coal plant conversion, emission control projects. So the world is changing a lot around us, and we're helping make that change.

Natural gas is an extremely important part of our strategy to reduce emissions, and the low current stable prices of natural gas and a good forward curve are critical to doing that on a going forward basis.

I think in our gas business, and we

operate a large LVC, but also it includes about 2400 miles of high-pressure pipeline, we're very focused on, first and foremost, in a long term context, in improving the safety and the reliability of our system. And with that -- to do that, there's a tremendous amount of renewals and expansions and replacement of older pipe types, but what comes with that is a significant amount of environmental benefit and additional flexibility to serve the needs of the electric industry.

The replacement of old pipe types -- we've just gotten all of our cast iron out of the ground -- but replacing those, installing 24-inch lines or 16- inch lines where we used to have eight- or 12-inch lines, provides the line pack and the flexibility that can work with our storage, whether it's our storage that we own and operate, or whether it's upstream on pipeline suppliers, like next to me here. All of those things have to come together and be planned in order to meet a new world.

I'm going to save some of my prepared comments for later, but hopefully you'll ask me a question that fits those, but I will say this: working in electric and gas planning about a decade ago, and setting up our first trading operations, I find that with the high level of renewable energy integration, I think it was mentioned that we had 60 percent of our energy on a Colorado day. It was in the middle of the night at a low load time, but 60 percent of our energy came from wind.

The old world of being able to plan for the design day, on a gas system, and to be able to think about the line pack they can build up through the day and what time of the day the system peak is early in the morning, we have a whole new set of demands that we're facing, and to have almost 2,000 megawatts of combined cycle generation operating at wildly different levels throughout the day depending on 2200 megawatts of wind generation and the 400 megawatts of solar that's either on or coming, those things -- and

this is in a self-contained balancing area for an electric system that's not part of the larger footprint of an independent system operator where these operating requirements can be spread across a hundred thousand megawatt footprint. Instead, we're doing it on a 7,000.

But we have to design and plan the system completely differently, and be in a position to be able to have the assets in place so that the panel that was just up here can operate that system and meet our customers' needs. So I look forward to taking questions and being part of the discussion.

MODERATOR WELSH: Thank you.

Mr. Moffatt?

MR. MOFFATT: Thank you, Peggy.

I'm here today representing not only Kinder Morgan, but also the Interstate Natural Gas Association of America. We operate over 200,000 miles of interstate pipeline. My company, Kinder Morgan, operates about 70,000 miles of natural gas-related pipeline. We serve in every region of

the country. Some of our pipelines include Natural Gas Pipeline of America, Tennessee Pipeline, Southern Natural Gas El Paso, Colorado Interstate Gas, Ruby into the Northwest.

So, we cover all of the regions. We're operating in bilateral markets as well as RTO's.

I've been asked to come and speak primarily about the infrastructure needs through 2030. In the record, we placed the most recent eco-foundation study on infrastructure needs through 2035. Dan quoted some of the statistics from that this morning.

Let me just put it in context for you. Between 2003 and 2013, the industry built 12,400 miles of new pipeline infrastructure. We spent about $5 billion per year, and we added 86.7 bcf per day of capacity.

By 2035, natural gas midstream, we estimate, will require onshore $270 billion, and another $43.7 billion of infrastructure to support LNG. We average $14.2 billion per year through 2035.

As far as the size of the mains, our 16-inch adds in 2014 to 2020, we estimate will be another 7,500 miles, and 16-inch from 2014 to 2025 will total 12,000; that's inclusive of the prior 7500. And by 2035, we'll need to add 20,300 miles.

The question is: can the industry keep up? Yes, I think our record demonstrates that we can keep up. I started in this industry back when we bought up over a penny per quarter increase at the well at natural gas price. I'm dating myself; I was in kindergarten at the time.

MODERATOR WELSH: No, you weren't, because I knew you then.

MR. MOFFATT: But we've seen a lot of change since then, and primarily the desegregation of the commodity from the transport capacity and storage capacity.

I thought it was interesting this morning that many of the discussions really devolved to where are the sellers of natural gas. Not the pipelines. We're there. Where are the

sellers of natural gas over the weekend? If they want to make money, why aren't they there?

But anyway. We do raise our capital in the capital markets. We're efficient doing it, as Lynn said, with long-term contracts. It's a model that's been there for decades, and it's worked reasonably well.

Unfortunately, we're not an industry that can build it and ask if they will come. We have a combination of demand that is behind the natural gas project. We then have to go to the FERC and we have to get a determination that it's needed. We cannot go to the FERC and obtain the certificates to construct and operate our pipelines if we don't have signed-up demand. It's a rock bottom issue. It's not just finances; it's the law.

We also, however, feel that we can modify our services. I think you've seen that since the 1980's that a lot of new services as market demanded it. With infrastructure comes the ability to provide additional amounts of storage

capacity, for example. Line pack services; additional balancing services; pipelines that have additional line pack and large facilities to operate are often more comfortable with various types of balancing services than non-ratable will take, so that we can offer those services.

At bottom, though, I think we have to understand two major things. One, the natural gas pipeline industry serves multiple types of customers. We have the local distribution customers; we have commercial; we have industrial; and now we have an increasing demand in some markets for electricity.

We are under the Natural Gas Act, required to provide services on a not unduly discriminatory basis, so when we're discussing new ideas and new services for the electric market, the pipelines go to the FERC to try to modify our tariffs, and we often have to battle with the other customers for cost allocation, undue preference. Even when we're trying to do the communication and overhead first, and Pam

Silverberg is in the audience, and she has a big role for that at FERC, we had to deal with and demonstrate that it was not unduly discriminatory to allow operators to talk to each other. But it took us, I think, about 18 months to convince the public and the FERC to permit that rule to go forward.

The other major, major point that I would like to make, is do we have tremendous development risk on our pipelines, which I'll get into in question and answer, I hope.

MODERATOR WELSH: Thank you.

Mr. Karnei?

MR. KARNEI: Thank you.

MODERATOR WELSH: Karnei, excuse me.

MR. KARNEI: Close enough.

Brazos is the oldest and largest generation and transmission cooperative in the State of Texas. We own and operate over 2,000 megawatts of gas-powered generation. We are a very active participant in the Texas-ERCOT market, and I also serve on the board of the ISO. I serve

on the ERCOT board of directors.

We're a large transmission provider at ERCOT. We have over 2600 miles of transmission line. We provide wholesale power to 16 electric cooperatives.

MODERATOR WELSH: Can you pull the mic closer to yourself?

MR. KARNEI: Yeah, thank you.

In 68 counties in north and central Texas, and serving a little north of Houston, and around the Dallas-Fort Worth area.

Brazos's mission is to provide reliable and affordable electric power to our member cooperatives. This affordability issue is very important to us because in rural areas, a disproportionate number of our member consumers are below the poverty level.

We are very accountable to our member owners since they own the organization.

Brazos, as well as ERCOT, is very dependent on the natural gas industry for generating power. We have firm and interruptible

transportation agreements with multiple major intrastate pipelines. We also have storage contracts to accommodate swings in our delivery so we can match up our generation needs with our gas delivery.

