

FUEL ASSURANCE, RELIABILITY, RESILIENCE, AND THE GENERATION RESOURCE MIX: REPAIRING VULNERABILITIES EXPOSED IN THE CRISIS

*Panel Discussion from the Energy Bar Association's Texas Symposium: The Texas Energy System at the Crossroads: Lessons in the Wake of Major Storms.**

PANEL DISCUSSION

Becky Klein: I'm just really pleased to have this robust panel to talk about the issue for this session on resilience fuel assurance and reliability.

Like Michael Jewel, I'm not going to introduce each and every one of them, but I would like them to take just a minute or two and we've prepped this already, so hopefully it'll be under two minutes to tell us and share with us really, given their experience, because we have really diverse experiences here in these chairs. Given those experiences, you know what is their perspective about this particular topic, so I'll just go Lanny can we start with you and go round robin?

Lanny Nickell: Alright, well, thank you Becky and it's good to be here. Good to see all of you in the room. It's been a while since I've been in a in-person meeting and so it's kind of nice being able to actually see the whole body, and not just the upper body of many people. I will not be imagining what you might look like on a zoom call but.

Here we go, got a little derailed there thanks .

My name is Lanny Nickell. Southwest Power Pool is my employer. I'm the Chief Operating Officer for the company.

And I have been with the organization for 25 years, a long time, and I have never experienced what we experienced back in February. Something I don't want to ever experience again.

* This is a transcript of the "Fuel Assurance, Reliability, Resilience, and the Generation Resource Mix: Repairing Vulnerabilities Exposed in The Crisis Panel" at the Energy Bar Association and University of Texas School of Law's symposium exploring all aspects of the lessons learned from major storm Uri. The Panel discussed the gaps revealed in the Texas energy cloth and how it can be mended back together to ensure that the lights mostly stay on in the midst of a crisis.

Becky A. Klein, the moderator of the panel, is a Principal of Klein Energy, LLC, an energy and water consulting company based in Austin, Texas.

Julia Harvey, one of the panelists, is Vice President, Government Relations and Regulatory Affairs at Texas Electric Cooperative.

Lanny Nickell, one of the panelists, is Executive Vice President and Chief Operating Officer for Southwest Power Pool, a FERC-approved Regional Transmission Organization.

Alison Silverstein, one of the panelists, is a consultant, strategist, researcher and writer on electric transmission and reliability, energy efficiency and technology adoption issues.

Rick Smead, one of the panelists is Managing Director, Advisory Services, for RBN Energy LLC, a oil, gas, and NGL market analytics firm, providing consulting and testimony services to entities in the natural gas industry.

Having said that, these kinds of events have become more frequent and I'm not going to count on not having to experience something like that again. We're going to do everything we can, as an organization, to learn from that experience and to change and improve where change and improvement is needed.

What I hope to be able to do today is to be able to share with you some of my insight that I gathered from the event. Some of the things that we're thinking about doing. We are developing a report that is the summary of a comprehensive review the organization undertook.

Shortly after the event ended, we have not yet published that report, you will see that published by the end of this month. Happy to share with you at least some of those preliminary findings albeit, they're in draft format, right now. So any insight I can share I'd be happy to do so.

Becky Klein: Good, look forward to that insight too, Rick.

Rick Smead: I'm a consultant analyst with RBN Energy, which is an oil and gas fundamentals analytics firm, very well known. My boss was Cramer's featured guest last night. So, we spend a lot of time looking at the Permian Basin.

I personally have been a big advocate of gas power generation for about 13 years. My team at my last consultancy, my team put together the first comprehensive study of what shale gas was really going to be worth and what abundance of natural gas would mean in the United States. And of the potential for what it could do for power generation.

So with that background, I gotta say natural gas was the failure in this whole thing that started it, helped it, kept it going, and that doesn't feel good, so why did it happen?

As I said, we focus on the Permian Basin. It is about one eighth of the United States natural gas supply. It's almost as large as the state of Qatar in terms of production, so it is enormous-- and the Permian lost 73% of its deliverability between Friday and Tuesday. Of its eastbound deliverability that feeds the power generation in the eastern cities in Texas, it lost 85% of its deliverability.

And so you know when that happens, it doesn't matter what you do to all the downstream stuff and with the power generators and everything else. They're like a Soviet grocer with nothing on the shelves.

It was a mess. But there's a report submitted to the Texas Senate on behalf of the Texas Oil and Gas Association by Enverus, which surveyed a lot of suppliers and asked "why did this happen?" And they placed much more blame on loss of power generation than on freeze-offs at the production end of the market.

The Bloomberg Report had a rebuttal, saying "no, they were already losing production before the power went off, so it was really something else." So everybody's pointing fingers but the fact is, it was both things.

Uri hit, you had what in Colorado we used to call a guillotine front, it just slammed into West Texas. It froze the windmills, it simultaneously froze the Permian Basin. They had a lot of freeze-offs, a lot of formation of hydrates that blocked the line, the gas when it comes out of a well in the Permian is extremely wet.

This loss of supply was about 27 percent, that ganged up with wind freezing, coal freezing, plants freezing, to force a blackout. So at 1:30 in the morning on Monday we all got to find out what it was like to live in front of your fireplace.

Basically the other 46% loss of the Permian happened after power went off. So essentially everything had been fixed on the freeze-offs at that point, but it was the loss of power that caused the gas industry not to be able to recover. So there still would have been blackouts but they would have been much shorter term if there had not been a problem with power .

Becky Klein: Thanks Rick. I am anxious to delve into it because you have such a rich background, and I think you're the only oil and gas guy, not only obviously on this panel, but throughout the day that's going to be on the panel. So I'll be going back to you several times here. So more to come on that. To Alison.

Rick Smead: Now Alison's gonna tell me I'm wrong.

