

American Perspectives on Energy Efficiency

On April 30th, *OurEnergyPolicy.org* and The University of Texas at Austin co-hosted “American Perspectives on Energy Efficiency,” a panel discussion about energy efficiency at The National Press Club in Washington, DC. The panel of thought-leaders provided insight into energy efficiency policy issues and explored the results of two recent sister surveys that reveal Americans’ and energy professionals’ perspectives on energy efficiency.

Opening remarks: **Bill Squadron**, President, *OurEnergyPolicy.org*

Presentation of survey results: **Sheril Kirshenbaum**, Director of The Energy Poll, University of Texas at Austin

Speakers:

- **Marilyn Brown** (moderator), Professor of Public Policy, Georgia Institute of Technology
- **Judi Greenwald**, Deputy Director for Climate, Environment, and Energy Efficiency, U.S. Department of Energy
- **Michael Webber**, Deputy Director of The Energy Institute, The University of Texas at Austin
- **Lisa Wood**, Executive Director, Institute for Electric Innovation VP, The Edison Foundation

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BILL SQUADRON: Good morning. As people continue to come in, we're going to get started. There are obviously tremendous transportation challenges this morning, and we appreciate all of you joining us and braving the elements to be here.

We are particularly delighted to have partnered with the University of Texas Energy Poll. I'm Bill Squadron. I'm president of *OurEnergyPolicy.org* and Our Energy Policy Foundation, which is a nonprofit and nonpartisan organization dedicated to providing resources for those involved in the energy field, particularly in the policymaking area, both in terms of substantive dialogue that can help to inform the area, as well as resources that are easily accessible and useful for people who are working on these issues.

We began this program about four years ago, and the goal was to create a substantive and open dialogue that would be inclusive of everyone involved in the energy sector, and would differ from things like wikis and blogs by being limited in terms of the discussion to people who were substantively engaged in the field, but open to everyone regardless of perspective. Because the goal is to bring together all the different views and to try to achieve some progress in the policy area that we all know has been a challenge in energy for decades.

So we're very pleased to have everyone here this morning. We have a tremendous panel. Energy efficiency is an area within the energy sector that I think sometimes gets a little bit less attention than some of the higher profile, more controversial areas. But it's a critical part of the mix as we look at long-term solutions in this field.

And we have a tremendous panel that will be addressing the current state [of energy efficiency], as well as some of the things that we need to be looking at going forward. In a second, I'm going to bring up Sheril Kirschenbaum, the director of the University of Texas Energy Poll. We joined forces with them. Our focus is on the professional energy community. We polled that community on energy efficiency issues. The University of Texas Energy Poll conducted its American Public Poll on the same issues, because we were looking to see what kinds of things came out of comparing the two side by side. And we did it in the same timeframe so that it would be a proper comparison.

So she will be going through briefly the results of that. We'll be able to provide to you the full report shortly. And the other thing that she'll be doing is going through some of the numbers that compare both their poll and ours.

We'll then turn it over to the panel. They will discuss these issues for about 45 minutes. And then we'll going to open it up to the audience for question-and-answer for about 10 or 15 minutes at the end.

So the last thing I'd like to recommend to everyone, if you're not already using *OurEnergyPolicy.org* and its resource library to look at the discussions and the dialogue and participate, if you're not registered as an expert on that site, I'd really encourage all of you to do it.

The discussions in particular have become increasingly interesting, compelling and useful, I think, to people engaged in the field recently, as more and more members of Congress have begun to use it as a platform to solicit input, not from the public, but from the energy community. Congressman Alan Lowenthal did something very recently, which was extremely interesting. Fred Upton did something very recently, which was really interesting in the natural gas area.

So I really encourage everyone to get involved and participate, because it's a growing resource that I think is going to continue to increase over time.

So without any further delay, I'm going to bring up Sheril Kirschenbaum, the director of the UT Energy Poll. She's going to go through the survey. Sheril? [applause]

SHERIL KIRSCHENBAUM: Thank you, Bill. And I'm delighted to see so many of you here today. Thank you for braving the weather.

So the UT Energy Poll has been around since 2011. We've done our version of this poll about six times. So we're creating a longitudinal data set, nonpartisan, objective, a way to track attitudes on energy. And it was such a treat to be able to partner with OEP on this particular wave, and really highlight energy efficiency. Because every time we come out with the data, we get more and

questions – well, what do you have to say about efficiency? We've highlighted other things over the years, like hydraulic fracturing and the water/energy nexus, and we'll continue to be doing this.

So without further ado, I think the best way to start this conversation is to show you a little bit of our latest survey. It's just really a snapshot of a much bigger data set to give you a sense of what we did and what we're doing. And of course, if you have any more questions, definitely come to us after, follow up with us by email or phone, and we'd be happy to provide a much more in-depth analysis on any given topic.

But to give you a sense of what we've done, our poll is weighted to reflect US Census demographics. So it should be nationally representative of the entire American public. The poll by OEP was distributed to their very vast network of energy professionals, and what we have represents those who opted to take the survey.

So you can see, the US is about 50/50, 52% female, while the energy professionals, perhaps not surprisingly, does tend to skew male.

Politics are a little over a third Democrat for the American public; a little under that for Republicans. Whereas, there were more Democrats represented in the poll by Our Energy Policy.

The good news is both groups do prioritize energy efficiency, with 79% from the American public and 82% of the energy professionals that we considered.

We also asked who is most responsible for driving energy efficiency measures. And what you can see is that among the American public, 36%, so just over a third, look at the federal government; while even higher among energy professionals, nearly half.

The public does look at industry a little more closely to drive energy efficiency; whereas just 7% of energy professionals do that.

We're very interested in trust. So where do people go for their information on energy efficiency? And what stood out to us very early was that there's a pretty big difference [in] who trusts the media. So we had about a quarter of Americans, 25%, saying that they trust the media on energy efficiency; whereas, just 7% of energy professionals say that they trust the media.

And what we're also seeing with our poll, which I'm happy to talk more about at great length, is that there's a general lack of understanding on energy issues overall among the public. Energy literacy appears to be low.

Also low on trust among the American public is oil and gas; whereas 19% of energy professionals say that they trust the oil and gas companies.

Some encouraging news for me coming out of academia, 48% of the American public say that they trust the academic community and scientists, and that's even higher among energy industry professionals.

And we also saw a pretty big split, which is just noteworthy as well, that 21% trust retail outlets among the American public; whereas, just 6% of energy professionals say that they trust the information from retail outlets. So a pretty big disparity there.

Where should we spend money? These looked very similar. Among energy professionals, it was 54% on energy efficiency; among the American public, it was 41%.

And also, another priority being renewables – 40% among the American public; 32% among energy professionals.

And again, this is just a small subset of questions. There's many ways to break this down demographically and it gets much more interesting from there.

But where can you personally save the most money from energy efficient improvements – 21% of Americans said transportation; whereas, 31% of energy professionals said transportation.

But you'll see that the most popular answer which was very close for both was home heating and air conditioning.

