

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
AND  
FEDERAL ENERGY REGULATORY COMMISSION

+ + + + +

JOINT MEETING

+ + + + +

THURSDAY,  
MARCH 31, 2022

+ + + + +

The Commissions met via Videoconference, Christopher T.  
Hanson, NRC Chairman, and Richard Glick, FERC Chairman, presiding.

NRC COMMISSION MEMBERS:

CHRISTOPHER T. HANSON, Chairman

JEFF BARAN, Commissioner

DAVID A. WRIGHT, Commissioner

FERC COMMISSION MEMBERS:

RICHARD GLICK, Chairman

JAMES P. DANLY, Commissioner

ALLISON CLEMENTS, Commissioner

MARK C. CHRISTIE, Commissioner

WILLIE L. PHILLIPS, Commissioner

ALSO PRESENT:

ANNETTE VIETTI-COOK, Secretary of the Commission

MARIAN ZOBLER, General Counsel

NRC STAFF:

JIM BEARDSLEY, Acting Deputy Director, Division of Physical and Cyber  
Security Policy, Office of Nuclear Security and Incident Response

ERIC BENNER, Director, Division of Engineering and External Hazards,  
Office of Nuclear Reactor Regulation (NRR)

ANDREA KOCK, Deputy Office Director for Engineering, NRR

NERC STAFF:

HOWARD GUGEL, Vice President, Engineering and Standards

FERC STAFF:

DAVID HUFF, Electrical Engineer, Division of Operations and Planning  
Standards, Office of Electric Reliability (OER)

ELIN KATZ, Director, Office of Public Participation

BARRY KUEHNLE, Energy Infrastructure and Cyber Security Advisor,  
Division of Cyber Security

DAVID ORTIZ, Acting Director, OER

HEATHER POLZIN, Attorney Advisor, Division of Investigations, Office of  
Enforcement

## P R O C E E D I N G S

9:08 a.m.

NRC CHAIRMAN HANSON: Good morning, everyone, I convene the joint meeting of the Federal Energy Regulatory Commission and the Nuclear Regulatory Commission in a public session.

The two Commissions meet periodically to discuss topics of mutual interest, I believe the last one of these was in the fall of 2019 before the pandemic, so it's great to get back into our usual routine doing these.

I want to extend a warm virtual welcome to our colleagues from FERC and from the North American Energy Reliability Corporation.

The NRC, FERC, and NERC are mutually interested in the nation's electric grid reliability and nuclear power plant safety and security, including, but not limited to coordination activities related to cybersecurity, physical protection, and emergency response.

And of course, the NRC has various memoranda of agreement and understanding with FERC and NERC to facilitate our interactions of mutual interest. I'll make a couple of additional notes this morning, I think.

I'll speak for Commissioner Baran and Commissioner Wright, we look at the full complement of FERC Commissioners and I think we're suffering from a bit of commission envy, frankly.

We long for five and look at you with somewhat green expressions. I want to take one other note and just to publicly celebrate the retirement of our Secretary of the Commission.

Chairman Glick, I know you know and the other Commissioners on FERC know how essential this function is to the proper

1 operation of a Commission.

2 There have been 17 Chairmen at the NRC but there have  
3 only been 3 Secretaries of the Commission, and our own Annette Vietti-Cook,  
4 who is retiring of 39 years of public service today, is the longest-serving.

5 She began her tenure in 1999, so she has been the  
6 Secretary of the Commission for 23 years.

7 It has been an absolute joy for me and I know for the other  
8 Commissioners to work with her during our tenures, and we just wish her the  
9 best on her retirement and thank her for her service to the country and the  
10 NRC.

11 With that, Chairman Glick, I'd like to hand the floor over to  
12 you for any opening remarks you would like to make.

13 FERC CHAIRMAN GLICK: Thank you very much,  
14 Chairman Hanson, and I want to first thank you and our NRC colleagues for  
15 hosting us today on this virtual meeting. I also want to join you in  
16 congratulating Secretary Cook.