Alison Silverstein: No, actually, I agree with everything he said it was very confessional. I don't have that much to share. I feel like I'm in an AA meeting or something, but I agree with everything he said. My background: I'm an economist. I have worked for Pacific Gas and Electric twice. Most recently, as wildfire and PS preparation coordinator and for the Texas Public Utility Commission, where I was Pat Wood's advisor for the six years when we restructured electric and telecom markets.

At FERC I was advisor to the chairman for three years where I led the US and Canada blackout investigation in 2003.

I have worked as a consultant since 2004, working on teams that did system planning across the western and the eastern interconnections. I have advised on a variety of clean energy initiatives. I have worked a ton of disasters before and after. I have run a number of things that get into planning and operations, including North American initiative to bring a whole new technology to bear to facilitate operations and planning on the North American and international grids. I led, organized, and wrote the 2017 Rick Perry DOE study that explained that maybe evil renewables and burdensome environmental regulations were not what was totally, at the time that Perry wrote this, killing coal and nuclear plants. And I have done a lot of work on energy efficiency, market design, redesigned resilience, and lately, been a pretty noisy critic on winter storm Uri

And I plan to continue being a real noisy voice on everything to do with energy efficiency and demand response and their value and sensible solutions, as opposed to knee jerk nonsense, on what affects reliability and how do we make operations and systems more robust and resilient in sensible, operational practical ways.

Becky Klein: Thanks, Alison. Julia?

Julia Harvey: Okay, thanks Becky and thanks to the Energy Bar Association for having me at this meeting.

Julia Harvey: I'm Julia Harvey. I'm Vice President of government relations and regulatory affairs for Texas Electric Cooperatives.

That's the statewide association that represents electric co-ops in the regulatory agencies in the state legislature and interfacing with our national trade group in the US Congress.

A little bit about TEC: I think this year is our 81st anniversary. We represent 75 co-ops in Texas and they take several forms. Most co-ops are distribution utilities, with a service area and the right to serve end users in that area at retail. There

are co-ops that also own transmission and generation assets. So we are kind of part of all of the functions of the power system in and out of ERCOT.

Our advocacy generally supports the co-op business model, and you know, highlights the value that we bring to rural Texas. We also manage a political action committee that supports candidates that support the co-op business model and prioritize rural issues.

So a little bit about me: I've been with TEC for a little over three years. Prior to that, I was over the wholesale market group at the Public Utility Commission. So Becky, I think you asked what would be the primary factor, or what is our kind of one takeaway from the event.

And I guess if we're talking about the event, I would have to agree that it was this kind of supply chain breakdown, failure of the natural gas system, and the interrelated nature of the electric and natural gas system. I know there's been some other events recently that, you know, required conservation appeal and things like that. So to me, these are kind of two separate phenomena, possibly related, but for the more recent kind of scarcity events, you know, I wouldn't necessarily point to fuel supply breakdown or resiliency type problems more just kind of a function of the economic underpinnings of our market design, which relies on scarcity from time to time. Thank you.

Q&A Becky Klein

Becky Klein: Let me start again I want to go back to you Lanny about the SPP.

As I recall, the SPP is about 14 States now including the tips of Texas. So, during ice storm Uri, you had a lot going on outside of Texas. We tend to be rather myopic as far as thinking about ERCOT as big as it is that, you know, it was the brunt of the storm and so much focus on it, but there was a lot more going on outside of ERCOT. And I wonder if you could just give us this broader perspective about what you were having to deal with outside of ERCOT during that week, given the fact that you also had terrible weather.

Lanny Nickell: Well, for me, a lot of sleepless nights that's what I was having to deal with. But I will say you know, just to correct you just a bit, we actually do have a presence in Texas, primarily in the panhandle and then of course north-eastern Texas as well.

Becky Klein: Outside of ERCOT

Lanny Nickell: Outside of ERCOT, that's correct. And we are connected to ERCOT via DC ties. We have about 820 megawatts of capability that we can share energy among ERCOT and SPP across those DC ties.

We began the week of February 14th by asking customers to conserve energy. We knew it was going to be bad and we just didn't yet know how bad it was going to be. Even before then, we actually began to commit all available resources we had.

That was Thursday before the Monday in which we actually had to start shedding load. We wanted to make sure that these resources were available to run, that they could procure gas because we knew that it was going to be tight.

Ultimately, during the event on the 15th we had to shed load for about 50 minutes, so a little less than an hour. And it only represented about one and a half

percent of the load across our footprint, which at the time was about 43,000 megawatts.

This was an all-time winter peak for us, in fact, it could have been as high as 47,000 megawatts had we not had the generation unavailability. Which would have increased our previous winter peak by 8%. That's how bad it was in terms of load. All-time record winter temperatures across pretty much the entire SPP footprint. You mentioned 14 states from the tip of Texas, all the way up to the Canadian border.

A lot of that footprint experienced record winter low temperatures. So a lot of load. More load than we've ever seen in the wintertime, and it could have been even worse. We have 94,000 megawatts of nameplate generating capacity. You would think 94,000 megawatts would be plenty.

We have 62,000 megawatts of that 94,000 megawatts is accredited as capacity. The term accredited capacity means that this is how much of the nameplate capacity you should be able to count on when you need it the most. 62,000 megawatts, but we had 43,000 megawatts of load. What's the difference? Why didn't it show up?

Well, 59,000 megawatts of the 94,000 megawatts of nameplate capacity was just simply not available. During the time we needed the most, 30,000 megawatts was on forced outage. Of that 30,000 megawatts that was on forced outage, the biggest contributor was lack of fuel.

Primarily, lack of gas. The gas shortages affected about 13,000 megawatts of our nameplate gas generation. Okay, to put that in perspective, in SPP, we have 28,000, I know I'm throwing out a lot of numbers. This is the important number when we're talking about gas, though, 28,000 megawatts of accredited gas capacity. That means we ought to be able to count on 28,000 megawatts showing up when we need it. 12,000 was produced. That's less than half, just a little more than 40% of what we count on to be there when we need it most to preserve reliability, that's all that showed up. And that's largely because of lack of fuel. That was our problem. That's what was really the primary root cause of our event.