Now, that was only a tiny bit of what we've got. So we really want to get to this panel. I just kind of went through that very quickly. But please do follow up with us; we'd be happy to talk to you a lot more. You can follow up with myself or Mike Spiak, who's very involved in the Our Energy Policy poll.

And with that said, let's get to the panel. So thank you so much. [applause]

Bill SQUADRON: So while everyone's taking their seats, I'm just going to give a quick introduction. The broader bios are in the package that was available out front, and as you can imagine, each one of our distinguished panelists has a biographical sheet that would take a long time to describe. So I'm just going to be very brief.

We're absolutely delighted to have such a diverse and expert group. To my far left, Judi Greenwald, who's the deputy director for climate, environment and energy efficiency in the Department of Energy's office of energy policy and systems analysis. Before that, she had been, for many years, lastly the vice president for technology and innovation at the Center for Climate and Energy Solutions, which was previously the Pew Center for Global Climate Change; and earlier in her career, worked as an advisor to the White House Panel on Climate Change, worked on the Hill at the Energy and Commerce Committee. So a tremendously distinguished career in this field.

To her right, Michael Webber, who is the deputy director at the Energy Institute at the University of Texas; associate professor of mechanical engineering there; and is involved in all kinds of energy entrepreneurial and incubation activities throughout the industry. So I'd urge you to read some of the things he's doing because it's pretty amazing.

To his right, Lisa Wood, who's the executive director of the Institute for Electric Innovation, which is a part of the Edison Foundation, and leading that into some very interesting and creative areas. Before that, she had spent several decades working with utilities all over the country on economic, financial and market analysis issues. So a real expert in working directly with utilities on how to deal with consumers and programs to encourage different kinds of behavior. She's also an adjunct professor at Georgetown. She's also on the board of Energate. So again, you can read the long list of things she's doing.

And then finally, Marilyn Brown, who will be moderating the panel. We've been working with Marilyn at Our Energy Policy for a number of years. She's our topic director for energy efficiency. She is a professor at Georgia Tech. She's on the board of numerous organizations. And she's been a tremendous supporter of what we've done.

And in closing, what I do want to make sure everybody's aware of is that *OurEnergyPolicy.org* is an online vehicle for discussion. So the discussion that's going to take place today will actually continue online. It'll be up in a couple of days and everyone here will have the ability to put in their own observations, comment, engage in a direct dialogue with each other and with the people here as an extension of the discussion that'll take place this morning.

So with that, I'm going to turn it over to Marilyn, and I think it's going to be a great discussion. Thanks.

MARILYN BROWN: Thank you, Bill. And thanks everyone for making your way here this morning.

We have had the benefit of several very interesting energy efficiency dialogues on OurEnergyPolicy website. So I hope you'll take a look at some of those. I thought that perhaps we might begin by talking about the concept of energy efficiency before I turn this over to Q&A with the panelists, because it has evolved. And it's really important to hone in on what it is we're trying to focus on today.

So I always think of energy efficiency as getting more for less; that is, more energy services while consuming less energy. So the kinds of measures you use are lumens per watt, or miles per gallon, or various coefficients of performance. It's always the same concept, of getting more for less energy.

And you can achieve this through either using better technologies, or by using technologies better. So there's both the equipment kind of focus, but there's also the behavioral focus. So you're going to use a high efficiency, perhaps a heat pump system for space conditioning a building like this, but you also are not going to condition rooms that are unoccupied. And you're going to use the appropriate O&M to be sure that everything is running well. So all these behavioral actions are important, too.

Very different from the concept of energy conservation, which was the focus 20, 30 years ago. Sometimes still gets blurred with this concept of energy efficiency. Energy conservation brings up concepts of welfare and sacrifice. So there's always a welfare loss when you're having to give

something up that you value. So we're not talking about that today, not that it's not wise for us to conserve, to use less, to dematerialize, but just because that's not the focus of this panel. And indeed, we're not going to talk about sacrifice; we're going to talk about using energies more smartly.

We're also not talking much about the demand side management; or demand response, I should say. We're not talking about shifting consumption from high-peak to low-peak periods. That's also not energy efficiency. Although, of course, if you have a peak concentrated energy efficiency product, that is more valuable than one that simply shaves energy across the board.

So I put that out there for you as a sort of conceptual framing of the discussion today. What we're going to do is we're going to start with statements by each of our panelists on their perspective on energy efficiency and whatever they want to say for no more than five minutes. And then we're going to go into a Q&A mode.

And I think you can probably speak from there, unless you'd like to come to the podium. You're choice. Okay, let's start with Lisa Wood.

LISA WOOD: Thank you, Marilyn, very much. Good morning, everyone. And thanks for braving the weather. I know it's not fun in Washington when everyone is trying to get the same cab.

So I wanted to say a couple of things about where we are today with energy efficiency and some of the major parts, I would say, of energy efficiency; and also note my organization is part of the Edison Electric Institute. We were started about five-and-a-half years ago as the Institute for Electric Efficiency. We've now changed our name to Institute for Electric Innovation, because efficiency is part of a much broader conversation today in terms of innovations that are happening around the country on the electricity side, with improvements to the grid, improvements all across the power system, and changes to the power system. So we've moved to that broader topic of innovation, which includes efficiency.

I want to go back to the poll just for a second. When Americans and energy pros were asked where should the US be spending the most money on R&D, they said renewables and energy efficiency; those were the two big parts of the pie. And that's an interesting response, because it tells you what people are interested in.

But renewables and energy efficiency are at the two ends of the spectrum in terms of costs. Energy efficiency is our lowest cost resource, and renewables, although prices are coming down, are one of our higher priced resources.

So it's interesting, to me, that the poll came out that way. But it also tells you what's on people's minds, and what they're interested in doing.

We look at the state of energy efficiency in the US every year. Lots of people look at it. We're still spending about three to three-and-a-half cents per kilowatt-hour to save energy. That's way cheaper than building a power plant of any sort. Even with the low natural gas prices these days, energy efficiency is definitely a lot cheaper than nuclear, renewables, or anything else.

So energy efficiency is an extremely cost effective resource. Probably everybody in this room is aware of that. But I do want to point out that we've achieved quite a bit of energy efficiency in the US, and we still have a long way to go. As we achieve more and more energy efficiency, or energy productivity – because that's also a term we're using today, related to making the economy more productive – those costs will go up a little bit.

But still, it's the lowest cost resource and we could be doing a lot more.

So what have we done, or what are the big components of EE? When I think of energy efficiency, I think of the electric utility industry – and gas utilities as well, but I'm going to focus on the electricity side – doing energy efficiency programs that are funded by customers. These programs offer customers ways to save energy in their homes, in their businesses, and in their buildings, whether it's a simple thing like changing to an LED light bulb, or a major retrofit of a building.

On the electric utility side, those kinds of programs achieved about 126 terawatt hours of savings in 2012. .

But what we're seeing, if you look over the past five, six, seven years is just a constant increase in savings achieved through energy efficiency programs that are administered by utilities, electric utilities and also– I'm giving the electric number, but gas utilities as well.