17 I do agree with you 100 percent, the Secretary plays the  
18 most pivotal role I think in our organization and I'm sure most agencies, I'm  
19 sure the NRC as well.

20 I just want to make a few brief comments and then turn it  
21 back to you and then we'll ask the other Commissioners from both agencies  
22 to make some opening statements as I understand it.

23 I think everyone knows the electric sector is undergoing a  
24 major transformation currently and a lot of the focus is on reducing  
25 greenhouse gas emissions and zero emissions generation.

26 And while we're in the transformation that we're currently

1 under, there's a significant focus on renewable energy, obviously wind and  
2 solar energy resources like that. We can't forget that nuclear power currently  
3 provides about 20 percent of the electric generation in the United States.

4 And I think currently it accounts for about half, 50 percent,  
5 of all zero emissions generation currently operating in the U.S. and that focus,  
6 the focus on nuclear energy, isn't just a temporary one. We see a number of  
7 states have adopted policies aimed at promoting nuclear power, keeping older  
8 nuclear plants online.

9 And we've also seen some legislation at the federal level as  
10 well recently enacted that helps promote nuclear energy.

11 And so from a FERC perspective and an NRC perspective,  
12 and our colleagues at NERC as well, the most important things we need to  
13 make sure of are that we reduce or address any reliability concerns that may  
14 exist and ensure that our older aging nuclear fleet can operate reliably.

15 It's also important that we remove whatever barriers might  
16 exist from a FERC perspective or other agency perspective in terms of  
17 advancing advanced nuclear technology as well.

18 So, with that, I think I will turn it back to you, Chair Hanson,  
19 and again, thank you all for hosting us today and I look forward to the  
20 discussion.

21 NRC CHAIRMAN HANSON: Thank you, Chair Glick.  
22 Would any of the NRC Commissioners like to make remarks to get rolling?

23 NRC COMMISSIONER BARAN: Sure, good morning,  
24 everyone, this is Jeff Baran. This is my fourth or maybe even fifth joint NRC  
25 FERC meeting and I've always found these meetings to be productive and  
26 informative.

1 NRC and FERC have different missions but as the  
2 Chairman mentioned, we also have areas of strong mutual interest, including  
3 electric grid reliability, physical security, cybersecurity, and environmental  
4 justice.

5                   So, it's terrific that we're gathering again to share  
6   perspectives and updates about each agency's activities. I'm look forward to  
7   the presentations and the Q&A.

8 Thanks.

9 NRC CHAIRMAN HANSON: Thank you, Commissioner  
10 Baran. Commissioner Wright?

11 NRC COMMISSIONER WRIGHT: Good morning, it's good  
12 to see each of you. I've looked forward to this for about three years now, the  
13 one in 2018 was actually my first Commission meeting. I had just been just  
14 a few days into my term here.

15 And in the fall of '19, which was our last joint meeting, it  
16 really offered helpful insights for us at the Commission into issues that were  
17 impacting the grid, and especially the loss of capacity.

18 I really appreciate the opportunity to engage with you and to  
19 hear FERC and NERC's perspectives on things, especially on every issue that  
20 relates to the grid and how those issues impact nuclear power plants and  
21 national security matters as well.

22                   So, you're very instrumental to everything that we're  
23 involved in and we appreciate what you do and we stand ready to assist in  
24 any way we can. So, thank you from me today.

25 NRC CHAIRMAN HANSON: Chair Glick, would any of the  
26 FERC Commissioners like to make remarks?

1 FERC CHAIRMAN GLICK: Thank you Chairman Hanson.  
2 I'll go and ask if any of our colleagues have anything to add, and I'll start again  
3 with Commissioner Danly.

4 FERC COMMISSIONER DANLY: I don't have any opening  
5 comments except to say I want to thank both of the Chairmen for  
6 reestablishing these meetings. Thank you very much, and that's all I have.