Alison Silverstein: How much of your fuel comes from Texas, Lanny?

Lanny Nickell: That I don't know, but I'm guessing a lot of it. We have a lot of gas in Oklahoma and a lot of gas in Texas.

Rick Smead: Oklahoma is where you saw the thousand-dollar prices too, on OGT.

Lanny Nickell: So, we've got an accreditation problem. You know, clearly. We've got to address that and we've got to fix it. Now, I've heard a lot of finger pointing about the different fuel types so to be fair I'll talk about it.

Coal. Coal, we've got about 24,000 megawatts of accredited capacity, about 17,000 megawatts showed up. So it performed a little better than gas.

Wind, we have about 27,000 megawatts of nameplate but only 3,500 megawatts of accredited capacity. We've actually done a pretty good job of figuring out how much wind will show it when you need it, because that's about how much did show up.

So, when you hear, "wind didn't show up". You're right when you compare that against nameplate capacity, but it showed up pretty much as we expected it and needed it to show up.

That's an important factor and an important fact to remember in all of this.

Becky Klein: How about the weatherization aspect? You know, ERCOT has said that the predominant percentage of issues here in ERCOT have been related to weatherization. To what extent was that a factor in the other SPP States?

Lanny Nickell: I don't think it was as much of a factor, and I'll tell you why. You know a lot of our footprint is in the northern part of the country, so North Dakota, South Dakota, Nebraska to some extent. They expect to see pretty cold temperatures. So that's another factor, I want to just point out, we benefited from two additional things that maybe ERCOT didn't. One is we have a large geographically diverse footprint. 14 states, all the way to the Canadian border. That diversity helped us, because some of those resources are used to that kind of weather and they were adequately winterized.

We also benefited tremendously from our interconnections with the rest of the eastern interconnect and to a lesser extent, even the Western interconnect. We were importing as much as 7,500 megawatts, now we were also exporting a little bit to ERCOT. So on a net basis we were the beneficiary of about 6,000 megawatts of power from our neighbors.

I mentioned 820 megawatts of capacity between SPP and ERCOT, and then I think there's some capacity between ERCOT and Mexico. But the ability to rely on others to help, ERCOT didn't have as much as what we had, and we truly benefited from that.

We thank God every day for the fact that our neighbors had excess energy and the capability to get it to us because that prevented us from having to shed more load for a longer period of time.

Becky Klein: So I want to follow this theme of weatherization this part, the resilience aspect of this topic. And Alison, given the fact that you've worked with that issue, you've worked closely with NERC and FERC before on outages. I wonder if you could take us back to 2011 and the NERC recommendations there and the standards that they had recommended that ERCOT incorporate. One, in a nutshell would they have been sufficient had we incorporated those fully to get us through storm Uri?

Alison Silverstein: They would have been better. One of the biggest problems with NERC standards is that they always leave too much to the interpretation of the owner. And certainly, the new NERC standards that are, let's check our watches, a decade after 2011, will only be going into effect next year. They still leave too much to the interpretation of the generation owner. And they are also backward looking, so that they never look at forward threats with respect to weather. And I'm pretty tired of hearing everybody say that this winter storm, Uri was unprecedented because it wasn't.

We've had storms like this before in Texas. We've had storms like this everywhere else. There's a British saying, or you know some of those obnoxious people who got caught in every unfortunate weather possible, that there's no such thing as bad weather only inappropriate wardrobe choices.

Almost every single generator in Texas also made inappropriate wardrobe choices. And, if you look at the UT report, that just came out two days ago, you will see that they did a test of which generators failed at what temperatures. And

you will see that many of them did not bother, even though they say, “I am weatherized to such and such an adequate point”, they in fact failed well before they are rated or claimed thermal readiness.

And if all you do is check to see, are you winterized in some fashion that ain’t enough. So, there is way too much discretion and way too much, “I’m going to do my interpretation of what it takes to be ready to serve at 16 degrees, but if my plant failed at 32, big deal.”

So, verification of plants is not enough, and voluntary plants is not enough. And one of the things that makes me crazy is blaming this on a market, and on energy prices, when one of the things that we should know as good regulators and ex-regulators is sometimes you need a mandate.

And something like winterization is too important to leave to the voluntary decisions and insurance bets of generators or of their gas suppliers. We need a mandate there to come in.

Julia Harvey: Just to update the group on where the PUC is with their rule-making to implement the weatherization mandates in the new law in SB3. They’ve issued a request for comment, but they haven’t published a formal proposal yet. And I think they’re actually doing a workshop on this in a couple of weeks at the Commission, and that should be pretty informative because I do think, maybe along the lines of what Alison is saying. I think it’s important to bring in independent experts to, you know, provide recommendations as to how the Commission comply with the new law, which also does require that they consult with the state’s office of the climatologist.

So, I believe those resources will be brought in, and I can imagine that will be a forward-looking analysis that, you know, what SB3 requires basically is that transmission providers and generation owners and some portions of the natural gas supply chain weatherize or implement measures to prepare to perform during extreme weather, as determined by reliability standards established by the Commission.

So, it’s really around these reliability standards that are supposed to reflect extreme weather. That’s kind of the crux of this rulemaking.

On the transmission side, I think we would prefer a lot of specificity, as to what is required there, what measures, you know, what are the standards and how to implement the measures to meet them. So that we have a little bit more assurance when we come in for cost recovery. You know that those were prudent measures.

I think, on the generation side, it does get a lot more complicated. There’s regionality and facility type and facility age even or maybe even some kind of cost benefit analysis that might be appropriate there.

Because you know it is sort of a mandate. It’s apparently not something that’s potentially already supported by the market. There may be incentives in the market to weatherize to perform to collect a high price, but if you expect weatherization to something more extreme than, you know, a reasonable resource owner would implement, it’s not consistent with, an outcome supported by the economics of the market.

And so, it's true, I mean it's not, a threat or anything, it's just possible that a unit owner might look at the mandate and decide, that it made more sense to retire the unit, rather than, the capital expense of whatever the new measures might be.