So along with that, you'll see budgets growing for spending money on energy efficiency, which means, again, having regulatory approval to spend. In 2012, electric utilities spent about \$6 billion on customer-funded energy efficiency programs and budgeted about \$7 billion for 2013.

Historically, the number grows every year. And there are reasons for that, and we'll talk about that later in the panel. And I'm sure some of you are aware of that.

The other big area I want to touch on is the absolutely critical role of codes and standards in the US. And what I mean by codes, is building energy codes; and standards, I'm talking about appliance efficiency standards, equipment efficiency standards, energy efficiency standards. Almost everybody has probably heard of the refrigerator story; that is, today's refrigerator uses about 50 percent less energy than one from 20 years ago. What we've seen over the years is that standards are incredibly effective at saving energy, because standards set the market baseline and give consumers choices of only the more efficient appliances or only the more efficient types of equipment.

DOE is working on standards and we (at IEI) have done some work on projecting the impact of standards over the next couple of decades– between now and 2025, between now and 2035. And our expectation, considering the long-term effects of codes and standards once they are implemented, is that, even without a lot of aggressive assumptions, we're going to see up to a 7% decline in electricity consumption in 2025 and up to a 10 % decline in 2035 relative to the AEO baseline forecast in those years. . This is a tremendous amount of savings from codes and standards. Plus, the standards kick in right away, in terms of what people are purchasing. Codes take a little bit longer as the building stock changes over and as buildings are retrofitted.

So those two things – the efficiency programs, but also the codes and standards – are incredibly important to the savings that have been achieved and savings that we will achieve in the future. In my opinion, the absolute most effective way to move efficiency forward is with codes and standards. They're low cost and they work. And we've seen it for years; we've seen it for decades.

I'll close with that.

MARILYN BROWN: Okay, great. Mike, your perspective.

MICHAEL WEBBER: Great. Thanks for coming out. As a Texan, going through an epic drought, I think this rain is magnificent. [laughter] We have epic droughts punctuated by biblical floods, and we're in one of those epic drought phases. Actually, when it rains like this in Texas, we're like, "What are those chemicals coming out of the sky?" So this is fun. I even own an umbrella that I brought with me; I was very pleased.

I'd like to note that the Energy Poll revealed that the energy industry is three-fourths male, one-fourth female. And this panel is flipped. [laughter] So we are now in balance as a world. So I'm pleased with that.

A couple comments. One is the poll – dig into details that wasn't shown today, so I'd urge you to look into some of the data – when asking people about their views on energy prices – we're very price-sensitive in the United States as consumers and as an economy overall – people think prices are too high for gasoline. No surprise; we've thought that for a long time. More importantly is that they uniformly, a vast preponderance of the respondents said they expect energy prices will be higher six months from now.

And I think that's very important. The decisions around energy efficiency are driven partly by price, but I think more importantly they're driven by what people think price will be in the future. And if people think prices are going to be high in the future, they're more likely to take the time to invest the money in energy efficiency today. And that's because energy efficiency is often an inherent financial tradeoff between capital expenses today for operational savings downstream – I'll spend more money today on energy efficiency so I spend less money on energy later on.

And that's a tradeoff for a lot of things, like initially the refrigerators; efficient refrigerators were more expensive. Although today they're cheaper. A more efficient car is more expensive. A more efficient air conditioner is more expensive. Better windows are more expensive. All these decisions around energy efficiency require more money up front, but then you make the money back over a couple months or years, depending on your payback, as you save your energy expenditures later. And then a funny thing happens, we all do it because of codes and standards like Lisa mentioned, those costs come down. So the energy efficient windows are not that much more expensive.

But there's this upfront capital versus downstream capital. So there's a capital problem, a financial problem. And if we get better capital markets that are aligned with this, where you are rewarded for your energy efficiency decisions – for example, if your house that you're remodeling, if you could

qualify for a bigger loan because you're going to spend money on energy efficiency devices and windows and insulation, and the bank recognizes your utility bill will be \$200 cheaper each month and therefore you can qualify to afford more money in your mortgage to pay for it, that would be a solution.

So there's a capital markets problem, and that hinges on whether banks understand what's going on, and also whether people expect prices will be high. So I think that's one interesting element of this poll that came out, is people expect prices will be high, and people think energy efficiency is important. These go hand in hand.

Another point I want to make is on engineers and scientists. I'm an engineer, and so I noticed in there, in the poll, in the details, people are asked "who are the groups who are doing the most to help you with energy?". And there were questions like President Obama or Congress or oil and gas companies, that kind of thing. The number one rated group was engineers. I just want to let you know that [laughter], that we are doing the best job to tackle energy issues that matter to you, according to the poll.

And it was about 40%. So I'm twice as popular as President Obama, is what it turns out. [laughter] He only clocked in at 22%. Congress was at 9%, by the way. So Obama was the highest rated of all the government officials or entities, and DoE was in there just behind him, and then Congress.

So engineers and scientists maybe play a role, at least according to the public and the respondents in the poll, which I think is terrific. And not only do they say engineers and scientists are valuable, but they also said R&D is valuable. So there's a call for R&D and a belief that engineers are useful. These go hand in hand because engineers and scientists like to do R&D.

And so I say, why don't we do more R&D? It is wanted. It's effective. We're pretty good at it as a nation. If you compare the United States to any other nation, it's one of the things we do better than everybody else, is invest in R&D and commercialize it and get good products out there.

R&D has few downsides. Really bad R&D is just a high-dollar jobs program. Like at worst, it doesn't kill people, right? There are a lot of policies that actually kill people. But R&D, you just maybe employ some people.

And yes, you might get good something out of it. You might get some breakthroughs or you might get some economic value. And I think of the space program. Something like 10% of the national economy in the '60s was invested in this space program. A lot of money was put into innovation at the time. And that got us Tang and the Slinky and better sunglasses. Think of all that economic value. Oh, and by the way, the entire microelectronics industry.

So you get really good economic spin-offs from R&D. The last time we did really big investments in R&D for energy was in the '70s. We spent about \$8 billion a year. We're not there now. We're at a couple billion dollars a year for R&D across the nation. And the last time before that we invested a lot of money in energy R&D was in World War II. We got catalytic cracking for petroleum and we

got the Bomb for nuclear. So we can argue about whether that was good investment. But we did get breakthroughs.

So this is something we could push for. R&D is desired. It's useful. And people like us. So we should do that.

One other comment I'll say that Sheril showed, is the poll of respondents showed that of the things R&D should be spent on, 60% wanted it to be on supply, renewables, nuclear and clean coal. Oil and gas wasn't on the list, I noticed. Or it wasn't selected. And 40% want energy efficiency.

So as Americans, we prefer to increase our supply, rather than to reduce our consumption. That is a very American thing to wish to just have a better drug, rather than to reduce our drug use. [laughter] And that's sort of the way we're headed.

Now interestingly enough, if you compare where our actual R&D dollars went, there was report out of Harvard a couple years ago that shows that R&D actually was 80-90% on supply; 10-20% on efficiency. So the public wants it to be more in balance. It is not aligned with where we're actually making our investments.