During this past winter, we experienced significant problems with natural gas deliveries to our power plants. Most of these problems occurred during the coldest days of this past winter. On 25 days, the gas pipelines limited our hourly deliveries to no greater than our nominated supply for a 24-hour period, and ratable gas flows do not allow you to increase or decrease your generation output in response to electric load on the grid.

Let me give you a specific Brazos example. We have two peaking combustion turbines at our Miller plant. ERCOT called on these for many of the days for a four-hour period in the morning to run. Unfortunately, we were required to take ratable gas for the full 24 hours, and that effectively precluded us from running those units.

So in order to maintain a reliable grid in the future, it's going to be important to have an adequate amount of online capability, generation capability, that can ramp up and down in real time, and the current pipeline model of ratable flow for a 24-hour period poses big risks and operating challenges that precludes electric generating units attempting to ramp up and down.

As the natural power grid moves forward into a world with significant coal retirements and higher concentration of intermittent renewable resources, like wind and solar, being able to ramp natural gas plants up and down is going to be even more important.

In my estimation, given the severe constraints that we experienced this last winter, we're not going to have the flexibility we need.

So what do we need? In my opinion, we need three things. We need to fix what we can. We need to grab the low-hanging fruit. And the first thing that I would like to see us do is get the FERC NOPR passed with a 4:00 a.m. start to the

gas day.

The second thing is, in an ideal world, we would have an hourly gas market to support an hourly electric market, but I don't see that happening any time soon, so we need to start looking at a bunch of new services for the electric grid such as no-notice service, and especially being able to accommodate non- ratable flows.

And the third item we need is we need more capacity. We need more pipeline, and we need more storage. It will be of paramount importance to us as we move forward that in order to continue to have a reliable grid that we be able to have the natural gas industry provide this kind of operational flexibility.

On behalf of Brazos and rural electric cooperatives, we urge the Department of Energy to weigh in on this critical reliability issue, and we thank you for the opportunity to share some comments from the electric cooperative sector.

MODERATOR WELSH: Thank you.

Ms. Musich?

MS. MUSICH: Yes, thank you. Musich.

MODERATOR WELSH: Sorry.

MS. MUSICH: That's okay.

So, Southern California Gas Company is the largest LVC in the country. Our customers use about one pcf of gas per year. We -- so, SoCalGas and San Diego Gas & Electric own and operate an integrated gas transmission system consisting of pipeline and storage facilities.

With our network of transmission pipelines in four interconnected storage fields, SoCalGas and SDG&E delivery natural gas to over six million residential and business customer meters.

The SoCal and SDG&E system complies with the California Public Utility Commission's mandated design standards for core and non-core service. Our system is designed to provide continuous service to core customers; that's our small -- our residential and our small commercial industrial customers. And the design standard for

that is one in 35 year peak days.

We are also designed to provide continuous larger, non-core customers such as electric generators, through a one in ten cold day.

Both of these days are expected to occur during the winter heating season when our core usage is at its greatest.

The electric generation market in southern California is a very important customer segment to SoCalGas and SDG&E. We are very proud of our service record to this market, and have recently proposed several procedural and infrastructure changes which will improve upon that record.

The SoCal and SDG&E system has the capacity to serve six billion cubic feet per day of customer demand through a combination of pipeline supplies and storage withdrawal.

The pipeline network is highly interconnected, which allows us to remove pipelines from service for inspection or repair

without severely impacting our operations or service to our customers.

However, our system's ability to provide these flexibilities to our customers is not unlimited. Several levels of pipeline supply -- some level of pipeline supply is always needed on our system; we can't serve it just from our storage facilities even though we have very substantial storage assets.

We have seen periods of low delivery storage system happen more frequently, such as during the recent cold weather events in the eastern part of the country, when supplies were economically diverted to that area. To remedy that, SoCalGas and SDG&E have proposed changes to our customer balancing service such that customers are incentivized to manage the difference between their usage and supply during times where our system is stressed.

We also require a minimum level of pipeline supply be delivered to our southern pipeline system, which runs through Riverside

County and serves San Diego and Los Angeles. This is an area of our transmission system that has seen dramatic growth in new electric generation plants, but it's not as well integrated with the rest of our system, and we have very limited ability to supply the southern system with gas delivered in other areas.

Compounding the challenge is the fact that SoCalGas and SDG&E offer to the customers a multitude of choices for their gas supply, and for economic reasons, customers generally choose to utilize the other supply sources to meet their demand rather than deliver gas supply on the southern system. This places SoCalGas and SDG&E in the position of trying to acquire those supplies on the market, or curtailing customer demand if we're not successful.

To rectify this, SoCalGas and SDG&E have proposed construction of a new pipeline that better integrates our southern system with the rest of our gas network, and will allow us to move gas supplies to our southern system. This

pipeline represents a significant undertaking in terms of scope, cost, and construction, and we've only just begun the regulatory process.

In southern California, local electric generation is primarily fueled by natural gas. SoCalGas and SDG&E serve plants totaling 20,000 megawatts generating capacity. The use of fuel oil is not permitted by the Air Quality Management District here, even for backup purposes. And with the advent of a significant percentage of renewable energy sources installed, the electric utilities have begun to deploy quick-start electric generating facilities throughout our service territory to compensate -- and to compensate for these sudden changes in the renewable sources.

This means that several hundred megawatts of natural gas-fueled electric generation can go from an offline state to a hundred percent utilization in as little as seven minutes. This sudden and dramatic change in gas use on our system can create a severe drop in a

pipeline's operating pressure, threatening the integrity of our system and service to our customers.

To date we have not found a facility-based solution, such as additional pipelines, to fix this issue. However, SoCalGas and SDG&E have initiated discussions with plant operators, electric utilities, and the CISO Cal ISO regarding this challenge, and have committed to improving already-good communication with these parties in order to avoid pipeline issues while providing service to these quick-start facilities. We continue to evaluate the situation and seek other solutions.

Thank you.

MODERATOR WELSH: Mr. Olson?

MR. OLSON: Thank you. And thank you for the -- is this mic on?

Thank you for the honor of inviting me to come and speak to this group.

My name is Arne Olson; I'm a partner with Energy and Environmental Economics. I think

my role here is going to be a little bit different than some of the other roles. I'm not representing a specific group, but I'm a consultant, and I'm going to talk about some of the work that we've been involved with recently. And I'm going to do this with slides as well.

So we are just in the process of wrapping up our Western Gas Infrastructure Study that was sponsored by the Western Interstate Energy Board. We had Phase 1 where we looked at questions of whether there will be adequate natural gas infrastructure in the West and looking out ten or so years in the future.

And our main question there in short is: can some of the issues that happened in the Northeast, in New England in particular, and New York and (inaudible) area -- is the West vulnerable to some of those same supply disruptions and natural gas infrastructure adequacy issues that caused challenges to the electric sector in those areas.

And then Phase 2, you know, then, of

course, of large interest in the West, increasing the penetration of wind and solar, very renewable resources, that creates a need for flexible natural gas generation that's sporadic, so will the western natural gas infrastructure have enough flexibility, both physically and are the market arrangements and institutions flexible enough or will we need to introduce new products and those kinds of things to manage those flexibility needs.

Next slide please.