7 FERC CHAIRMAN GLICK: Thanks Commissioner Danly.  
8 Commissioner Clements?

9 FERC COMMISSIONER CLEMENTS: Thanks, Chairman  
10 Glick and Chairman Hanson and to all of you for virtually hosting us today, it  
11 is a great chance to be back together. I know that the Staff at our two  
12 organizations work behind the scenes to work towards the really important  
13 goals of system reliability and security.

14 And so I'm pleased to reestablish my own personal  
15 connection with you all and look forward to the presentations today.

16 FERC CHAIRMAN GLICK: Thank you Commissioner  
17 Clements. Commissioner Christie?

18 FERC COMMISSIONER CHRISTIE: Thanks to the two  
19 Chairs for putting this together, it's my first one, and I hope next year we're  
20 together in person, as I'm sure everybody else does. I really look forward to  
21 that.

22 I've looked at the agenda and I would just ask of our NRC  
23 experts, and you all are, please tell us today about where the modular nuke  
24 technology is and how close we are to getting that rolled out on a commercial  
25 scale.

26 Nuclear obviously is emission-free, which is a huge asset

1 but it's also dispatchable, which we need to keep the lights on.

2 So, modular nukes seem to me to be one of those  
3 technologies that we're going to really be betting on, and so the sooner the  
4 better.

5 So, I'd love to hear from your experts today at some point in  
6 the agenda where we are on modular nukes and when those things might be  
7 commercially deployable.

8 With that, thanks again and I look forward to this, I'll be  
9 listening and learning, thank you.

10 FERC CHAIRMAN GLICK: Thank you Commissioner  
11 Christie and now Commissioner Phillips.

12 FERC COMMISSIONER PHILLIPS: Hello, everybody.  
13 Glad to be here. I'm excited to hear the presentations today.

14 I'm also thrilled to talk about reliability, which I believe is a  
15 very timely subject right now and I especially look forward to hearing from my  
16 former colleagues at NERC. Thank you.

17 FERC CHAIRMAN GLICK: Thanks Commissioner Phillips  
18 and Chair Hanson, I'll turn it back to you to get us started.

19 NRC CHAIRMAN HANSON: Thank you Chairman Glick.  
20 Let's get rolling, our first speaker this morning is going to be Mr. Howard  
21 Gugel, Vice President for engineering and standards at the North American  
22 Energy Reliability Corporation.

23 Mr. Gugel, the floor is yours.

24 MR. GUGEL: Thank you and thank you all for allowing me  
25 to speak today on behalf of NERC. I'll be presenting on a couple of different  
26 reports that we produce, the State of Reliability report and the Long-Term



1 Reliability Assessment.

2                   And then I'll finally provide a bit of a summary on some  
3 activities we're doing in energy assurance. So, if you go to the next slide, I'd  
4 like to speak first about the State of Reliability report and I want to note the  
5 fact that this is the 2021 State of Reliability report that looks at what happened  
6 in 2020. So, some of the events that occurred in 2021 were not going to be  
7 highlighted in here but I will speak to a few those.

8                   The purpose of the State of Reliability report is to provide an  
9 objective, credible, and concise report of information to policymakers, industry  
10 leaders, and our NERC Board of Trustees on issues that affect the reliability  
11 and resilience of the North American bulk power system.

12                  We identify system performance trends and emerging  
13 reliability risks, we determine the relative health of the interconnected system,  
14 and then finally, we measure the success of whatever mitigation activities  
15 have been deployed by industry and by the North American Electric Reliability  
16 Corporation.

17                  We'd like to acknowledge that in this report, there were  
18 some unprecedented conditions in 2020 that challenged the resilience of the  
19 system. For one, we talked about it earlier, the whole impact of COVID-19  
20 and what that's done for operations and really for the electric system in  
21 general.

22                  We also in 2020 saw a historic hurricane season that  
23 affected a wide swath of the electric system. We also saw extreme heat that  
24 had load shed and wildfires out West that again impacted reliability.