One last comment I'll make because I'm about to get the hook, is what Lisa said, about codes and standards. I was about to make a compliment to Lisa, so I think you should give me the time. [laughter] She emphasized the importance of codes and standards, and I want to affirm I think it's very important. Codes and standards are one of the places where there should be policy agreement. We argue about the role of government, should government intervene more or less, but Article I, Section 8 of the Constitution gives Congress the authority to set standards, it gives the government authority to set standards. This is one place we should agree there is a role for government intervention.

And I'll be quiet now. Thank you.

MARILYN BROWN: All right, very good. Judi?

JUDI GREENWALD: Thanks. It's always nice to follow Michael. Then I don't have to even try to be funny because he's done the allotment for funny. I do want to associate myself with his remarks about engineers. I'm an engineer, too, so I liked that we did well in that popularity contest.

And I do want to attempt at least to live down Bill's introduction of me. He described me as being on his far left. And so, hopefully I will show through how reasonable I am [laughter], that that's not really not quite correct.

So I wanted to give a little tour of the federal government's activities in energy efficiency. There were some questions on the poll about what the Feds might do on energy efficiency and I want to get a little bit specific about what it is that we actually do, just in terms of the categories. And then we can drill down into any of these during the Q&A.

The government is a very big user of efficiency. We buy a lot of products. We own and operate a lot of buildings. And the decisions that we make in terms of what products and services we buy have a big influence on what's available in the marketplace. And we also indirectly influence other decision-makers in the marketplace. People may actually look to us as a role model. That does still happen, despite some of the general views about government. And also, it's often convenient for people to use, for example, our procurement standards in their own decisions; it sort of makes it easier.

So we have a role in terms of what we buy and what kind of services we procure. And a lot of that within DoE happens at the Federal Energy Management Program, and there's a lot of activity across the board in the federal government on that front.

We also have a big role in R&D as Mike Webber talked about. That's actually most of DoE's budget; we are mostly an R&D organization. We do a lot of energy efficiency R&D. And that has had a big impact. We do it at our labs, we also fund a lot of external research. And we've been at least partially responsible for some really important innovations, like most famously, probably, compact fluorescents. And there's a lot of other agencies who are doing important R&D, like the Department of Defense for related and important reasons.

We also have a big role as a regulator. The Department of Energy is responsible for these efficiency standards for appliances and equipment. That's had had an enormous impact again on market transformation and on reducing our energy use. The Environmental Protection Agency and the Department of Transportation have a big role. They do these CAFE standards that have saved Americans a lot of money on fuel costs over a vehicle lifetime. And of course, as Mike mentioned, there was this issue of upfront cost versus lifetime savings. But the benefits far exceed the cost and have had both energy security, broadly, benefits as well as benefits for individuals and have saved a lot of energy.

And then our fourth role is, I guess this is a fairly large cleanup category, but I didn't want to run out of time, so I put a bunch of things together. We're kind of an enabler of other actors and a catalyst for action. And we do a lot of things that would fall into that space. We provide a lot of information. We have our Energy Information Administration that has a bunch of information that helps people make good decisions about energy. We provide technical assistance to states. We provide funding to state programs on efficiency.

And we do a lot of work on the finance base, more so under the ARRA, the American Recovery and Reinvestment Act. A lot of that funding slug is mostly gone now, but there's actually a new program that I can talk a little bit about, if it was of interest. In the US Department of Agriculture, they're just standing up a program that's going to offer low interest loans for energy efficiency investments. And it's a fairly significant amount of money, and potentially a significant entry into an area in rural America where this has been less available. So there is still that financing piece that we do, although less so than we did under ARRA.

We also convene people. We promote best practices. We share information. And basically a lot of these things can be thought of individually, but they also work together to catalyze action.

Two related areas, two specific examples of that kind of analysis and convening that we're doing in my office is we're actually on point for the quadrennial energy review, which is a big administration-wide effort to come up with essentially a national policy, energy policy action plan. And that work is ongoing, and it involves a lot of analytical work, it involves a lot of convening. And that's a big emphasis of my office and the Department, and the Administration broadly over the next year.

We're going to do the first installment of the quadrennial energy review – we call it the QER – by early next year. And it's on transmission, storage and distribution. And I can talk a little bit about that more if people are interested.

Also, my office is doing a deeper dive on– the President established an energy productivity goal to double our energy productivity by 2030. To be honest, these are units that I'm not yet sort of intuitive about. The goal is to go from \$136– I should explain what it is.

Energy productivity is GDP over energy use. It's the reciprocal of energy intensity, which a lot of us think about in terms of energy use for GDP.

So right in 2010, we were \$136 per million BTU, and the goal is to get, by 2030, to \$216 per million BTU. And I have trouble getting my arms around what that really looks like. One way to think of it is that by 2030, we need to be using 20 quads less energy than we otherwise would use in the base case.

That's a pretty ambitious goal. We've started doing a lot of work toward meeting it, both internally and thinking about how it can be met by the broader economy, by all the other players in the energy efficiency space, which is a lot of how we're going to get there. And that's an interesting area that we're spending a lot of time doing a deep dive to make sure we continue to be on track to meet that goal. And it's part of the President's climate action plan. So it's a priority for the Administration.

And with that, I'll stop and we'll go on to our Q&A.

MARILYN BROWN: Well, Judi, thank you very much. You're on a roll, so I'm going to toss you the first question so you can keep at it. And the question has to do with barriers to energy efficiency. We've talked a little bit about codes and standards, and usually they're justified as a necessary intervention when there's a failure in the marketplace. People like Bill Prindle, who's over there at the table, I believe, have written extensively about. But there are other barriers, too. And some of them are information-based.

So in the poll, there was a question which asked the energy pros, "Would you support a mandated disclosure of energy bills for all commercial and residential buildings at point of sale?" And there was an 82% support for that kind of a mandate. So again, underscoring the need for better information about the energy efficiency of buildings in the marketplace.

What do you think are the key barriers? And what do you think we need to focus on in trying to push efficiency further?

JUDI GREENWALD: So yeah, it's a good segue from the basic federal rules that I was describing. All of these federal rules really are about going after these barriers and trying to address them. And certainly our provision of information is all about that. It's to help people make better decisions to deal with that lack of information.

The other barriers are important though, too, because as much if you give people information, but they really can't afford to act on it, because either they themselves can't reap the benefits; for example, if they're a renter as opposed to an owner. This is the split incentive problem. If you make an investment and you're just a renter, you're not going to be able to reap the benefits of that. And if you're building a home and somebody else is going to live there and actually pay the energy bills, it's hard for you to reap those benefits.

So it is important to deal with figuring out how we can actually fix those market barriers so that the right people can get the right incentives. And some of that is about providing financing and we, the federal government does do some of that, although budgets are tight now. But there is some interest in doing that. And again, that's one of the key goals of this new USDA program, is to help with the financing of energy efficiency measures for rural cooperatives particularly and their customers.

R&D is also going after a key barrier. And this is true for most things that the private sector's not going to provide R&D to the socially optimal level. So we need to step in there.