Lanny Nickell: If I could just add, we've spent several minutes now talking about winterization. You can harden the armored truck all you want, if it doesn't have gas in it, you're not getting from A to B. It's not going to do you any good. So, I think if we're going to talk about winterization, we have to talk about it across both industries, the electric and the gas.

Becky Klein: Great segue because Rick has been very patient over here.

And I think that's so important for a couple of reasons. Number one is, that side of the house has a very asynchronous, regulatory regime than what the electric power sector is accustomed to. So, I would love to get your insights, Rick, on how you see, at least in ERCOT with the Railroad Commission, this Supply mapping and winterization process coming to bear, especially since our legislation doesn't really have a compliance deadline for any of that.

Rick Smead: Send me in, coach. The fragmented regulation is obviously a problem. And when you look at it from the power generation upstream, the generator and the specific physical pipeline connected to it can be identified and whichever agency does it can be forced to do whatever they need to do. Get a little bit farther upstream, some processing can be forced, but the Railroad Commission's regulatory oversight starts diminishing just sort of fading the farther upstream you go.

The other wrinkle that makes it very difficult is that most of the gas that was delivered to the generators was delivered by marketers who aggregated from liquid points, so you don't know which wells it came from.

And essentially, unless all of the wells or the vast majority are hardened, you still have multi-hundred-dollar prices if there's a major shortage, if there's just no gas available. So, from a regulatory perspective, the folks at the Railroad Commission have told us that everything's fine, everybody did their job, and we can all go play golf.

I think something else has to happen. For it to be effective, it would have to be collaborative with the major producers in the major gas fields. Some standards have got to be developed, because essentially what happened was, at least in the first phase where freeze offs became one of the dominoes along with, at the same time, the plants freezing and stuff happening in the pipeline systems and all that. We lost 26% of the production out of the Permian Basin. And that by itself didn't cause everything to happen. But it was one of the dominoes that caused it to happen up front, then loss of power to the producers became the thing that made it such a prolonged and deep outage after everything else was fixed.

So somehow, producers have to have a different design condition. The weather simply went way beyond their design condition for their freeze-off prevention measures at their wells.

The heating and antifreeze injection, all that, just wasn't big enough. And so, if they don't collaborate, just enforcing something like that over thousands and thousands of wells all over West Texas, that would be a lot of people who are going to get shot.

So it's a hard problem and until it's solved, the rest of this is all just getting really ready to receive all the gas you're going to get then not having it show up.

I think, you know, the thing that gets lost in this is in the horrible temperature and ice storm conditions out in around Midland, in that area, producers that were fighting their way to the well heads, they were beating on things with sledgehammers, they were doing everything they could to get back online. But basically, it should have been more protected against in the first place in their design.

Alison Silverstein I'd like to pile on with two or three more points. One of them is the reason why this gas supply mapping proposal is going to be so ineffective is that it focuses on what are the points in the gas supply that feed ERCOT power plants. So that doesn't help you guys, Lanny. And, apart from the fact that you can't, because of marketers, identify which gas supply points there are, the fact that part of the Texas wells are shutting-in in advance of a freeze or freezing off means that we are going to affect the entire Midwest. One of the reasons that people act like this is a surprise now is because they didn't pay attention to the fact that we did this to the entire Southwest in 2011. So everybody's horrified that this time we just shut ourselves off instead of screwing over some other states.

Second thing is that, hard to imagine that was only one thing, the second thing is that if we lose enough production we're going to lose linepack. Which means that we have delivery problems no matter what to power plants everywhere in Southeast Texas and in points North.

The third is, I want to go back, lest we forget the outrage of gas compressor stations and production points that do not have their own generation and that do not have backup supplies of some fashion. And it didn't occur to them to fill out a piece of paper that everybody knew existed (except apparently the Chair of the Railroad Commission) that said, "you are a critical facility and tell your distribution utility about it."

Back when I was at the Public Utility Commission of Texas, there was an outrage in the press because senior living centers, old folks homes, some of them were signing up to be voluntary curtailment because there was a price break, so I'm going to let my local utility shut me off, and then the utilities did and everybody was outraged because old people were sitting in the dark and there was this big to-do.

This is your job to keep the lights on, to protect people, if you are a gas producer you think you're so damn important why the heck are you signing up to be on voluntary curtailment. That's an outrage and I don't understand why people aren't outraged and you know why should people be blaming ERCOT for the shock of discovering that these people were on it.

If you think you're that important and your business depends on having electricity then for God's sake stand up and make sure you've got electricity and don't sign up for voluntary load down.

Rick Smead: But we can't lose sight of the fact that at 1:30 in the morning on Monday, nobody got power. It doesn't matter what priority you were, or what you signed, or anything, the world had just stopped. And so I really believe that the standard for production platforms and processing plants and everything, the standard ought to be that they all have backup generation.

Alison Silverstein: yes please.

Julia Harvey: I'll just briefly add, you know, what Alison's referring to are the critical natural gas facilities that happened to be compensated by ERCOT to curtail during an emergency, because they participate in the emergency response program.

And so that was discovered later, I think that's in the UT report, it was 67 facilities. I'm not sure how important they were in the supply chain, but I think that's another kind of symptom along with this failure to register truly critical load as critical. Of this discontinuity in the regulatory apparatus, because we know the industries are just deeply interrelated and if one piece fails, there are compounding problems. But the regulatory regime is not, and so that's part of what I think the legislature was trying to address, and some of the provisions of Senate Bill 3 that formalized like a venue for communication between the agencies. And so we're hopeful, you know, as a result of that we just get this better coordination.

Becky Klein: You know one other question on this line before we go to another topic, and that is so, to what extent do y'all feel the current supply stack priority of gas supply going prioritize to you know, not to generation, but to residential thermal uses, to what extent do you think that should be changed?

Rick Smead: Not.