I want to recognize a number of people in the room today who contributed to the study. Of course, it was sponsored by the Western Interstate Energy Board, a group of western states and provinces. Funded generously by the DOE. And we were assisted by a technical advisory group consisting of Beth Musich, and Kinder Morgan, and Mike Jenkins from APS, and Alaine Ginocchio and the other Wheaton staff, and the study wouldn't have been the same without the generous contributions from -- and I should mention Northwest Pipeline, as well -- from all the

pipeline companies and all of the members of the tag.

And the Phase 1 report was released on March 17th. Our Phase 2 executive summary is being released today, and our full report will be released on Wednesday.

Next slide, please.

So in our study we considered a number of different scenarios, with the intent of stressing the natural gas infrastructure in the West in ways that it's not stressed today to see if it can respond adequately to those. Of course, every study has to have a base gauge, so ours looks at kind of current trends out through 2024.

We have a high coal retirements case where we retired 50 percent of the remaining coal resources in the region that were -- over and above the ones that are already scheduled to be retired. So today we have 40 gigawatts of coal in the West. Our scenario had 16 gigawatts of coal in 2024.

We looked at a high renewables case

where we would end up with 27 percent of renewable portfolio standard effectively throughout the West. And we looked at sensitivities on exports both to Mexico and LNG exports out of the Pacific Northwest.

Next slide, please.

Our key findings in Phase 1 are that the western natural gas infrastructure will, largely, be adequate to meet the needs of the electric sector, except under the most extreme winter weather conditions.

Now, all our regions are linked, and the West is a very broad area. This isn't a study of a small area in geography, like New England. The West is a vast area with many different supply basins and large infrastructure to support it. These regions are all linked together. They are largely planned separately today, but to the extent that there are regional events, cold weather events that affect multiple regions at once, there is an area where there is potential vulnerability in the west.

Another potential area is that gas generation that doesn't contract for firm transportation active auctioning, as we heard earlier this morning, may be subject to interruption. Now, we largely don't have this problem in the West because of our bilateral market structure. In our largest deregulated market, such as in California, we have a very explicit planning standard that takes into consideration the needs of the electric generators. So, in that area, we have adequate transportation capacity as well.

But if you're relying on a gas generator that doesn't have that firm fuel, that generator might not be firm. It might not be there when you really need it to be.

But, of course, to the extent that our natural gas needs will continue to grow, we'll need to continue to expand our natural gas infrastructure. The picture I have up here is of our coal retirements case. And on the left hand side, it's historical and natural gas demand

throughout the West region. You can see it kind of bounced around a lot, but it's largely been flat for the last 10 or 12 years.

And our base case projects that to be largely flat going out for the next 10 or 12 years largely because of the increase in renewable generation on the electric side. The red area -- the red wedge -- is the increase in gas demand caused by the retirement of 23 gigawatts of coal resources.

So you can see, it's a noticeable increase in gas demand in the West, but it's not one that's out of character with the types of increases that we've seen in past, so we believe this can be accommodated and our market arrangements are adequate to do that.

And in the next slide is Phase 2, and our key finding in Phase 2 is that increased variability in gas demand that are caused by high renewables. While it does create challenges that need to be managed on an operating day basis, but that overall, it appears that there are no

technical barriers to doing that, and, in fact, if you superimpose renewable resources on top of a system that doesn't have them, the overall effect is to reduce gas demand. It reduces gas through-put. That provides pipeline operators with increased flexibility, increased operating range, to use storage and line pack to manage those variable flows.

So if you can see the pictures on the right show -- or it can be the results of one of our simulations, where it shows operating pressures under the base case are more challenging than the ones under the high renewables case, which are the ones in orange, because as the solar and wind energy comes online, it allows the gas generation to back off, which allows the pipeline to be recharged and the line pack to be recharged, thereby providing the flexibility that the pipeline needs.

MODERATOR WELSH: Okay. Thank you all for your summary statements. Let's just jump right in. What I heard your panel -- what your

comments say is that reliability and safety are number one, and yet you have a real need for flexible service. So how does improving infrastructure answer that and how does that -- what are the steps to getting to that scenario?

Mr. Eves?

MR. EVES: You want me to start?

MODERATOR WELSH: Yeah. So what infrastructure solutions do you have that result in safety, reliability, and flexibility?

MR. EVES: So we undertake this in two modes. One, on our own system where it's improvements to the LDC or our transmission facilities. But the second mode would be working with upstream suppliers, on their storage, contracting for storage or the improvements and the capacity contracts that we're going to enter into.

So the things that can and should be done, and that we are doing, is replacing older facilities, upsizing facilities, we're reducing methane emissions, we are increasing the safety of

the system as we modernize the infrastructure, but we're also building the capability, couple it with storage, but we're building the larger facilities that have the line pack and the additional flexibility.

So, basically increasing the flexibility and the capability of the infrastructure, which, hand in hand, increases safety.

MODERATOR WELSH: Mr. Moffatt?

MR. MOFFATT: I would have to tell you the same for the upstream interstate pipelines who are under the jurisdiction of the PHMSA and we had a recent reauthorization that required even greater inspections and the use of new technology on inline tool.

So on a routine maintenance, which is not included in the numbers I quoted earlier, but on routine maintenance, we are repairing systems; we are constantly refurbishing; we're taking out and replacing compressors on a regular basis. All of that increases safety. All of it does increase reliability.

One of the challenges that we've all noted is the tremendous amount for -- well, really from the mid-continent over to the East Coast, a tremendous shift in how the systems are being used, so that the demand on various systems is different than it was for the prior 20 years, for example. We're finding compressor stations that have not been utilized in some number of years that are now being retrofitted to reverse flow, to take out south, for example, from the Marcellus; or to take increased flow out of the Marcellus midway in our system northeast. We're now building west; everything is going to Chicago and will disperse, as it has over the years. So all of that adds reliability and safety.

As I mentioned earlier, increased infrastructure, as well; new and added infrastructure, whether it's in terms of compression, larger pipe when you're replacing pipe, or building new pipe, you have more capacity, more line pack, more flexibility to work with in trying to meet shifting demands in

different parts of our system.

MODERATOR WELSH: Mr. Karnei?

MR. KARNEI: So when I look at this, I obviously approach this from the electric grid standpoint, and being from Texas, we're sitting on a lot of gas, we're sitting on a lot of pipe, so you would think everything would be good in Texas. Not so.

So the three things I think we need to do is we need to look at synchronizing, as was discussed in the earlier panel, the scheduling of the gas day and the electric day. I think the FERC NOPR is well thought out, well-reasoned, and a great start in that process.

I think we have to get access in the electric industry toward no-notice service, more non- ratable flows. That's a big concern of ours. We're looking at developing additional generation at ERCOT, and that's one of the things we're looking at very closely.

And then long term, to make sure that we can actually deliver when we have these cold

winter days, and it's primarily and a winter phenomenon in Texas, we're going to need more pipe and more storage. I know we've got a big discussion about who pays, but fundamentally, that's what we're going to need, and that the third piece.

MODERATOR WELSH: Thank you.

Ms. Musich. I cannot say your name, I am sorry.

MS. MUSICH: That's fine. It's just music, like the song.

MODERATOR WELSH: Musich, thank you.

MS. MUSICH: Anyway, yes, so as far as safety goes, California, I think, is on the forefront of the pipeline safety issues, and we had a decision recently from the California Public Utilities Commission that will allow us to hydrocast or replace some of our older lines.

And, you know, our system is highly piggable, so we are very concerned about safety. It's job one at our company, and so I think we do a very good job with that.