And then particularly with efficiency, there are a lot of private benefits. And luckily, we can reap a lot of those, and that makes efficiency pretty attractive to ordinary consumers and businesses. But there's also a lot of public benefits to energy efficiency. So unless the government steps in, you're not going to get the socially optimal amount of investment or purchase of energy efficiency.

So I think we need to play— I think that's why the government needs to play a role. I'm mostly focused on the Feds, but of course there's a lot for states and locals to do. And the way that energy policy works in our country, for many arenas, they are actually on point more than the Feds. So a lot of the information provision and these programs happen at the state and local level.

MARILYN BROWN: Lisa, you want to say something?

LISA WOOD: Yes, I want to add to this. For commercial building energy efficiency, it may help to chip away at the barriers by doing little things that might be more likely to happen. And I think one little thing that we could do as a country with commercial buildings is this: Every time there's either an ownership change or every time a tenant leaves a commercial space, the new lighting has to be efficient. When you look at energy use in commercial buildings, people think about heating and cooling the low cost opportunity is in lighting. The biggest potential savings, we've seen this for decades, and it's still true, at least until 2035, are from interior lighting in commercial buildings.

So mandating a simple thing, --when a new commercial tenant moves in, or when there's an ownership change -- you have to upgrade the lighting. In addition, architecture firms have to

incorporate efficient lighting. A lot of them are focused on keeping upfront costs of the design low. But now we've come such a long way in lighting technology, there's all kinds of options.

So that's what I would propose.

MARILYN BROWN: The mandated disclosure programs have actually taken off. There's some traction behind them. There are seven or eight cities across the US now that have requirements, and many other cities, including my hometown of Atlanta, are considering for commercial buildings. What's the utilities' perspective on that? Do you think the electric utilities are supportive?

LISA WOOD: Actually, I'm going to give you a real-life example. In downtown Charlotte, North Carolina, Duke started the Envision: Charlotte program with 70 participating buildings in the downtown area. And, in the lobby of each building, there are energy usage kiosks so people can see building-level energy use in near real-time and receive suggested actions to take to reduce their personal energy usage in the office.

So I think it's a great idea. I do think the utility industry would support it. I think the more visibility around energy use, the better. It's better for everybody to have a sense of energy use, not just the people that own the buildings, but the people that work in the buildings as well.

MARILYN BROWN: Mike, I'd like to toss you a question about energy education. Do we have an energy IQ problem, an energy literacy problem in this country? There were a couple relevant factoids from the survey. One is that pros were almost unanimous in supporting the creation of new and bigger training and education programs in energy.

And there were also a number of interesting results – I'm sure you have noticed – about the types of information sources that were seen as most reliable. Being at the National Press Club, it was interesting to me that the pros ranked the media as next to the bottom on the list of reliable sources of information on energy efficiency.

So what is all of that about, and what should we be doing?

MICHAEL WEBBER: Great question. I do think there is a problem with energy literacy or resource literacy in general. I feel like as a nation we're not as sophisticated in our knowledge and understanding of energy as we could be or should be. And I think that's a problem. And I think the poll actually showed that people who were polled and responded also agree with that. So not uniformly, but in general Americans are very confident and we think we're very smart.

So let me give an example. I think it's like 85% of drivers think they're above-average drivers. And that is impossible, right? Only 50% of can be above-average drivers. But we all think we're above-average drivers. And I wonder who those 15% are who think they're bad drivers. But we all think we're good drivers. We all think we're smart.

But in this poll there was sort of a survey of how knowledgeable do you feel about energy, and something like a third, I can't remember the number exactly, about a third said "I do not feel

knowledgeable." A third said they feel reasonably knowledgeable, and the rest were somewhere in the middle.

This is a surprisingly honest assessment by respondents, that they don't feel confident in their energy knowledge. And I would say as an educator, this is probably true. People feel like energy's very complicated, it's very technical. It has all these non-obvious parts that are hidden, that you don't understand. And so it's a tricky subject and people don't know much about it. And they don't know where to go to get the information.

So I would think that people are sort of honest and self-admittedly ignorant, by their own assessment about what they need to know for energy. As a nation, this is a problem. It's how we get policies that make no sense on energy. And there are countless examples of this over the last 40 years.

So what do we do about it? I don't know. I can tell you a few things I've been trying to work on that might be getting traction and we're experimenting with. There's college courses. So I teach college courses. And so, for those 50 students who happen to get in, who can afford thousands of dollars of tuition, that works great for those 50. We have 315 million people, so that's not a good model.

There are a lot of energy books out there, but it's not clear which ones are the best ones. You can do online courses. In fact, I did an online course, a massive online open course, a MOOC, this past fall called "Energy 101." Just as a test. And 44,000 people signed up. Which I think is sort of interesting. So it's a sign that people are, they feel like they don't know the information, and they want it. So that's a good sign; people want the information but don't know where to go. So if you give them an option, they'll follow up on it. And there's TV and radio and other things we can do.

So I think we do have an energy literacy problem. We don't have any energy curriculum for high schools, for example. So we're trying to develop that now. I actually worked with a couple of high schools this past fall to teach a course for them using the online course curriculum. And they were desperate for it; they said "we can't find any high school-appropriate textbook or content."

So this is a problem that people have identified. People are hungry for the knowledge. We have to develop the solutions. There's not much funding for that, it turns out. The business model isn't really clear. I guess it's more of a textbook model. The textbook publishers aren't there yet.

So yeah, it's a problem. People recognize it's a problem. They're hungry for the information. And now we educators have to provide them an answer. So I think that's the next step.

MARILYN BROWN: Okay, good. Anyone want to elaborate on that?

LISA WOOD: I completely agree and I'm just going to add an example here. . I also teach a class, and these are graduate students and they're not very energy literate either. But that's why they're taking the class. One of the things we say is "your role, when you leave this class is to teach other people about energy." It's such a problem in the US.

I think teaching young people about energy is really important. There are some technology companies actually that are doing that, that are going into high schools and creating curriculums to talk about modernization of the power sector.

I think there's a role for government here in creating a campaign or materials that can be used for educating young people. These are the people that are going to be running the country in the future. Energy literacy is a really important issue.

JUDI GREENBERG: I just want to add something; I'd actually be interested in Lisa's view on this. I think there may be things we can learn from what people know about their gasoline bills. Gasoline prices are something that people know better than pretty much any other price, from what I've seen, according to polls. People are used to seeing very large signs with gasoline prices and they can tell you what they're spending, and they know how much they spend on gasoline.

And so, that becomes an easier sell then, because then we also have really good labeling for fuel efficiency vehicles. And that sort of information people seem to be able to make that connection. I think buildings and sort of the energy readings for electricity and gas is a little more challenging. And I think there's probably a lot that could be done through the information that comes in with bills. A lot of utilities already do that. I'd sort of be interested if Lisa thinks there's more there.

But I do think if we could make people's feel for what they spend on the rest of their energy bill and what they could do to fix it, that it's broken down more, the kinds of uses that they have and how it affects their monthly bill, that actually could have a big effect.

MARILYN BROWN: I think that the Administration is going to have a tough time getting the public to relate to this productivity goal, because dollars of GDP per BTU. What's it, BTU? Or is it per million tons of oil equivalent? Or how are we measuring these things? It seems much more meaningful to talk about per person, or per household. There, you can really get your arms around it.