25                  We saw an ice storm in October of 2020 in Texas, not as  
26 impactful as what we saw in February of 2021 but certainly a foreshadowing

1 of events to come, and then finally, a supply chain compromise that occurred  
2 in December of 2020 that put us all on alert as to what the supply chain issue  
3 could be for the bulk power system.

4 We saw escalated resource adequacy risk and a  
5 widespread heat wave across the Western interconnection, and it led to  
6 substantial load-shedding in August of 2020.

7 And then finally, cybersecurity attacks and vulnerabilities,  
8 including supply chain, which we're very attuned to, continue to remain a  
9 significant concern for us.

10 We did see some favorable trends in the system, we saw  
11 improved restoration time in transmission system outages after extreme  
12 weather, and then also a continued reduction in misoperations rate.

13 I can remember a time when I spoke to this group many  
14 years ago and we were at a 1 in 10 misoperations rate, or 10 percent, and  
15 we've seen that rate decline significantly through a lot of actions of industry  
16 and increased focus that we've done here at NERC.

17 There were some unfavorable trends that we saw in the  
18 report, we are again seeing our highest AC circuit unavailability due to extreme  
19 weather and that's beginning to cause us to focus on a couple of the effects  
20 of extreme weather, which I'll talk about for the energy assurance taskforce  
21 that we have coming up later.

22 And then we saw the highest transmission-related events  
23 that results in load loss. So, a couple of unfavorable trends that we are looking  
24 into some causes for that, and to determine what mitigating activities should  
25 occur for that.

26 Next slide. One thing that most people I think don't really

1 look at with focus is how often the system operates without having operator-  
2 initiated firm load shed and how reliable it is.

3 As you look back over these five years in here, you can see  
4 that one year we had no hours of operator-initiated firm load shed. The most  
5 that we had was in 2020, which was 22.4 hours. That doesn't reflect, again,  
6 what happened in February of 2021.

7 So, with some back-to-the-envelope calculations, let's say  
8 we had our worst year, which was 2020 and we add on that the number of  
9 hours that we had load shed in ERCOT, which was 70 hours.

10 That would still show the number of hours without operator-  
11 initiated load shed of about 98.94 percent. So, again, a very reliable system  
12 shows the robustness of both the planning and the operations of the system.

13 Next slide, please. You can also see here some of our  
14 reliability indicators and these are all the favorable indicators that we have.  
15 You can see that failed protection system equipment, which would be the  
16 relaying on the system, is again showing a favorable trend.

17 We're also seeing a favorable trend for human performance  
18 events on the system and then also failed equipment is also trending down.  
19 So, some very good favorable events based on some focus that we've had on  
20 human performance, and then also on the misoperations and protection  
21 systems.

22 So, I continue to see a declining trend there and I think it's  
23 due to both actions by industry and the focus that we've placed on it, both at  
24 NERC and at FERC. Next slide.

25 This slide shows some information about resilience. We  
26 took an event, Hurricane Zeta, that occurred October 28, 2020, and you can

1 see how it affected a couple of the different interconnections, both the Eastern  
2 interconnection and Quebec in Canada.

3 And you can see the load that was lost and that would be  
4 the red line there. A maximum load of almost 60,000 megawatts, really  
5 56,000, was where that line went. And then you can see how it was restored  
6 with the green line.

7 So, the net overall effect would be that gray line, so although  
8 there was a maximum of 56,000 megawatts that was lost, at any one time  
9 there was only 32,000 that was out at any time.

10 So, the restoration was occurring immediately and was able  
11 to mitigate the maximum of load that was out there.

12 So, again, it speaks to the coordination that occurs on the  
13 system and just how well entities are able to recognize events that are  
14 occurring on the system and be able to react to them in a very favorable  
15 method.

16 Next slide. I'm going to focus now on the Long-Term  
17 Reliability Assessment and this is our annual independent assessment of the  
18 long-term reliability of the North American bulk power system that looks out  
19 over the next 10 years.

20 So, looking at trends, looking at information that we can see  
21 and forecast it over the next ten years. In our assessments we identify  
22 trends, emerging issues, and potential risks to system reliability.