As far as gas distribution to residential and commercial loads and in cities or towns, wherever, one thing you can never ever let happen is to lose pressure to those customers.

Boston had that happen once, they lost the whole city and it took every appliance service man from every utility from Florida to Maine to come relight and purge that system. It took months.

Alison Silverstein: I was at PG&E after an earthquake and we had to, in fact, go back and visit every single gas customer in the residential area and every gas customer in northern California. It was a nightmare. So there are valid cost and safety reasons. You don't want citizens going out and messing with their gas feed and trying to fix it if they think it's gone wrong. It's just a nightmare, as well as the cost.

Rick Smead: I also got to say our gas fireplace saved my family that night.

Becky Klein: Okay, so I want to go back to you Lanny and talk about, you know, the difference between ERCOT and SPP, lot of differences there as far as regulatory structures and also governance structures. But what would you say are some of the top, you know, three tradeoffs between those two areas?

Lanny Nickell: Wow I wasn't expecting you to quantify a number of tradeoffs there.

Becky Klein: Well even if there's just one that's fine.

Lanny Nickell: I'll do my best, I'll come up with the top three. So let's talk a little bit about what the differences are just so everybody understands.

One, SPP is FERC regulated. And we have delegated certain responsibilities to what we refer to as a regional state committee. So it's a committee that's composed of the regulators of 11 of our 14 states. Three have just simply chosen not to participate. We haven't excluded them, they've just chosen not to participate.

We have 11 regulators from our 14 states that do participate on that committee, and they make pretty important decisions for the organization. Those decisions

include how to allocate costs for transmission expansion, they include how to define the resource adequacy policies of the organization which is really critical here in light of the winter event. And then they have some other responsibilities as well, including congestion hedges and transmission rights and so forth.

But to me, that difference is pretty critical, because what it does is it allows that organization to work together to come up with policies that are good for everybody. So I would say the diversity of the multiple states that participate in our footprint, recognizing, understanding each other's differences and yet being able to come together to make some pretty key policy decisions, is very helpful for us. I've already mentioned the geographic diversity.

I think diversity is going to be very important. We benefit from an engaged, diverse, stakeholder-driven process, and our regulators are a key part of that, our state regulators.

So I mentioned the geographic diversity, I mentioned the diversity of opinions of our stakeholders, our regulators. I guess the third thing is just, and I've already actually talked about this, we benefit tremendously from being highly interconnected with the rest of the Eastern Interconnect.

Becky Klein: With that backdrop, if there's a couple of things that you think ERCOT could learn from the SPP region, and especially what happened during that week, what would those items be?

Lanny Nickell: All right, anybody that is so pro ERCOT that they won't want to hear anything from an SPP guy, feel free to leave the room.

As I said, to me diversity is really important. You have to have different perspectives at the table or otherwise you're going to keep doing the same things that you've been doing forever that may not be what's in your best interest. So I highly suggest and encourage having diversity at the table. It's just so critical. I

think, from a technical perspective I would love to see more interconnection between ERCOT and SPP. Now granted, I understand the regulatory issue and the fact that ERCOT doesn't want to be regulated by FERC. I think we can still achieve more interconnection, even if it's just a matter of expanding the DC ties. There are ways to avoid that concern and yet be able to provide more emergency assistance in times of need between the two organizations.

Becky Klein: That would be good. You know I want to continue on along the lines of lessons learned and turn to you, Julia.

You know from your catbird's seat, interacting as much as you do with the different electric co-ops here in Texas. What do you think after Uri are some of the future things that the electric co-ops are going to take away from all this and incorporate differently?

Julia Harvey: Thanks Becky. So there are, as you know, 75 co-ops in our association, about 50 in ERCOT, and so the experience was pretty varied, I would say. Really kind of the core of the co-op program is the distribution provider and by and large, they actually had pretty good outcomes during the storm just in terms of following ERCOT's directives and the ability to successfully rotate outages.

There was a University of Houston study, I think Mark Jones is speaking later, which kind of surveyed the experience of different end users, and cooperatives did actually fare favorably in comparison to IOU and MOU counterparts. So we're proud of, you know, how we managed the event in terms of communication

with our members, transparency, and just effectively rotating outages and managing the system reliably.

Obviously, it's known that some of the generation providers that are cooperatives were more exposed than others. There were mixed results on that side, and you know, from that perspective we're still kind of learning the path forward there.

I would say, as far as lessons learned, I think this may be a topic we're going to address in this panel, but just more of how to grow resiliency on the demand side, on the distribution system, what are the options there given the current regulatory framework and the variety of market participants.

So one change actually that happened as a result of last session is there's a change in the law where now grocery stores in cooperative and MOU areas can partner with DG providers to provide backup power during an emergency and during certain other times and that DG provider can sell into the grid at other times.

The change in the law was needed because it's not permitted for a third party to come in and sell at retail in what we call a -non-opt-in area in a co-op or MOU. So, we needed some tweaks in the law to create this new business model for securing the food supply chain. I didn't know we were going to do that, but that's what we're doing. And it's kind of an innovative, unique approach to DG that we're hoping increases resiliency for these specific end users and helps contribute to that ongoing decentralization of the market that we're seeing in a productive and fair way.

Becky Klein: Great. Alison, you've already mentioned a little bit early on in the panel discussion about your affinity for demand response and energy efficiency. You want to tell us more about that, given the fact that we didn't really see any legislation on that this go round? What do you think needs to happen there, and what do you think the PUC ought to be focused on in that regard here, in the near medium term?

Alison Silverstein: Thank you, my favorite topic. So, listen y'all—energy efficiency—think of ERCOT and meeting extreme weather events as an athlete trying to do the high jump. You train and you train, and you get a couple inches higher every time if you keep working at it.

Extreme weather events, there's more and more of them. If I'm ERCOT and I'm used to doing six-six, clearing that pretty easily and steadily. All of a sudden, a heat dump or winter storm Uri moves the bar from six-six to seven-six, which, by the way, is what happened with the last couple of heat dumps that are going on last month and this month, as we speak, or winter storm Uri that did this for winter.