So while we're talking about the roles of different organizations, there were a couple of questions asked about who's responsible for driving energy efficiency into use in America. And the energy pros, 46% of them said that it really should be principally the responsibility of the federal government. Americans assigned a little lower percentage to the federal government.

So Judi, what do you think?

JUDI GREENWALD: So I think we definitely have a big role we're playing, multiple roles, as I said at the beginning. I don't think it can be all the federal government. A lot of, pretty much all of our energy infrastructure is privately owned, and it's a lot about private decisions. So there's only—we can influence those private decisions. We can be helpful. But there has to be other players.

And I do think the way that our policy regime is structured in this country, there's a lot that states and localities have authority over. And so, I think a lot has to, by law and by appropriateness, I think in many ways, has to fall to state and local.

One of the things that's coming up in our initial work on the quadrennial energy review is the importance of looking region by region. Because different regions are very differently situated in terms of their energy mix, their energy prices, their ability to reduce energy, how manufacturing-intensive they are. There's just a lot, that having sort of a national view is useful, but you really have to go down region by region, state by state, in many cases, or locality by locality to really figure out what is appropriate. And so, there are lots of other players.

And I do feel strongly, obviously, that the federal government needs to play a big role, but there are lots of other players. And we actually can't do much without everyone else helping as well.

MARILYN BROWN: Lisa?

LISA WOOD: States have actually done a lot to promote energy efficiency; establishing energy efficiency resource standards in 25 states is one example. Those standards require electric utilities to save a certain amount of energy based on how much electricity they sell. So they have to meet those mandates or they're penalized for it.

So even though sometimes a mandate is a little bit like a hammer, mandates actually do achieve results. States have taken the lead on setting energy efficiency resource standards across the country.

The other thing I'll mention, which was announced last week, is that Georgetown University just created an energy efficiency prize. And what that's about is having municipalities compete to be the most efficient municipality. The most efficient municipality wins a pot of money. The competition is based on the X-Prize model that was developed some years back to incentivize innovative breakthroughs in areas such as medicine, exploration, education, and the environment.

That's another grassroots-y kind of way that people are saying energy efficiency is something we want to do. There's a lot of interest in it. So I'm agreeing with Judi, the federal government has a role. The states have a role. Municipalities have a role. People have a role.

All of the above.

MARILYN BROWN: All right. Well, let's see, Judi, you said that there are different models across the country in different regions. And Lisa, you mentioned EERS, the importance of energy efficiency resource standards. But there aren't many in the Southeast, for instance. And I would argue that that's probably because of the way the utility industry is organized there. What is the business case for energy efficiency in, for instance, a vertically integrated utility economy like we have in the Southeast, and a few other regions of the country? I'm not including Texas in the Southwest because that's a very different system.

MICHAEL WEBBER: We're neither South nor West; we're Texas, we're our own. [laughter]

MARILYN BROWN: Lisa?

LISA WOOD: I'll go back to this: on the one hand utilities sell electricity; on the other hand, in many states, they also promote efficiency programs to save electricity. In some states, those programs have been in place for a couple of decades, and that's basically the West Coast, as well as much of the Northeast. And we've seen those programs -- savings from those programs and spending on those programs -- grow in leaps and bounds.

It's not a question so much of being vertically integrated or deregulated whether you have efficiency programs. It's really a question of your state regulatory environment. Is the right regulatory framework in place for your company so that it make sense to both sell electricity and to save electricity via efficiency programs.

Sometimes people ask, "Why are utilities trying to save electricity when their job is to sell electricity?" Utilities do both-- . There have been over 20 years of progress in creating regulatory frameworks to make that make sense. What it means is this: First, utilities that run efficiency programs are able to first recover their costs for running the programs. . The second thing is related to the way we structure electricity rates in the US. And we structure them in a way so that utilities don't really recover, all of the fixed costs of maintaining the grid as a fixed cost,. These fixed costs are recovered through selling electricity. What winds up happening is that, the more energy I save from efficiency programs, the less likely I am to recover all of my fixed costs. And, because of the way we in the US happen to regulate and create electricity rates, that leads to a problem with fixed cost recovery or revenue recovery. The solution to that is some type of decoupling, which is really just a true-up mechanism. At the end of a year, utilities can recover those fixed costs, because their efficiency programs were successful.

MARILYN BROWN: So interestingly, I had an opportunity to interject a question about decoupling on the Our Energy Policy poll for the pros. And it was the one question that we were not able to evaluate responses for, because we had so many of the respondents say they didn't know what we meant. What did we mean?

The question was referring to the decoupling of utility profits from the electricity sales. But I think many experts just didn't really know what the issue is. What is this about trueing up and getting revenue recovered, that sort of thing.

So we've got an energy education problem there.

MICHAEL WEBBER: We have to teach them what decoupling means.

LISA WOOD: But the utilities understand it and the state regulators certainly understand it.

MICHAEL WEBBER: The Texas experience might be different. The decoupling is complicated. And that's where you separate the revenue sales, like you said, from energy efficiency and everything else. I think regulators are often bound to either don't understand it or cannot act on it for a variety of very complicated pressures.

I think it's very hard to do this. And so, I think your question was what does this do to the integrated utility. I think these trends are very bad for the integrated utility. I think the current utility model is not going to be here 20 years from now. And I think there's a race to figure out what the new model will be, and who will survive, and who won't. But I think it's going to be very different. I think it's going to be a shakeup for the industry, kind of the way it was for telecom of the '80s and the way it was for oil in the 1910s. That kind of thing.

So these kind of shakeups happen. I think we're about to have one. And I have no idea if it'll be good or bad or who's going to win or lose. But I think it's going to be different, for sure.

MARILYN BROWN: There are a lot of disruptive challenges facing the utilities today. Sort of along those lines though, one of the benefits that efficiency sometimes can offer is improving grid reliability. And I wanted to toss this to you, Mike, because I know you've been involved with the Pecan Street initiative, one of the largest smart grid projects in the country. Do you think that energy efficiency has a role in delivering grid reliability? And what's your experience there?

MICHAEL WEBBER: This is a great question. I think the short answer is, energy efficiency is very good for grid reliability. The longer answer is, well, it's complicated and it depends.

But the short answer is, if we consume less, that will strain the grid less. If we have demand that can be turned on and off, like pool pumps or water heaters and things we don't need on all the time, that can be used to prop up the grid at times of strain.

So grid reliability can be improved by efficiency. And it's mostly good news. And it saves money for us and helps us avoid power plants, and that kind of thing.

If you dig down one layer deeper, it can get complicated, because LEDs are very efficient light bulbs and they run on DC power, and if we do a lot of LEDs and we do a lot of solar panels, it will actually mess up the power quality on the grid.

So if we start doing too much energy efficiency and you haven't accommodated power factors of power quality, and that kind of thing, which is more like electrical engineering terms, you kind of put junk onto the line, so to speak, and that messes up grid reliability.