23 We collect demand data, generation data, and transmission  
24 projections for utilities and system operators all across North America and we  
25 publish this assessment annually in December.

26 This graphic here is a high-level summary of the 2021

1 Long-Term Reliability Assessments most significant findings. The areas with  
2 the red icons have resource adequacy or energy risks in normal peak  
3 conditions in the five-year assessment horizon.

4 You can see specifically in that northern area, the MISO  
5 area reserve margin shortfall is advancing from 2025 back into 2024. So,  
6 we're starting to see some reserve margin shortfalls advance earlier in the  
7 system.

8 They could face the retirement and a resultant loss of over  
9 13 gigawatts of resource capacity over the next 3 years, 2021 to 2024.

10 And then in the California and Mexico, the Baja Peninsula  
11 area and also the California part of WEC, the planned retirement of the Diablo  
12 Canyon Power Plant contributes to declining reserve margins in the area  
13 beginning in 2026.

14 But even today there are energy risks present that today, as  
15 energy resources are insufficient to manage the risk of load loss when a wide  
16 area heat event occurs.

17 Those energy risks are deflected in high unserved energy  
18 and load loss metrics so if you look in the report, you can kind of see the issue  
19 that we have and the coordination between inverter-based resources, solar,  
20 wind, and in coordination with that, with the generation that's actually online.

21 And then in other parts of the U.S., of WEC, they continue  
22 to have high energy risks as well. That's out in the Western interconnection.  
23 And these are on a concerning trend towards higher unserved energy over  
24 the assessment period.

25 The areas with the blue icons are highlighted for risk in the  
26 extreme long-duration heat or cold weather.

1                   Flexible generation resources are following in Texas,  
2                   California, and the U.S. Northwest to the point that projected peak demand  
3                   cannot be met without some kind of combination of weather-dependent wind  
4                   and solar generation, along with external transfers.

5                   Extreme weather conditions raise the likelihood of one or  
6                   more of these resources to fall short of forecasts, leaving other resources to  
7                   make up the gap or load will need to be shed.

8                   And then finally, the natural gas infrastructure that supports  
9                   electric generation in New England, California, and the U.S. Southwest is  
10                  susceptible to disruptions with the potential to affect winter reliability.

11                  So, we project all of these gray areas to have adequate  
12                  capacity resources and low risk of energy emergencies through the  
13                  assessment horizon. Regulators and policymakers must keep reliability at  
14                  the forefront of their actions to prevent new risks from emerging as the grid  
15                  transforms.

16                  And I'll point back to one of the comments that was made  
17                  earlier, as we begin to see more and more of these inverter-based resources,  
18                  solar, wind, the renewables coming online, our existing generation fleet is  
19                  going to need to be more flexible and be able to ramp to meet those changing  
20                  generation outputs.

21                  Traditionally, most of our baseline generation has kept at a  
22                  flat level and it's going to be important for us as we go forward to design  
23                  generation that can rapidly ramp up and down to be able to meet that.

24                  And we also are interested in seeing how the research is  
25                  going on the new modular nuclear generation fleet and how quickly that can  
26                  be adapted and can be used to meet these changing needs.

1                   Next slide.     Governmental policies changing in  
2 comparative resource economics and customer demand for clean energy are  
3 driving the rapidly changing resource mix within the bulk power system.

4                   The bulk power system has already seen a great deal of  
5 change and more is underway. Solar, natural gas, and wind generators are  
6 overwhelmingly predominant generation types in the planning horizon for  
7 additions to the bulk power system.

8                   As shown in the chart, generation interconnection  
9 projections are less. As older fossil-fired and nuclear plants retire and new  
10 resources come onto the system, thermal generator fuel sources will become  
11 less diverse and more renewable resources will be available to meet demand  
12 over a range of demand hours.

13                  With increasing renewables, planners and operators must  
14 also be prepared for an increasingly variable generation resource mix and  
15 consider the risk of energy shortfalls from an energy-limited resource.