Then, all of a sudden, I am completely—as ERCOT with all the assets that we have—unable to make that jump instantly. Particularly given ERCOT's weaknesses in weather forecasting and in demand forecasting, part of why we have not had the supply assets ready is because they weren't warned how bad it was going to be consistently by ERCOT in a quality way.

So, you get ready. You know, if I'm told I'm going to be thrown into a track meet at the last minute, the kind of prep that I do to get ready for it, I didn't have a chance to do.

The reason that energy efficiency and demand response are so important, not only on a long-term asset basis, because we cannot build ourselves up as an interconnection; we can't build the level of transmission and generation that we need

to move load peak from six-six to seven-six overnight or within a few years. It takes years to build your capability to do that. And, we don't have the regulatory steadiness; we don't have the cap-backed steadiness; we have extraordinary country risk here, in Texas, right now, frankly, y'all.

And so, the thing is—and everybody who is a customer within ERCOT, we are held—if ERCOT and all of our friends who run our assets succeed, then we do okay. But, we're betting on them, and if they fail we lose as customers, as many of you know from personal experience.

So, the thing about energy efficiency is—go back to the high jump analogy—energy efficiency permanently reduces the bar or it holds the bar down from rising as quickly.

And while it does that, it protects you and me as customers because it keeps us from being some of the 210 people who died in Uri, or some of the 500 people in the Pacific Northwest who died in the heat wave last month. And demand response, not only—energy efficiency slows the height of the bar and protects the poor saps who are victims of ERCOT.

And demand response essentially is like a button that the athlete pushes that says, "That six-six or six-seven-foot bar? I'm going to drop it six inches. I'm going to drop it by a whole foot." So, that I can use the assets and capabilities that I've got in this emergency.

And, the benefit of all of them is they're not going to fail, for as many reasons and due to as many failure modes as we've seen repeatedly. And, they're going to be there, whether it's a surprise, or whether it's well anticipated.

So, energy efficiency and demand response permanently improve operational capabilities, as well as give us more time to figure out how to operate a grid this complicated, and to wait until those of you who are working the supply side can figure out how to do it well.

Rick Smead: So, if I understand it, if you don't use as much you don't need as much— is that about it?

Alison Silverstein: And, it makes it a lot easier for the ERCOT operators or for the SPP operators to do their jobs because they don't have to jump as high.

Rick Smead: Give me an easier job; I can do it better.

Becky Klein: So Rick, is there any such concept in the gas world?

Rick Smead: Ah, well, I guess, you know, the gas market has been effectively unregulated on the commodity for so long now that it is basically price that drives conservation and drives the seeking of alternatives. We don't have the real time problems that the electric industry does.

I'm often reminded by my electric colleagues that they move at the speed of light; we move at 20 miles an hour. But, what I try to tell him is no, our problems move at the speed of light, because when you put an MMBtu in a pipeline it comes out the other end at the same time, a thousand miles away. It's our *solutions* that move at 20 miles an hour. So, the advance planning, it doesn't do much good to cut off, or to be able to shed some gas load for a little while, the line pack gives you a tremendous amount of flexibility to move gas around.

Actually, oddly, when I was in Colorado on the front range with the Public Service Company of Colorado, they would use rolling blackouts as a way to conserve gas supply when it got tight because if you turn off the furnace, it won't burn

any gas. This was how they managed their gas load when they had severe events, sort of forcible demand response.

Basically, demand response is not a not an explicit thing in the gas industry, but it's been happening anyway.

Becky Klein: Julia, how would you describe—whether it's energy efficiency or demand response programs—how would you characterize their ubiquity among electric Co-ops here in ERCOT?

Julia Harvey: Yeah, that's a good question Becky. Definitely some of the larger kind of faster growing, more suburban Co-ops have integrated those types of programs.

You know, the power rush hour type programs and incentives for, you know, energy efficiency, weatherization, and things of that nature, it's growing. I would say, it's not ubiquitous, but there is interest. You know, the decisions that a Co-op makes are driven by the interests of their members. So, once you get kind of a critical mass of interest among the membership of a Co-op, they embark on that type of program.

Becky Klein: What would motivate those members to deploy some of those services and technologies more?

Julia Harvey: I mean, I think it would be the prospect of saving money on their electric bill would be a motivator. Or, just you know interest in having a more efficient home and lifestyle.

I did want to comment a little bit on one aspect of demand response. You know, there was a piece of legislation that passed the session, HP 16, which banned a certain type of retail product, a wholesale index product, that I guess the main provider was Griddy. And, I completely understand why that needed to happen; however, I do think it's kind of a little bit of a shame that, you know, that type of product or similar products can't be kind-of built on and innovated on in ERCOT going forward. Because that, you know, price responsive demand, I've been told, is, you know, one missing piece of the energy only market puzzle.

Alison Silverstein: So, if I can add two more thoughts, one of them is, I wanted to distinguish between old fashioned energy efficiency, which was about saving kilowatt hours and MMBtu.

What we need today is peak targeted energy efficiency that's very specific about heating, cooling, and weatherization, which keeps people alive, and peak adjacent uses that can be controlled and managed like EV charging, water heaters, pool pumps, things that can actually make a difference to how high peak goes—whether it is, you know, classic summer peak or a surprise peak.

Every single event that ERCOT has had, in the last three years, has been a confluence of unexpected demand spike, hint forecasting problems, and b) a generation shortfall. It doesn't matter why you're missing, if you're missing, you need the tools.

The second part of that is, I am a big fan of having demand response markets that are price driven, but, at the moment, I'm much more driven by reliability. So, I want a lot of demand response tools that we can use in emergency situations.

And, one of the most important is I'd like to see every retail electric provider and every large customer be able to drop 20% of its load on a remote basis on call from the ISO. And oh, by the way, I want to start with the state and have every

state facility be a mandatory 25% drop—and actually, I'd like to drop all state loads by 20, by 10%, because I'm tired of freezing every time I walk into the capital or any other state building.