As far as reliability goes, because we have slack capacity on our system, and that's part of the planning standard from the California Public Utilities Commission, our customers are blessed with pretty liberal balancing rules, much more complex than what you're dealing with. And we have also substantial storage assets. We have 137 billion cubic feet of storage, and we can draw up to 3 bcf in a day.

So, I think it's a good situation for our customers, the electric generators and the other customers on our system. I think we've done a pretty good job of dealing with that.

MODERATOR WELSH: Thank you.

Mr. Olson?

MR. OLSON: I'd say the number one thing -- and I will do this mostly from an electric sector perspective as well -- the number one thing is to make sure if you're relying on a generator to provide electric service, that generator either has firm transportation capacity -- it has firm fuel, either natural gas, or backup fuel.

It seems really simple, if you think about it from a reliability perspective, but where I come from, seems simple, but it's not.

And the second thing is the one scenario that we found with the high renewal penetration that can get you in trouble is with -- if there is forecast error.

So, with solar, you know, you kind of know a day ahead if the sun is going to shine, and you have a good chance of what your demand is going to be over a course of the day, but you may not have that sense over, you know, one or two hours ahead.

With wind, it gets a little bit more difficult, so, you know, I think there's going to be increasing pressure on -- then moving from a day ahead to, you know, more near term, and I don't know if it's all the way to hourly, but more pressure on the kind of 4-hour ahead, 8-hour ahead, 12-hour ahead kind of scheduling timeframes, and more flexibility in the market arrangements that will allow you to move that

generation around in time as necessitated by the regulator rules.

MODERATOR WELSH: Let me talk about that a little more. Just generally, could you all give me your comments on how the increase in renewables on the system is impacting your system, your forecasting, your plans for new infrastructure, and what are you looking at? How is it impacting you?

MR. EVES: So we've added very significant amounts of renewables for -- we have 4500 megawatts of wind across three systems, and about 500 -- 400 megawatts of solar, and you know, we're significantly increasing the solar.

The wind has had a significant impact on a lot of things, but in particular it's required a flexible natural gas system to support on a firm basis with the NNT, with the delivery flexibility to support the gas peaking and combined cycle generation that is so important to go with the wind energy.

That's not to say that utilities --

well, and we certainly have modified and improved the ability of coal plants to regulate and even cycle on and off over weekends or for a week or two, to make changes in the way you operate other facilities, like we had a peak pump storage facility that used to be basically an economic differential between, you know, surplus energy at night from coal generation and peak prices in the day; it's now basically a wind backup plan, and it's used in that way.

So there's a lot of other changes that can happen and need to happen, but the most -- the single most important change to accommodate, you know, significant amounts of renewable energy is flexible natural gas generation because of the low heat rate penalty, the flexibility that it has, the quicker start time, stop times, cycling capability, and so on.

The one other thing I would say, I always find that when we have this discussion, we think about changes the gas industry needs to make to meet the electric industry's needs. And it's

not just -- it has to work the other way, too.

For example, progressive areas of the country that have implemented structured energy markets, and we heard from some earlier on the other panel, give the utilities an -- in those regions, the electric utilities, the flexibility to spread that, regulating, and response to changes with wind in one region or another, and lots of other kinds of resources. You can spread that -- if you can spread that over 100,000 or 50,000 megawatt footprint, instead of having, you know, one of the 35 balancing areas in the West trying to do that on their own, that makes a huge difference.

Likewise, we need to work -- the electric generators need to look upstream to the gas industry and contract for flexible delivery not only to each plant, but to be able to move that capacity that we've purchased in NNT flexibility, move it around to different resources, because there are effectively, through the day, they are substitutes for each other. They

work as a combined plant much like we look at an electric load on the system that moves through the city, and we treat it like one customer, like a light rail system. And that's the way the power plants are.

MODERATOR WELSH: Mr. Moffatt?

MR. MOFFATT: I think first of all, looking across all of our pipelines, it's obviously very regional. I think the bottom line is that we have seen the need for increased natural gas fired generation as a backup to increase very slowly. I think that may be partly because of the ramp up of various forms of renewable energy have been somewhat more modest than perhaps some of the expectations might have been.

We also, though, see in the natural gas industry quite an impact of efficiency, such that we have a fair amount of efficiency gains within the natural gas commercial, industrial, and residential use, and we think there will also be not one-for-one replacement of all coal-fired

power plants, in part because of the efficiency. So we're factoring that in.

To date, I would say it's been overwhelming; however, if you look at the INGAA study, we do, when we look out more, see much more demand for laterals to connect electric generation. How much of that is backup peaking for intermittent power and how much is replacement base load, I don't have that breakdown, but we're seeing a mix of both of them.

MODERATOR WELSH: Thank you.

MR. KARNEI: So, in Texas, it's always about the response to the market, and what we've seen: we currently have 12,000 megawatts of wind generation in the State of Texas. We've seen that cause a significant reduction in wholesale prices of electricity, which has caused people to -- when they've looked at resource additions, primarily look at peaking plants as opposed to combined cycles because they don't run very often and you have the ability to start and stop.

Under the clean power plan that was

mentioned earlier, one of the building blocks EPA did was additional renewables. If that plan goes into place, we're going to have to increase our renewables from 16,000 megawatts to 28,000 megawatts by 2030. That's going to put even more downward pressure on wholesale prices, particularly in the spring and the fall, which I think is going to drive the market to build even more peaking capacity and less combined cycle, which is going to put even more stress and strain on the natural gas pipeline.

The storage system, when we get into one of these cold weather periods, and we even push the button on a peaking plan at 6:00 in the morning and run it until 10:00 in the morning.

MODERATOR WELSH: Ms. Musich?

MS. MUSICH: Got it. Okay.

In the written materials that I sent you, I provided the results of some of our hydraulic modeling that we've looked at, where we've looked at what kind of pressure drops we can see on our system where you add one quickstart

unit versus three quickstart units versus, you know, traditional electric generator, because this is what we're seeing in California.

Pretty much every unit that is coming on in California now, whether it's a peaking plant or a combined cycle, is a quickstart unit. And so we're at the -- what we've found is that when you have one unit that's isolated from everything else, you tend to not have that much of a problem, but when you start working them together, such as in the LA Basin, we've seen our hydraulic modeling and shown that you can have, at 70 psig pressure drop in about 15 minutes.

So, if you in gas control and you're watching your pressing go completely down, you don't know that it's going to bottom out and you're going to be okay. And so it's causing us to change the way the natural gas system is run, and it's causing, you know, issues that we're trying to grapple with and deal with, because this is clearly the way the world is going, so the natural gas industry is going to have to deal with

that.

MR. OLSON: One of the things we've found that comes back to the regional differences that, I think we've heard I think kind of throughout the morning, but we looked at various different parts of the West, and the way that they treat these issues are different because of the way that the gas systems are structured.

And California, as Beth mentioned, and in the Northwest, the balancing rules are very liberal, these areas have a lot of storage -- natural gas storage that they can use to help with the balancing, because there has never been the economic pressure and the requirements to, you know, have stricter balancing rules.

The counter-example to that is El Paso in the Southwest, which the geology there doesn't really support storage, so there isn't any. That's also an area that has historically relied on natural gas peaking resources to help meet these needle peaks and electric demand. So it's an area that's very familiar with variable use of

natural gas. Natural gas use for electric generation that's not ratable, that's -- varies -- rated dramatically throughout the day.