So we can't just do a bunch of energy efficiency. We have to do a lot of energy efficiency in a thoughtful way, preparing for the day when we have 20% energy efficiency on the grid, not 1%. And what's that going to do to everybody, all our big industrial customers who have big motors, that kind of thing. Are we going to put a lot of noise on the lines that will mess up reliability.

So that's one thing we have to watch out for. We're not there yet. It's not a crisis yet. But it's something you have to worry about. If big box retailers reinvent their footprint to be much leaner, which would be great, they would save themselves money and save a lot of strain for all of us. But there might be this second order factor we have to watch out for.

MARILYN BROWN: One of the big contributors to grid reliability, still to be pursued in the US, is combined heat and power. And we're doing so little of it. There's a new executive order, just about a year old, which set a new goal for industrial CHP. But since the 2005 Energy Policy Act, which allowed utilities to no longer be required to purchase the generation from these CHP plants, we've seen almost no investment. And yet for grid reliability, having distributed generation like that could be very helpful. So what is going on there? Anyone care to weigh in on the CHP dilemma?

MICHAEL WEBBER: I always have a comment, so I'll jump in. Combined heat and power is a very efficient use of resources. We tend to burn a fuel and get some useful energy out of it, and we throw away two-thirds as waste heat. So we've got a lot of waste heat around. And if we can find that waste heat or use that waste heat, that would save on costs and all sorts of things.

And there are places where waste heat's very valuable. For example, there are heating districts in Boston and Copenhagen, cold climate areas. The University of Texas actually has a heating loop on campus, so we use our heat in the winter. We don't know how to use that heat in the summer, which is a challenge.

So one of the problems of combined heat and power is you need to have a customer for the heat, which in cold climates in the winter is fine. It turns out the largest users of combined heat and power are industry, and in particular oil and gas, which a lot of people don't realize. They use the heat for processing of petrochemicals and all sorts of things.

So I think the single largest combined heat and power installer in the world is ExxonMobil, actually; I need to check that, but I believe ExxonMobil has the biggest combined heat and power installation in the world. Because it saves them money. It is a good investment, and they can use the heat.

So how do you get other people to use the heat? Well, we need to find a way to convert that heat into additional electricity or to cooling, not just heat. So we need absorption air conditioners, and that kind of thing.

So there's an opportunity here. That is the low-hanging fruit, is all the waste heat we have in America.

MARILYN BROWN: All right, well we could go on forever, but I also wanted to give a chance for anyone in the audience who might have a question of anyone on the panel. Yes? And please introduce yourself.

Q: [off mic] with the extensive AMI work that's being done and all the opportunity for knowledge that will result from those smart meters, does the panel think that the grid modernization, slash, the AMI rollout will really improve the issue that you all have talked about in terms of energy education, energy information?

JUDI GREENWALD: I'll start. I do think that this information really matters. I do want to mention something about the role of consumers. I'm going to sort of take this question as an opportunity to talk about it, because I think it relates to the business model as well. Both the other panelists talked

about how the business model for the utility is both really about the regulatory model as well as the business model. But it's also about the consumers.

And I know at least in my family there are at least two categories of consumers and how we like to use information. And you have consumers who love this information; they want to manage their energy use on their iPhones, and there's other people who really don't want to be bothered.

And so, I do think how information gets used, there's going to be at least those two categories of people who would like someone else to manage their energy for them and might actually be willing to pay for that, particularly once they have information about what that might look like; and others who actually want to actively be involved users of that information.

And I think we see some of that playing out in the debate about metering, do people really want this information. And so, I think the information is going to be useful, but it's going to be useful differently depending on what kind of consumer you're talking about.

MARILYN BROWN: That was a great question. Yeah?

Q: Hi, thanks. Joel Yudken, High Road Strategies, an energy and economy policy consultancy in Arlington. I should point out, I'm also an engineer, since it's very rare that I get extra points for that. [laughter]

And being an engineer, I wanted to focus on the industrial side, because it wasn't mentioned in the poll. I always feel like I'm Scotty in Star Trek. He only start— anybody pays attention to when you have a problem, or when the electric grid doesn't work.

But it comes back to, several years ago I did a study, or I was involved in a study on impact of climate policy when we really had a glimmer of hope there might be a climate policy, funded by the Bipartisan Policy Center, impacts on energy-intensive manufacturing.

And one of the things it concluded, that over time we're going to need something in the range of 20-40% improvement of energy efficiency. This was not going to be met— I mean, ACHP, improving facilities, management of energy, workforce practices and heat recovery, all those are very important and a lot of people have been pushing and there's been some movement. And this is something where the wind is at our back because of industry gains as well.

But it became clear, too, in order to make any major gains, we need the next generation of low carbon manufacturing, especially in the energy-intensive sector. Now, Industries of the Future, it was once a really big program of the Department of Energy and is now defunct. And I know AMO was supposed to be carrying the ball on that, but it seems to me that that's an area of R&D, of like looking at what is the next generation—

MARILYN BROWN: And do we have a question?

Q: I wanted to get to that question of what you perceive in terms of R&D in that area. Where are we in that?

MARILYN BROWN: Okay, R&D in industrial efficiency. Judi?

JUDI GREENWALD: So we are doing a lot in that. That's a big priority for our office of energy efficiency and renewable energy. We have an advanced manufacturing initiative. You're right, Industries of the Future went away, but there is still quite a bit of work going on on industrial energy efficiency, both R&D that we do, as well as collaborative work that we do with companies. So I think it is a high priority.

I do want to use your question as an opportunity to point out that industrial efficiency is kind of a bright spot in many ways in the whole efficiency landscape, particularly large companies; they get the numbers, they can sort of look at the finances, they have the sophistication to really use the information that we all kind of know, that these investments are worthwhile.

I do think there's probably more opportunity both with smaller and medium sized companies, as well as more broadly with consumers who may need more help with that. But there still is a lot that can be done. I think a lot of that potential though, there's a lot of companies who are on the case on that.

And the government does have a role, but I think it's more of a cooperative one, working with companies who are interested.

MARILYN BROWN: There is, of course, a very exciting initiative in additive manufacturing. That materials approach has a lot of potential, but it does still need some more research to move it into reality.

Anyone else have a question? Bill?

Q: I'm Bill Prindle with ICF. There's been a lot of talk coming out of EPA on the role of energy efficiency in the forthcoming rule for existing power plants on CO2. And I heard a thread about reliability and so forth. Some companies, including AEP, were warning us that given what happened this winter and the Midwest grid, we may need to keep some coal plants online. I also note that the Indiana legislature essentially hit the stop button on the statewide DSM program for other reasons.

And I'm wondering if in fact EPA does provide for a large role for efficiency in the rule that's due out in June, do folks think that it might actually help not just ease the compliance burden on power plants, but possibly allow some legacy fossil units to continue to run? Maybe solve some grid problems?

What do the panelists think about the role of efficiency in this forthcoming 111(d) rule?

LISA WOOD: Ill just say a couple of things, Bill. One, if efficiency can be included, I think it's a win for efficiency. The reason I'm saying that is, because efficiency's now bid into wholesale markets in the Northeast, that makes efficiency real. It gives it a price.