Lanny Nickell: But, I was wondering if I could ask Alison a question because it's not often I get to be on the same panel with the smartest person in the room—

Alison Silverstein: And you're still not.

Lanny Nickell: But, so you know, to me and, I do agree, demand response, energy efficiency can provide a lot of value and it can avoid a lot of cost.

My question as to how do we, as utilities, RTO's, regional organizations, anybody who's responsible for reliability, know what we can count on? And it's the same issue that I just pointed out with gas. You know, if we don't have mandates, that's just simply up to the market to figure out that maybe the value isn't there. And it'll eventually self-correct. I agree with you, you made a statement earlier that I think it takes a combination of mandates and market signals. But, even without mandates, eventually, as long as the RTOs do a good job, or whoever it is that's responsible for capacity accreditation, we understand what it can provide and won't provide. Eventually, people figure out, "Maybe it's not as valuable as I thought it was," and it will shift to some other resource.

How do we do that on demand response? Do we have the ability to know exactly what we can count on when we need it the most?

Alison Silverstein: Yes, and a lot of it depends. Price responsive demand not so much, but there's a lot of work that's been done with dispatchable demand response. And that's why, having remote control—you know, DG aggregators managed things like battery storage, distributed generation turn-ons, EV charging management, and building energy management systems—there's telemetry that you can use. And you can do things, like monitoring at distribution and transmission substations, to tell how the feeder responded in terms of load within "X" minutes of when the dispatch signal was sent out. So yeah, there's lots of ways to verify that a particular load drop occurred and did happen after you called for it.

Lanny Nickell: So, if I could summarize, as long as we correctly forecast what that load is going to look like when we need it the most, and we know how much we can control, then, it's just as effective as any resource?

Alison Silverstein: Yes, and in particular, has done work verifying that I called for it, and this feeder dropped in response within five minutes, kind-of thing. So yeah, it's doable.

Becky Klein: Okay, I'm mindful of our time. What I'd like to do is maybe just take some time now and pause if there's any questions, not only from the room, but also virtually.

Audience Question: I would like to have you address the social implications of if we had gone into black start because one of the things that the group that I'm working with has discussed, is that black start, here in Texas, appeared to have been conveyed almost like just a brown out or a blackout when, from our perspective, it's a significantly greater social impact. Can one of you speak to that, please?

Oh, my name is Oliver Smith and I am here representing the American Society of Civil Engineers.

Alison Silverstein: I have not seen the final numbers, this is why we've been so insistent in the Alison and Commissioners group about the need for a full root cause analysis. I have not yet seen final numbers on how many of Texas's official and ERCOT official black start units were completely unavailable because they were frozen or lack gas, but it's a pretty big number. And all the happy people who assume that hydro is a black start capability—sure if you've got hydro, but in Texas, not so much so. And we don't have the benefit of being able to restart from Niagara Falls or from an aircraft carrier in the port of Alameda in California, which we did after an earthquake.

So Texas lost a whole lot of black start capability. We did not—as far as I can tell, there were minimal numbers of drills. There was minimal specification of what it takes to be a black start unit and to earn compensation for being a black start unit. And, had we actually, God forbid, gone down, we would have been out for probably several weeks for the time that it took to get all of those units back and pasted together and bring the grid back up.

So one of the things that we called for in our “never again” report is a complete rethink about how Texas—how ERCOT—defines, and qualifies, and compensates black start units and what their obligations are. And one of, in my personal view, the single most important reasons that Texas—ERCOT—should have interconnection, significant robust interconnection with the rest of the United States and Mexico, is so that we can import black start capability the next time we get a major hurricane, or a Uri, or something else.

Rick Smead- Also, the other element of that is a lot of people are calling for a capacity market to beef things up, but in Uri, a capacity market where you had spinning reserve all ready to go but it was running on gas, it would have gone off too so it wouldn't have helped.

Becky Klein: What else you got?

Audience Question: Hi, Elliott Roseman with the US energy association. I appreciate all of the different solutions that have been proposed: standards for weatherization, energy efficiency and demand response, greater interconnection. Is there any way that we can, at this point, or is it too soon, to begin to put together some kind of a prioritization or a hierarchy that looks at the cost versus the benefits? I mean there's got to be a cost for the different solutions that have been proposed. Is it possible yet to put together some kind of an order of what we should do first, second, and third based on what the costs? And if \$9,000 or whatever is the value of lost load, you know, compare—excuse me—that to what the benefit would be if we do those things?

Becky Klein: I'd love to hear that from whoever wants to address it from a ERCOT perspective, but also Lanny from SPP, given your report is going to be coming out, if y'all have done anything like that?

Lanny Nickel: Well I'll just let a little bit of the cat out the bag, just enough so you can see the little furry whiskers.

We have 22 directional objectives that we will be recommending to the board. They're directional in nature, and what I mean by that is, they don't necessarily—there's a lot more evaluation, assessment, discussion, debate that has to occur to understand what the costs and benefits are of fully implementing all of those directional objectives. I will tell you that four of the 22 are what we deem to be

urgent, critical, work has to begin immediately. And those four have to do with fuel assurance and resource adequacy. And I also know that both of those are going to be expensive. Depending on the extent to which you implement them and how you implement them, but we got to get started thinking about it, we got to get started debating it, and we got to get started figuring out exactly how to increase fuel assurance and how to improve resource adequacy. Recognizing that billions of dollars of costs could have been avoided in just this one event, if we had done a better job in those two areas.

Yep. Absolutely. And I will tell you that our regional state Committee, those are the 11 regulators across the footprint, have been very involved in our comprehensive review and generally support, well they support the direction. Now the question is, will they support the detailed implementation answers? That's to be determined, but we got to get started moving down that path.

Becky Klein: Julia, it'd be great to hear from your perspective because you're close, you know, co-ops are so much closer to the end use customer. How would you see some of those resiliency measures, reliability measures, being prioritized and especially given the cost benefit analysis?