16                  The ERO's suite of tools include mandatory reliability  
17 standards, reliability assessments, voluntary guidelines, lessons learned, and  
18 other mechanisms for developing and sharing best practices.

19                  We're leveraging these tools to reduce risk as the grid  
20 transforms and resource changes mix. Some priorities include improving  
21 resilience for wide area, long duration, extreme temperatures, focusing  
22 assessments and planning on energy sufficiency, not limiting measures of  
23 capacity adequacy, and addressing the vulnerabilities that exist in  
24 interdependent gas and electric systems.

25                  And then enhancing our suite of reliability standards to  
26 prevent the exposure of new vulnerabilities in areas of cyber risk, extreme

1 weather, and resource performance as the grid grows in complexity.

2 Next slide.

3 This chart shows a projection that we have on distributed  
4 solar photovoltaic capacity in the assessment areas that we have. This is  
5 behind the meter generation so not generation that's connected to the  
6 transmission system, but generation that, from our perspective, would affect  
7 load.

8 And as you can see, that's projected to grow from just a little  
9 over 20,000 megawatts in 2021 to in 10 years being over 60,000 megawatts.  
10 So, a growing concern and something that our system needs to be able to  
11 adapt to. And so that's one of the reasons why this is a high priority for us.

12 Next slide. What we're concerned about is traditionally,  
13 we've looked at generation from a capacity perspective and if we have enough  
14 capacity on the system, we weren't too concerned about being able to meet  
15 load.

16 Now we're in a situation where capacity is variable and is  
17 dependent highly upon the sun, the wind, and the resources that are out there.  
18 And so simply having capacity is not adequate.

19 We need to make sure we have adequate energy behind it  
20 also.

21 So, unassured fuel supplies can result in an insufficient  
22 amount of energy on a system to serve electrical demand and to ensure the  
23 reliable operation of the bulk power system, due to again those variable  
24 renewable energy resources, the fuel location, and then the volatility of  
25 forecasted load.

26 So, we have kicked off an energy reliability assessment



1 taskforce that's looking at this and looking to see what modifications need to  
2 be made to our standards and what modifications should be made to practices  
3 in the industry, to be able to adapt to this changing resource mix.

4 And with the next slide, I am available for any questions that  
5 folks might have on any topic that I've presented.

6 NRC CHAIRMAN HANSON: Thank you Mr. Gugel, very  
7 much for your presentation. I think we're going to start on the NRC side this  
8 morning and we'll start with Commissioner Baran.

9 NRC COMMISSIONER BARAN: Thanks. In recent years  
10 more nuclear power plants have been engaging in load-following type  
11 operations. Can you talk about how often NERC is seeing nuclear load-  
12 following and how effective it has been?

13 Have there been any challenges associated with nuclear  
14 load-following from your perspective?

15 MR. GUGEL: I don't know about challenges, I'm not aware  
16 of too many instances where you've seen rapid ramps, if you could say, of  
17 nuclear generation. We've seen more of that rapid ramping occurring with gas,  
18 less so with coal and then probably even less so with nuclear.

19 I think the concern there is probably the O&M cost and then  
20 the wear and tear that it would take on the equipment and the rapid change  
21 there.

22 So, I wouldn't say we've seen any concern but certainly, it  
23 would be an area that we'd like to see maybe some more research in and see  
24 whether or not existing units could have more capability of doing some sort of  
25 fast ramping.

26 NRC COMMISSIONER BARAN: Thanks, Chairman.

1                   NRC CHAIRMAN HANSON: Thank you Commissioner  
2 Baran. Commissioner Wright?

3                   NRC COMMISSIONER WRIGHT: Thank you Mr.  
4 Chairman. Thank you, Howard, for your presentation. I've got a couple of  
5 questions.

6                   It's really good to hear about all the work that's being done  
7 to plan and account for transmission outages, especially related to weather  
8 and supply chain issues.