When markets set a price for energy efficiency then it becomes a resource that people want to use for compliance, and it has a real value. I mean, this discussion is about efficiency. This conversation we are having and the public poll reflects a belief that energy efficiency has value. But that's not true everywhere.

So I think it's really important for efficiency to be considered as a possible compliance option.

MARILYN BROWN: During the real tough January that we had in the Southeast, I'm on the TVA board of directors, I was watching how those plants were being dispatched. In hindsight, a lot of credit is given to energy efficiency and demand response for meeting some of that load that otherwise would have been difficult. We were having trouble getting natural gas; supplies were tough. The wind that we had procured from the West wasn't coming in because the oil there was too cold for the turbines to be able to spin, or for the generator to be able to work.

So yeah, efficiency really was powerful in its role. And looking forward to more of it in the future.

Let me get another question over here. Yes, sir, next to the microphone.

Q: Terry Hill with the Passive House Institute. We can retrofit existing houses and build new and save 90% energy heating and cooling, okay? Throw a little DC inside the envelope and we've got a pretty powerful combination. Throw a direct current microgrid in the mix and my question— this is the question: Who is taking a clean slate approach to this whole utility supply grid and painting a what-if picture? Because without it, nobody has an idea.

MARILYN BROWN: Judi, is that a focus of the QER?

JUDI GREENWALD: A clean slate, probably not. [laughter] I mean, interestingly, the theme of the QER – I'll take it as a QER question – the theme of the QER is transmission, storage and distribution. And one of the key attributes of transmission and distribution is how long-lived those assets are and how the transmission and distribution system that we have today largely got built decades ago and is likely to last decades.

And so, we are kind of stuck to some extent with the infrastructure we have. So that is both limiting, but potentially enabling. So I do think that there are lots of things one can do to enable a really different kind of energy future. But you can't start with a completely clean slate. The investment that exists is just too big and you can't avoid that.

MARILYN BROWN: Last question and then we'll wrap up.

Q: My name's Chuck [1:07:20] I have a small R&D company in microgrids. I have sort of a marketing question to follow through on his. I'm wondering how we can engage far more participation from the American public generally. And I have it in the form of a couple of questions on the code and policy side.

So for example, we put solar panels on homes. To what degree would it be beneficial to have a policy that would subsidize energy storage instead of just generation for those circumstances, so when the grid goes down I actually have the ability to use power in my own home.

And similarly, for hospitals, there was an interesting book that just came out called, *Five Days at Memorial*, where those skeleton staff at the hospital in New Orleans had to decide to euthanize a dozen or more patients because the power went out and they couldn't evacuate the patients.

I'm wondering, in light of things like that, is there an opportunity to recommend, say, that all hospitals make 20-30% of their own power either on site or near site so that in the middle of an emergency you don't have to evacuate the very facility you need the most.

The hospital's an icon that everybody understands and loves enough that maybe we wouldn't even have to put the burden on the hospital to fund it. We would just, in our own local communities, rally around our local hospital and find out a way to make it more viable in the long haul in a way that creates a vision that each of us can feel like we have something we can understand to do something about, as opposed to only having experts in Washington figure it out.

MARILYN BROWN: So Mike, since you're not in Washington, do you have a view on that?

MICHAEL WEBBER: Yeah, so I think it's interesting. I think I need to read this book or watch the document on the five days in the hospital. I think this could be a codes issue, like we said earlier. We should have a code requirement that hospitals have a slightly different code than others. I think it's an interesting idea. We do need hospitals more in those times of crisis. They should have backup power.

Now, they often have diesel generators on site for backup power. That doesn't mean they have five days' worth of diesel. And diesel's like the dirtiest kind of thing you have near people who sensitive ailments; you might not want diesel right there.

So you could build something more robust, and maybe hospitals are a testing bed for some of this. At the same time, the last thing you want to do with a hospital is experiment with its energy supply.

So in Austin, we had this horrible series of anecdotes with the Dell Children's Hospital, brand new Dell Children's Hospital with onsite natural gas turbines and combined heat and power. The most efficient hospital in America. Gave more reliability problems to Austin Energy than any other power plant they own when it came on. Because they had every advance control switch and smart grid this and that you can imagine. And I think they were using Windows or something, Microsoft Windows operating system. Couldn't keep up with the decisions. So power would go off and the diesel couldn't come back on.

Eventually they went in and ripped all the cables out and just turned on diesel generators for several weeks to keep it running while they figured out the system.

So I think the idea of having a robust, secure, resilient energy system hospital makes a lot of sense. We also probably shouldn't do the testing at the hospital to figure it out. We should figure that out, I don't know, at another site. And then once it's there, build it into the code so that they're ready to go.

I think it's an interesting point.

JUDI GREENWALD: I actually would like to make a broader point about this connection between resilience and efficiency, because I think it is a tight connection and there's tremendous opportunities there. I think there's some untapped potential and maybe some education that can be done as well.

I've noticed, in recent times, whenever we have power outages, it used to be that that was a very quiet time; you could sort of hear a pin drop outside. And now to me the sort of sound of a power outage is my neighbors powering up their backup generators. And there does seem to be, for an economists' term, a willingness to pay for resilience, that people are at least acting on privately. And I also have seen some evidence that people are willing to pay for resilience more broadly in the light of some of the storms that have occurred. People do seem to be willing to let the utility put in its rate base some work on upgrading the transmission and distribution system.

So I do think there's something potentially there. I don't think we've quite taken advantage of it. But I think this desire for resilience, desire for efficiency could be harnessed so that we could actually make some big improvements on our systems.

LISA WOOD: One quick remark. The state of Maryland, through the efforts of – the governor and the energy administration, formed a Grid Resiliency Task Force in 2012. Some of their recommendations effectively said to the utilities, "We recognize the importance of grid resilience. We want you to spend money on this. This is important." I congratulate the state of Maryland for doing that. I think that's really important.

Bill SQUADRON: Actually, those last three comments were a great segue into the ongoing dialogue that will continue this morning. But first, let's have a hand for our panelists who I think have done a tremendous job this morning. [applause] Thank you.

I want to, as we conclude, I want to thank a couple people, Michael Spiak and Brad Townsend from Our Energy Policy, who put in a lot of time and effort to help put this together this morning. Could we acknowledge them? Mike, Brad? [applause] Great work.

And I also want to thank our partners at the University of Texas Energy Poll for the joint work we did. That survey and the report will be out shortly.

And everyone should spend a few minutes going to UTEnergyPoll.com because there's actually an interactive infographic there which is very cool, and you can really see by each individual demographic how people are responding and what Americans think about different energy issues. So I'd really encourage you to do that.

And really, the hallmark of what we're about at *OurEnergyPolicy.org* is that the discussion that began today will then extend online and hopefully serve as a resource for people throughout the community. And I urge all of you to visit the site, register, participate in the discussion, and continue the tremendous addressing of the issues that was begun today by our panel.

So one last round of applause for our panel. [applause]

Thanks again for coming out and joining us today. And we look forward to working with you as we go down the line. Thank you.

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