So what they've done is develop market products that allow them to position their pipelines with line back to meet those needle peaks in electric demand.

So that's an example of how these -- this variability can be managed with a fixed pipeline infrastructure if the right market structures are in place. And this is kind of the most extreme example because there isn't any natural storage that's available to help with that.

So this is an example that other regions, I think, can look to as they need to develop more strict balancing rules for themselves.

MODERATOR WELSH: Did you have a follow-up? No.

I want to ask you a little more about regional differences. If you could speak to what

is going on in your region to address the issue of adequate supply of electricity and gas. Are there coalitions, partnerships?

I asked the first panel about public-private partnerships, the role of Federal Government in those. But there may already be regional efforts that we are either not involved in or not aware of, so I know, Curt, you have a national perspective from INGAA, but I wondered if you all could talk about your regions and what is going on collaboratively within the industry?

MR. MOFFATT: You want me to start?

MODERATOR WELSH: Sure.

MR. MOFFATT: Thank you. Let me just pick -- I'll pick three.

As mentioned in the Southwest, we have accommodated a lot of uneven load for a long time. It is a challenge because there is no storage to speak of. And, quite frankly, across the country, we're seeing it difficult to develop storage. Again, it goes back to the financials because there is so much flow in gas, and there's not much

basis between price points that people are not parking gas, they're not storing it for any type of arbitrage purpose.

So to try to develop new storage fields right now, we need market demand from traditional buyers of storage, and as we see it, they're not willing to buy from storage firm transport, they're not likely to buy it from storage. So that's sort of connected.

In the Southeast, take SNG group for example, Entergy, certainly the southern companies, they're bilateral markets, they function extremely well. They've had a fair amount of penetration of natural gas in the history -- over history.

Florida is another good example. It's a bilateral market. It's at the end of the line. It's a peninsula, but it gets the demand it needs because it's backed by firm contracts with the PUC supportive and flow through those costs.

The Northeast is a totally different story. You know, the so called organized markets

have various incentives built in, and the ISO's each seem to be different that put pressure on people signing up for firm capacity.

But firm capacity is what's needed, even there, the geology doesn't support indigenous storage to the Northeast. So all storage to support the Northeast has to get transported. And it has to get transported through the most difficult development area, across New Jersey, New York, Pennsylvania, into Massachusetts. We have our Northeast direct project in Tennessee. It's 1.2 billion cubic feet a day project to expand. And we built a 36 2.2 bcf.

People mentioned in 2003 to 2008, we had tremendous shale pipes built. They were subscribed to by producers. That was between one set of board of directors and another. You struck a deal; you struck a contract; you built it.

Northeast, this is their first market pull with LVC primarily anchoring the pipe. Totally different ballgame. We're back into the 1970's and '80s. And they have to look over their

shoulders to their PUC. So it's a totally different process.

And we also have tremendous development risk. Once we get an economic deal with our customers, we have all of the challenges to getting our permits done, all of the people who don't want a pipeline in their backyard. It's a very difficult process to build a pipeline these days. And I'll be glad to talk about that in the wrap-up.

MODERATOR WELSH: Regional efforts from Colorado, Mr. Eves?

MR. KARNEI: We've been -- have done multiple studies on our costs because of our high dependence on natural gas, the risk of curtailments in a cold winter event either from freezing on the gas infrastructure or possibility -- we talked about this earlier -- of being in rotating outages, and actually cutting off the electricity on a rotating basis to gas compression stations, and what's the domino impact of that.

We did a study on that a couple of years

ago, and we're in the process of updating that. The thing I'm concerned about now is I'm not sure it goes far enough.

If you look at the Clean Power Plan, there are multiple units in the base case of the Clean Power Plan in ERCOT that are planned to be shut down by 2020. So if we're going to get on top of this, we really have between now and 2020, assuming those assumptions are right and that plan goes into place to make sure we have enough infrastructure to support what we need, because we're at risk of losing a lot of coal plants in ERCOT.

MODERATOR WELSH: Thank you.

In California?

MS. MUSICH: Yes, so as far as the coalitions or partnerships, I think the issue of gas and electric, keeping both of them up, is very near and dear to my heart. And we had a couple of real life examples of that this winter, both in December and in February.

In February, we ended up in curtailing

end- use customers, and that was the electric generation. It was very important to us to be able to hold up the electric as well as the gas, and the way we were able to do that was because of our partnerships with California independent site system operators as well as the other local balancing agencies. We worked with them really closely on that day, as we do every day, to make sure that they had enough natural gas fired generation to keep up the electric grid.

And absent that coordination, I am fairly certain that we would have lost something, probably the electric grid, in that situation. So that partnership, and as I said, that's happening every day, that we coordinate with them, and I just -- and I think it's actually vital to both sides of the -- so I think California is a good example of how that can work.

MODERATOR WELSH: Great.

Mr. Eves?

MR. EVES: I guess when I look at electricity and natural gas industry in an

operating mode and coordination mode, and in a long-term planning mode, the long-term planning of the gas industry is probably the least coordinated within any region.

I mean, it's done more bilaterally. Just the nature of electricity and the way everything flows across each other's facilities requires more centralized coordinated planning between all the interconnected companies.

We just don't operate that way when we go out way into the future and pipelines are competing with each other, and they'd like to sell capacity to the LVC's and the generators, and -- so we do it more transactionally.

I don't know what kind of opportunity there is, but if anything would drive the potential for more regional coordination, it might be the Clean Power Plan. I mean, it's going to create a significant impact on many, many states in terms of the amount of gas generation that needs to be added in the future of our coal plants, so it could be that there is something

there.

But my sense is that we operate pretty much -- you know, as utilities we operate under the oversight of our state regulators hands-on from a safety standpoint, but from a planning standpoint, our state regulators oversee that, whereas electricity there is a lot more FERC oversight.

MODERATOR WELSH: Thank you.

Mr. Olson?

MR. OLSON: In the West, as far as the regional issue, and you heard Beth talk about the things that California has done, that's one of our geography constraining load pockets where they've been very concerned about these issues. It's also a jurisdiction where, you know, everyone is kind of under the same jurisdiction and the same backyard, so they work -- they have a long history of working very closely with these other --

The other geographically constrained region is in the Pacific Northwest, and I think you heard Lynn Dahlberg mention the effort that's

been going on there under the auspices of the Pacific Northwest Utilities Conference Committee, PNUCC, and the Northwest Gas Association. That's kind of a similar circumstance. But the area that's constrained by geography with now, you know, heavier lines on natural gas to meet peaking needs is also a region that has a winter peak both on gas and on power. So they've been very, very concerned about these issues in natural gas and portability.

Where we haven't seen as much effort, I think, is West-wide, and that's one of the things that our study has indicated is a vulnerability. We've done pretty well in the West looking regionally. We haven't done that well looking at kind of West-wide weather events. And they do come in occasionally. There can be a cold spell that sets in over the West, and that's where we might have things like well freeze offs that can contribute to reliability events. And so that's probably an area where it might be beneficial to do more work regionally in the future.

MODERATOR WELSH: Thank you.