9                   Talk to me a little bit more, give me maybe some more detail  
10 about what's being done to address supply chain issues and disruptions. I  
11 just think they're important to address so can you give me a little bit more meat  
12 on the bone there?

13                  MR. GUGEL: We'd agree. We began with an initial  
14 supply chain standard in our cybersecurity area back in 2018 timeframe, so  
15 we've got the standard that we started with that requires procurement  
16 processes to be in place.

17                  And then we've also got controls around vendor access and  
18 monitoring that would occur there. We are continuing to refine that to expand  
19 that to more of the equipment. Initially, that was just what we call the  
20 medium-impact and high-impact cyber systems.

21                  We've now got a project to extend that further into basically  
22 the entire system, all of the loads too. And then we're continuing to look at  
23 and coordinate what would be involved with a coordinated cyber-attack and  
24 what protection could be put in place there.

25                  I'm happy to say that we're one of the few industries that has  
26 mandatory enforceable cyber standards, including supply chain. And we're

1 continuing to look at the concerns there and be able to address things as they  
2 come up.

3 NRC COMMISSIONER WRIGHT: You mentioned cyber  
4 threats there.

5 Given the evolving and new cyber-attack threats that we're  
6 facing as well as the concern related to the protection of the supply chain, give  
7 me your thoughts on whether the MOU that we have between the NRC and  
8 NERC, I believe it was revised last in 2015 if I understand right?

9 Does that need to be revisited or updated?

10 MR. GUGEL: That's a good question, I haven't looked at  
11 that to see whether or not there's anything that's come on the horizon from a  
12 cyber-perspective that would mean that we would need to look at that some  
13 more.

14 Let me take that back and see if whether or not that MOU  
15 should be looked at or not. That's a good point.

16 NRC COMMISSIONER WRIGHT: And I have one last  
17 question, I don't speak FERC and NERC that great but I wanted to drill a little  
18 bit on the reserve margin and capacity.

19 And your slide, I believe number 8 it was, says that as the  
20 future reserve mix gets more variable and less fuel diverse, how are reserve  
21 margins impacted?

22 Is it going to be a different look going forward as it was in  
23 the past? And is there a target number that you're looking at that would be  
24 hopeful for the whole system?

25 MR. GUGEL: That's a really good question and it's an area  
26 that we're very concerned about. It kind of goes back to that whole how much

1 capacity for renewables can you really rely upon at the time of peak or even  
2 across an hour across the day.

3 And so the forecast for the availability of that resource and  
4 what percentage of the installed capacity can actually be used at any particular  
5 time becomes a concern.

6 That's really the focus of that energy assurance taskforce,  
7 to be able to say, okay, how do we account for that? How do we project that  
8 going forward?

9 We're also in a situation now where the generation resource  
10 mix is changing so rapidly that we can't even rely upon what our historical  
11 trends have been, to be able to forecast for the future.

12 So, we're trying to put some of our smartest heads together  
13 to say how do we look at this and what do we do to address it and get out in  
14 front of it before it becomes an issue that we just have to follow as opposed to  
15 lead on?

16 NRC COMMISSIONER WRIGHT: Thank you Mr.  
17 Chairman. Thank you, Howard.

18 NRC CHAIRMAN HANSON: Thank you, Commissioner  
19 Wright. Mr. Gugel, you talked about the rapidly changing resource mix and I  
20 was just interested to hear how you see the increase in micro-grids at a lower  
21 level and the reliance I think in some cases of those micro-grids on distributed  
22 energy resources affecting the ability of higher-level grid operators to balance  
23 supply and demand.

24 And maybe there's a comment in there too you can make  
25 about an emergence of additional RTOs in that middle layer as well and how  
26 that is influencing this dynamic.

1 MR. GUGEL: Yes, an area that is continuing to evolve.

2 I would agree the whole idea of micro-grids and how it  
3 impacts really points to the fact that there's going to have to be increased  
4 communication and observability by operators on both sides of that to make  
5 sure the handshake occurs very well there.