Julia Harvey: Sure yeah thanks for the question, Elliot. I mean, I think, it would make a lot of sense to approach the problem in that way. You know, there are some directives we've already gotten as far as closing this resiliency gap that we just have to move forward with, and there's not really going to be a lot of opportunity for cost benefit.

I mean there's kind of low hanging fruit like, requiring critical natural gas load to register with their utility so that they're not inadvertently curtailed. And then there's other, you know, more ambiguous directives that are kind of like: direct ERCOT to procure ancillary services to ensure dual fuel capability or direct ERCOT to streamline incentives to support additional thermal generation. It's really unclear right now what the magnitude of the costs will be on those types of mandates. It's that tension: sort of, markets, and mandates, and can you just direct the market to produce a certain result? So I think if you create the right incentives, you can. But that's the debate that's going to happen in the next few months at the public utility Commission as they evaluate these market design changes.

And I'm sure we'll hear a lot from consumers. You know, co-ops, we represent load, but we also have generation assets, so we do take kind of a balanced view. And so we'll see. I think there's a lot of analysis yet to be done. And some of it, like I said, some of the mandates don't really allow for a lot of cost benefit analysis, but with market changes, I think that that will be part of the discussion for sure.

Alison Silverstein: And I want to remind everyone that a small group of people who have some experience in ERCOT costs and benefits and policy prioritization did issue the "never again" report with 20 recommendations. Most of which are nowhere near the governor's and legislature's immediate priority list. Which is unfortunate because many of the things that we recommend have relatively low cost, highly practical implementation and improvement capability that addresses a lot of the heart of the resilience issues that we screwed up in winter storm Uri. And most of the measures that we recommend will help ERCOT and advance equity for all of the citizens of ERCOT and all the electric customers who

got harmed. And those things don't have the same sort of headline glamour as pounding your fist on the table and saying, "give me more power plants," but they're going to do a lot more to help people day to day on a low cost basis here.

Becky Klein We have like two-and-a-half minutes left, but I think instead of me asking a question, I would love it if each one of you can just go down the line and give a closing remark about this topic.

Lanny Nickell: Awesome, this is my last chance. So, as we were talking about cost and the benefits of spending money to improve our reliability posture, I recall an administrator of a local university in Arkansas describing how often-times parents of students or prospective students would come to him and say "oh my gosh," just lament the cost of education: "Education costs are just so expensive, it's just too expensive". And he would always respond, he said to them in this way, he would say, "if you think the cost of education is expensive, try the cost of ignorance. That's really expensive."

And so, I think the same thing can be said about our electric industry, right, I mean, "it just costs so much to be reliable," well try experiencing the cost of not being reliable—that's worse. And we have done it, and we got to recall that because, unfortunately, two months, three months, two years, three years passes, and we forget about the cost of not being reliable.

Alison Silverstein: And I'm pretty sure Texans are going to stay angry for a long time.

Rick Smead: Well, they'll just stay angry, they still won't be willing to spend. Yeah, they'll stay angry but with each month that passes they'll be less willing to spend money, and that's the challenge.

I guess from the gas perspective, natural gas is a wonderful generation fuel: it follows load, it's low carbon, it's so responsive, you can site generation just about anywhere because it's not very intrusive like a giant coal plant, it's a wonderful fuel. But the suppliers, the people that actually get it out of the ground, especially in the Permian, they're oil producers. Gas is something they just want to get rid of. And so, they don't have any of the same objectives or priorities that we're talking about here, because that's not their business model.

There's always been a competition between utility reliability, and competitive commodity markets, trying to operate in the same systems. And here, we've got to have a way that the role of natural gas in the reliability of the electric grid is recognized differently in the oil and gas community than it is right now. Right now it's just something they sell to get rid of it.

In fact, you know, you'd think that if you were the guy sitting in a producer—who his boss suddenly runs in and say "mother of God, we can get 500 bucks an mcf for our gas, how we doing?" And you say "well sorry boss, we're all shut in, we're not selling any." You'd think you'd be in a lot of trouble, but most of the producers, being oil producers, they hedge their gas. It's their hedge partners, it's Banc Paribas, it's people like that that made all the money because the producer just wanted a fixed price for the gas so they wouldn't have to worry about it. So it's got to be a whole different model with them.

Becky Klein: Okay I'm gonna have Julia go next, and Alison, you can close it out.

Julia Harvey: Well, I think it was on Tuesday that—at the Senate hearing—the Chair of the PUC said that we’re going to move away from a crisis-based market business model. And so, we are undergoing a dramatic change to our market design I would say, and there’s going to be this ongoing kind of balance of mandates, which are a lot easier to do on the regulated infrastructure side, and then changes to the competitive side. And as we kind of trend towards a more fully regulated approach, I think we’re going to continue to kind of try to make that balance work for ERCOT.

Becky Klein: Wow, that’s a big statement you just said. Alison?

Julia Harvey: Ha, thank you?

[Audience laughter]

Alison Silverstein: I want very high reliability and resilience at moderate costs with high equity. And what that means is we need both supply and demand side.

I’m reminded of the first rule of holes: when you’re in a hole, stop digging. The reason that we need energy efficiency, and demand response, and distributed generation, and distributed storage is it’s a way to keep from digging the reliability hole and the potential consequences of reliability and resilience failure from getting deeper and deeper every year as Texas population grows and as climate change grows even more terrifying.

And it can buy us time while we figure out how to make all the supply side work and how to make all the investments happen, and what all these fancy-pants market redesigns are going to mean in terms of people’s willingness and ability to invest and get their money back. Because that’s a giant unknown. As well as, how do folks like Lanny operate a growing number of unknown resources and resource combinations that don’t always behave the way we want to. So we need every possible option, and we need to do them all aggressively. Thank you. And thank you all for being here.

Becky Klein: Thank you and thank you all for being here folks. I saw a lot of pen scribbling away and no tomatoes thrown so thank you very much, that is a good sign.