So, let's turn to the QER now. I'm going to ask you the same question I asked the first panel, and that is what one critical recommendation would you put forward to the task force today, remembering that the task force is grappling not only with what the industry's roles and responsibilities are, but with what the Federal Government's role and responsibility is.

So, why don't we mix it, and, Mr. Olson, why don't you start with your one recommendation to the QER task force?

MR. OLSON: Well, this is -- the title of this panel is "Infrastructure Needs Through 2030," which is kind of a long way out there, but when you start to think about 2030, that's pretty close to 2035, and that's -- it starts to get close to 2040, and in the year 2040 you're not that far from 2050.

And 2050, if anyone has been following sort of longer term climate issues, is a big milestone for, you know, a lot of the efforts that

have gone on on the global negotiations and the target of, you know, reaching -- if we want to reach two degrees Celsius of warming that greenhouse gas emissions would actually need to reach that level to be set at what they were in 1990.

So, we can continue to plan for 2030 as if the next -- as if the world ended there, but I think that would be a big mistake. And I think it's time that some of these efforts that look at 2050 in isolation, and these efforts that look at now to 2030.

We don't have the golden spike yet. They have kind of taken a late charge in isolation now, but at some point we need to start building bridges between them, and start to think about what the world does in like 2035 and 2040, and whether that's the right path long term or not.

MODERATOR WELSH: Thank you very much.

MS. MUSICH: Well, I would echo that sentiments as being representative as far as recognizing the importance of the

interconnectedness between gas and electric. We really cannot look at one without the other. They just really interplay, especially in places like California where so much of the electric generation is dependent on natural gas.

And so I think that you need to look at them and make sure that the coordination between the two is prominent in what you're looking at.

MODERATOR WELSH: So, do you mean in terms of R&D, the Federal role of looking at the two industries together?

MS. MUSICH: So I think he said that earlier talking about, you know, somehow see LVC, you know, for natural gas can go down because you lose an electric compressors. And the same thing can happen, you can lose the electric because you've lost natural gas. And that was -- you know, we lost supplies in natural gas, and that had a huge impact on the electric.

And so I think you have to look at all those factors, the infrastructure, adequacy of supply, adequate -- not just infrastructure,

what's supplied. You need them both. You can have lots of pipe and have it empty, you're not really helping yourself any. So just how are we going to do the very best job we can to hold up both sides of that coin?

MODERATOR WELSH: Okay.

Mr. Karnei?

MR. KARNEI: I love what Beth said, but I think that's such a big issue. I'm looking for something that we can get a stake in the ground and execute on, and I would ask the QER to support the FERC NOPR.

The FERC NOPR revisions include starting the natural gas day at 4:00 a.m.; moving the time of nomination cycle later; increasing the number of intra-day nomination opportunities to help shippers adjust their scheduling. And we believe as cooperatives at Brazos that this is very thorough, well thought out, and it's a good first step to starting this coordination process.

MODERATOR WELSH: Thank you.

MR. MOFFATT: I'm going to go back purely as Curt Moffatt and not a representative of anyone today to when we thought of the Department of Energy and the Carter Administration, and there was a provision, the DOE Organization Act, where DOE can propose a rule to the FERC. The FERC is required to consider it. Not necessarily adopt it, but consider it.

And then it was exactly these types of issues, particularly, for example, ideas on appropriate rate design and non-ratable take. What is the end dynamic necessary to provide for a four-hour take as opposed to 1/24th, which is how we design our systems and allocate costs.

That's something that the researchers at the Department were thought to have more resources, to gather date, refine options and ideas, and they proposed a rule to FERC.

The Congress and the Administration recognized that as a regulatory agency constantly engaged in on the record proceedings, it was much more difficult and more limited resources at the

FERC to undertake some of these policy initiatives, and that was the idea of the dotted -- - part of the dotted line to FERC. The other had to do with budgets.

But there is this rulemaking provision. It's been used, I think, once by Spencer Abraham in recent memory. It was used a little bit more often right after the DOE was organized, but it's sort of fallen by the board.

So, I think the QER has a tool available. It will be interesting to see if they choose to use it.

MODERATOR WELSH: Thank you.

MR. EVES: So, my recommendation may be a little bit out in right field, but I agree with what you've heard across the panel.

But, the one thing I would add to that is, I look at the Federal Government, well, particularly the FERC, and, you know, you could ask anyone in the industry about their policy around transmission and competitive wholesale markets, and we all know about the incentives, and

you know, so much work and direction that's gone into advocating that.

This is hard for me to say next to the biggest pipeline supplier, but I think encouraging cost recovery, not just at the Federal level with interstate pipelines, but across states with the intrastate LVC, to make the investments that are needed, and to get ahead of this and build a system that has the additional capability and flexibility, but also like we talked about earlier, the safety and reliability.

And these facilities are getting very old. There's a need to do this anyway, and we definitely see the push from pens, that we see it on the regulatory side in terms of what we need to comply with.

But, I think we're all going to have to invest more and more capital in this, and we can do it in a way that's going to build a better, more flexible system that then, alignment of gas day, improved operations, all those other things can take advantage of those facilities, so, it's

not to say, Curtis, that we're not going to have something to say about your next rate case, but anyway.

MODERATOR WELSH: Well, let's talk about financing a little bit. It's been talked about on the first panel. You've certainly raised it, and what's the impact of access to capital markets? Is there money out there to invest in infrastructure? If there is, what are the challenges to accessing it? How does that play with the topic of this panel, which is infrastructure needs and challenges?

Anybody want to tackle that one?

MR. MOFFATT: I guess as the pipeline representative that is projected to raise $313 billion, I would say that the most important thing is to have credit-worthy customers that are signing contracts that cover the basic cost and debt service of your project. Then it's between us and our board of directors on the equity component, which we're obviously going to have to have some return on equity.

But, whether it's a consortium of companies that get together with some sort of parental guarantees behind supply, I don't think that really matters to the pipeline. It may have issues with the FERC, and that may be another area you want to look at, because of the capacity release rules and how they nominate the scheduled capacity within the consortium.

And -- but I think I speak for all the pipelines that we look for credit-worthy parties, and once that credit is established and it's a new venture consortium, maybe through different types of guarantees and letters of credit.

But I don't think the pipeline industry has any difficulty accessing the markets, but our lenders do look at our contracts, and they do look up behind us as to who the contracting parties are and what is their credit.

MODERATOR WELSH: Thank you.

MD. KARNEI: Not being in the gas side, I haven't financed any state pipe recently, or ever, but I would echo what Curtis said. I think

there's a tremendous amount of interest out there with lenders if you have facilities -- any facility backed up by credit-worthy purchasers with long-term contracts.

MR. OLSON: I would just echo -- I'm sorry, Beth, go ahead.

MS. MUSICH: Okay, Arne.

For us, obviously, from a little bit of a different situation because we -- because we are regulated by the California Public Utilities Commission and it's our rate payers who have to pay for any infrastructure improvements. We did file our application for a major pipeline in our system recently -- last December -- and I can tell you that our rate payers are very sensitive to paying more money, and they want to make sure that before they pay that money there is a good reason why they need to pay increased rates. So, it's always an issue for us, you know, trying to convince them that we need to have additional infrastructure. It's a challenge.

MODERATOR WELSH: Thank you.

Mr. Olson?

MR. OLSON: Yeah, I was just going to note that I think the experience overall in the West has been that the recourse to captive rate payers to finance very long-term investments is really important. That's what establishes that credit-worthy counter-party so that gas infrastructure can be expanded to meet the needs of the electric sector.

And that reason for that hasn't been there, and that's where I think we've seen issues.

MODERATOR WELSH: Any thoughts on financing?

MR. EVES: I think we share -- Colorado or California -- same thing. It's really rate recovery, rate impacts to our customers who can access the capital. It's really a matter of finding that right balance.

And I know our commission in Colorado, and increasingly, I think, across the country, have allowed pipeline system integrity adjustment-type, as we call our clause, and we work with

their staff on an annual plan to develop, you know, the right amount of, you know, pipe replacement, new lines, et cetera.

MODERATOR WELSH: Well, let me give you all a chance to provide some final thoughts to the task force and tell us what gaps in these issues we've missed in our discussion here today. I think it's been a good one.

Mr. Eves, why don't you start, because you said you had some other things you wanted to talk about.

MR. EVES: I think the one thing that I would add to the discussion that we've had, and I may have just started to touch on it, is, you know, I've heard people joke about natural gas being an input fuel for making electricity, and frankly, the interrelationship between these two industries and the amount of levers and modifications to the market structure, to the way we sell electricity, the way we deliver it, considering the provision of firm versus interruptible electric service, to the gas

infrastructure, to the compressors, et cetera, this is -- it's a continual circle, and it works equally both ways.

I think it's really important to include, and the Department of Energy should incorporate, consideration of enhancements and changes in the electric market that can provide a -- you know, a benefit back to or maybe reduce the demands for instantaneous, you know, natural gas service the way that we'd like to have it.

Natural gas is never going to flow like electricity. It's an instant business versus something that you build up and send down a line, and it takes a long time for it to get there, so I don't know that we get to, you know, five-minute gas markets, like we're headed to -- like we have in electricity.

But you can change the way we sell electricity. You can create more demand response programs. You can create interruptible programs. You can do more things on the demand side and the supply side, and with other electric resources,

and bigger markets, bigger footprints, organized ISO's and structured markets that have a significant change in the demand on this gas infrastructure and the operations of the gas system.

So, I like to think of them as kind of siblings instead of, you know, one serving the other.

So, that's the end of my comment.

MODERATOR WELSH: Thank you.

Mr. Moffatt?

MR. MOFFATT: Again, being here to talk about infrastructure construction, I mentioned earlier development cost risks.

I think another area that DOE is -- we hope to be the advocate for the energy industry. It's one thing to have Gina McCarthy talk about needing more natural gas infrastructure on the one hand as part of their greenhouse gas initiative, but then her branch's comment on EIS's in a not helpful way the very next day. It defies me why the Department of Energy cannot, within the

Executive Branch, coordinate better the choices that are being made by DOI on the case of federal lands, EPA in the case of EPA's comments on NEPA documents, CEQ and Department of Transportation, which is going to be making tremendous amount of decisions on pipeline safety and integrity standards for all for safety, but there are choices as to how dependent you are on hydrostatic testing, for example, versus use of other data that's reliable from inline tool.

So, just a few examples, but I think DOE can play a much stronger coordinating role within the departments.

MODERATOR WELSH: Thank you.

MR. MOFFATT: Within the Administration, sorry.

MODERATOR WELSH: Yeah.

MR. KARNEI: In my opening remarks, I mentioned my big three: support the FERC NOPR; somehow get to more of a gas market that puts more hourly like the electric market with additional services; and number three, we need more capacity,

more pipe, more storage.

But, my concluding remarks are going to be that when you look at the Clean Power Plan, particularly in Texas, it's going to be a redo of our grid. We need to start planning now for what our grid looks like in 2020, because it's going to have much more renewables, much less coal, and therefore we're going to need a lot more gas.

So that's what we need to start planning for is a different type of grid coming in 2020 to 2030, and I think we're going to have to do the same thing on the gas side, not only how the market is structured, what services are offered, and I guess my parting comment here is I want to make sure I'm not underestimating this effort in front of us for the next five to seven years.

MS. MUSICH: So, I just want to make sure we focus on the challenges the gas system is going to be facing as these renewables come on line, and the ramping issues associated with that.

And also ask that you would encourage and support that relationship between the gas and

the electric side that I've talked about a number of times.

I can tell you that establishing that relationship when you're not under stress is key, because when you are under stress, you don't have time for all the niceties. You have to trust each other, you have to understand both sides, and you have to make decisions very quickly, so that support of that relationship is important.

Thank you.

MODERATOR WELSH: And when are those industries ever not under stress?

MS. MUSICH: Yeah. Good point.

MR. OLSON: I'm kind of struck by -- I think I'm a little bit bipolar, I guess, because those are two very different focuses of the discussion this morning.

One of them is very, very long term, and one of them is very, very short term. And so we've been kind of focused on both.

The longer-term needs are to 2030 and beyond. You know, will we continue to replace

coal generation with natural gas generation, thereby increasing demand for natural gas and the need for new pipeline and natural gas infrastructure? How long will that continue? Will, at some point, the demand for natural gas begin to decline as we get more and more serious about power production later in the century? When and how soon does that start?

At some point, we'll be at the point where we need to have -- where we're reaching the economic lifetime of the investments that we're making now, and we'll need to start to have more and more certainty about the future of those investments.

Now, the good news is that for this industry, and Michael has been doing some really interesting work that shows there might be an interesting future for the natural gas industry to supply a blended supply including -- introducing more hydrogen in the supply and introducing sources of bio- gas, possibly doing things that are even more interesting like power to gas,

taking advantage of this big infrastructure that we've built and using it to help balance some of the issues on the electric grid, as it's already doing today.

So there is a long-term future that is interesting and worth thinking about.

Then we have this very, very near term focus on, you know, solving those issues around the variability, some of which is caused by the increase in renewables, some of it is already there, anyway, due to the challenges of supplying this commodity to an electric sector that needs to be balanced on an instantaneous basis, and those things are very serious and need to be addressed as well, and I think there are a lot of efforts going on there.

As we heard today, there still isn't really consensus about what needs to be done on all those, and I hope that the industry can get there soon.

MODERATOR WELSH: Well, thank you all. I think we've learned a lot about the

infrastructure challenges, and certainly many of the solutions articulated here. Thank you all for joining us. Let's give them all a great round of applause.

(Applause.)

MNOERDERATOR WELSH: It's rare that we're running a little ahead of schedule, but we are, so let's just move forward and set up for the open mic session. And I would ask the DOE staff to come forward.

(Pause in proceedings.)

MODERATOR WELSH: So now we turn to the portion of our meeting where we hear from attendees.

For those of you that are watching livestreaming, that doesn't mean we don't want to hear from you as well. So please submit written comments. Really, truly, they are read, in detail, and considered very seriously. So, I'm going to do it one more time. The address is QERComments@hq.doe.gov.

For those of you in the room, we have

two speakers who have signed up today, but before we hear from them, let me introduce our Department of Energy panel.

To my left is Chani Vines. She's a senior advisor in the Office of Energy Policy and Systems Analysis.

Matthew McGovern, also in the Office of Energy Policy and Systems Analysis as a special advisor.

And Levi Tilleman in that same office as senior advisor.

All three of these people are spending night and day working on the QER. It is not a 9-to-5 process. Very dedicated Federal public servants.

MR. TIMMELMANN: But, Peggy, just, Matt is senior and I'm special.

MODERATOR WELSH: Oh. All right. So noted.

So with that, let me ask for our first speaker to come up to the standing mic in the aisle, and that is Brad Bouillion.

Brad, we have the timer on, and you have five minutes.

Speak closely into the microphone.

MR. BOUILLION: I have only a couple of comments. I had more but I'm getting old now.

MODERATOR WELSH: So you can submit them as written --

MR. BOUILLION: I have two, I think.

The two observations I had was during the discussions there was comments related to the gas day starts. I'm Brad Bouillion. I'm representing the California ISO.

And there was multiple gas day starts, and I wanted to just reiterate that California ISO is the one ISO that accepted all the gas day start timings because we believe you can look at other issues and other solutions, and the gas day start is really just -- it's not the crux of the problem; it's one of the symptoms that we're seeing.

The second one was a discussion on regionality -- a discussion of regionality, and

unique principals involved in the markets. And in California we actually have the gas cycle nominations will close, and we immediately our day at market for the next day. And our participants like that structure because it gives them price certainty when they go to the market. And that's because of two conditions. It's because in California, we have deliverability certainty on the gas side, a function of what you heard earlier. And also that we have stability in our day-end market. Our day-end market is highly representative of what our real-time solution is. So there is very little variability between the day ahead and the real-time markets.

So these two conditions, I don't want to consider them to be all the -- for California versus other ISO's, but the way that we have them set up, it's a condition -- given the conditions we have, it's a solution that works, and I'm encouraging additional investigations and discussions to say, "Okay, there is more than one way to be right here. It's not one solution,

because not everybody has the same conditions in their market that are simply solutions." People are trying to solve their problems and move forward here. We've heard a lot of discussions on that, and I think that when we look at California's market, our renewables penetration is very high. Our growth in our rurals is very extremely high. We have no coal. We're over two-thirds gas fire; we're 68 percent gas fire.

So, I mean, everything is in our market that I think the rest of the country is headed towards. And I want to encourage us to learn because we made mistakes as we go along, but I hope other people don't repeat those mistakes so that we all learn and we all leverage the learning to make the process less painful for people that are moving along slightly behind us or right along step with us, but just watch those percentages.

That's all I want to say.

MODERATOR WELSH: Thank you very much.

Our second speaker is Pam Silverstein.

MS. SILVERSTEIN: I'm Pam Silverstein

with the National Rural Electric Cooperative Association. Thought it was two great panels. I want to thank the DOE for putting this together, and for the three of you and your colleagues, I know how hard you are working. I've had conversations with your colleagues at nights and on weekends, so it's going to be a long summer, but you will -- just schedule your vacations for next February.

I think one thing that I was thinking about was I think it was in 1978, and maybe it was somewhere around when DOE was created, but there was a Fuel Use Act that actually really sharply restricted, if not outright prohibited, the use of natural gas for electricity.

And that's, in the scheme of things, not that long ago. And I just wanted to point that out. Well, in my live -- in our lives. Not that long ago. So this incredible revolution that we -- and of course, everyone knows, the shale scale is just a creature of really the 21st century, so the changes have been very, very fast. Very rapid,

and everybody is running in place to keep up.

In terms of something that I think is incredibly important for the QER to undertake, and to echo something that Curt said, and I'm not just calling him out because he called me out, but the fact of that is one of the four building blocks of the EPA greenhouse gas when it was in (inaudible) does really depend on gas-fired generation replacing so much of the coal.

Mr. Olson was talking about looking past 2030 to 2050, but that's the near-term issue. I mean, that's in the next two, five, seven years. And I think, you know, people like to say, "What keeps you up at night?" I think that's what should be keeping us up at night.

Curt mentioned in passing, the difficulty of building interstate gas pipelines right now. I mean, one thing that the Natural Gas Act has that the Federal Power Act does not have is the Natural Gas Act does give FERC the deciding authority, and once a pipe has a certificate, it can go ahead and come down and whatever. Electric

sites can do that for transmission, but even with that, the process of building pipe is painful, long, and expensive, and if we are to -- having this confluence of issues where we meet at a lot more depth of infrastructure, they'll -- now to accommodate, you know, the impact of whatever changes come about as a result of the EPA regs, I think it's a potentially scary future out there.

I think that as many of you probably know the House Energy and Commerce Committee is holding a hearing tomorrow, to which all five FERC commissioners have been invited/commanded to appear, and that is the very topic. So that's really something that I think the -- you know, it's part of the Presidential Climate Action Plan with QER, but there does need to be more coordination between federal agencies like siloes and really are almost working at cross-purposes to each other.

UNIDENTIFIED SPEAKER: Thank you.

MODERATOR WELSH: So that is the conclusion of our open mic session. Let me turn

the floor over to Matt McGovern.

MR. MCGOVERN: Well, first, is there anyone else in the audience that wants to speak today that we didn't get?

MR. LARSON: Doug Larson, Western Interstate Energy Board, these views are my own.

The concern and argument made for the long- term view that I think is really important for the QER to pay attention to. Also, the QER needs to pay attention to the question of whether methane leakage, in fact, is going to cause natural gas to be a more greenhouse or highly greenhouse gas intensive fuel, not unlike coal.

So if that is the case, then our worries about gas infrastructure are probably expressed. So my suggestion would be that QER pay close attention to the issue of methane mitigation and its effect on greenhouse gases.

Thank you.

MODERATOR WELSH: Thank you, Doug.

MR. MCGOVERN: Thank you.

Anyone else?

All right. Well, we'll just wrap up.

First, I just want to thank everyone for coming today, and thank you to our panelists for putting together your presentations and traveling to this meeting and giving the DOE the input that's so important for the QER process.

I also want to thank the -- all the DOE and energetic staff who helped put this meeting together. And thank the Auraria Higher Education Center and Metro State University staff who helped put the meeting together and host us here and livestream the event online.

We are still taking comments on our website, Energy.gov/QER. You can also email them to QERComments@hq.doe.gov.

We've got several other meetings coming up. Our next meeting is in Chicago on August 8th on rail, barge, and truck transportation.

The same day, August 8th, we'll also be in Bismarck, North Dakota, for a meeting on (inaudible) and infrastructure constraints.

We'll be -- after that, we'll be in

Santa Fe for state, local, and tribal issues. That's August 11th.

August 21st we'll be back in Cheyenne to discuss infrastructure siting.

And the next one after that is in Newark on September 8th. That's for electricity transmission, storage, and distribution, focusing on the eastern states.

So we've got several more meetings coming up. All the information about our past meetings and meetings coming up is on Energy.gov/QER.

And with that, we'll wrap up today. Thanks everybody.

(Whereupon, the meeting was concluded at 12:20 p.m.)

CERTIFICATE OF COURT REPORTER

I, ROGER MEYERS, 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.

_____
ROGER MEYERS

CERTIFICATE OF TRANSCRIPTION

I, VALORI WEBER, hereby certify that I have typed the transcript of this proceeding using the Court Reporter's notes and recordings. The foregoing/attached transcript is a true, correct, and complete transcription of said proceeding.

_____ August 12, 2014

_____ VALORI WEBER Transcriptionist

G

S