6 We were actively involved, IEEE recently created a standard  
7 for distributed energy resources management systems, which would speak to  
8 how micro-grids could work and do something similar to what we do on the  
9 transmission system with our energy management systems.

10 But one of the reasons why we were interested was we need  
11 to make sure the communication from that management system occurs well  
12 to the transmission system so we could see that power flow through the grid  
13 and see the lights remain on reliably on the system.

14 So, we're actively involved with many of the IEEE activities  
15 in this area just to make sure that reliability continues to remain a forefront of  
16 concern for folks as they look at it.

17 Does that answer your question?

18 NRC CHAIRMAN HANSON: I think so. Thank you very  
19 much. I appreciate it. Chairman Glick, over to you.

20 FERC CHAIRMAN GLICK: Thank you very much, Mr.  
21 Chairman. I really appreciate the presentations, very helpful, and I wanted to  
22 talk a little bit about extreme weather.

23 I know we're going to have a presentation in a bit discussing  
24 what happened in Texas in February of 2021 and the implications for reliability  
25 and some of the lessons learned.

26 And obviously, we're seeing, and you mentioned it as well,

1 extreme weather conditions on a more frequent basis, whether it be extreme  
2 cold, whether it be extreme heat, or whether it be for wildfires.

3 And I was wondering if you could talk a little bit about the  
4 potential threats from a nuclear perspective associated with some of those  
5 extreme weather issues, and secondly, what NERC is doing more generically  
6 or generally with regards to -- maybe you could describe a little bit more about  
7 what NERC is looking at in terms of standards for weatherizing generating  
8 facilities.

9 MR. GUGEL: Good questions. I'll speak specifically to  
10 the nuclear side and then I'll talk more generically about what we're doing  
11 across the system.

12 One of the things, and you'll see the report a little bit later  
13 from my colleagues at FERC about what happened in Texas, we saw impacts  
14 of extreme weather across the board even in the nuclear fleet.

15 So, I think it was a good wakeup call for a lot of folks to say  
16 we need to be looking at weatherization for plants and the impacts for that in  
17 systems we hadn't even considered before.

18 I think understanding how ice can affect your cooling intakes  
19 and can affect all of the systems that occur on generation is important.

20 So, I think it's probably a good wakeup call for all of us to  
21 say generation that we thought traditionally we didn't have to worry about from  
22 a weather perspective, we need to look at all of our systems and make sure  
23 they're most available.

24 So, I think the second thing that I would say for that is of all  
25 of the units that we would expect to be there, and I'll talk about cold first and  
26 the heat, but really, for either one of those we would expect the nuclear fleet

1 to be there because they are.

2 That generation fleet is available unless it's down, for the  
3 most part, for refueling or maintenance that's required. And so as we become  
4 more and more in these extremes, the plants we expect to be online, we really  
5 need to be there.

6 And so looking at that and making sure the plants are  
7 available and prepared for both the extreme of heat and cold is going to be of  
8 utmost importance. What we've done from NERC's perspective for cold  
9 weather is we created a standard initially that looked at cold weather and really  
10 involved communications.

11 We saw that as the primary key issues that fell down.  
12 Making sure the generator owners and operators and the transmission owners  
13 and operators and the reliability coordinators are talking, and making sure  
14 everybody knows what the limitations of the units are going into the operating  
15 system.

16 And so we created that standard, that standard will be going  
17 into place this year, and be effective. The next step, and we're in the  
18 development of this, is more to require units to be available or be prepared for  
19 temperatures to a certain extreme.

20 And looking more at cold at this point but I think as we begin  
21 to look more and more into it, the heat is going to become an issue also. The  
22 problem that we face is it's not a one-size-fits-all concern. The units in the  
23 North are prepared for cold but they're not prepared for heat.

24 Although the boilers are enclosed, they've got all the  
25 insulation that they need, they can ride through a very cold event, but when it  
26 becomes hot they become very limited in their output.

1                   Similarly, the units in the South are designed for heat and  
2   so the boilers are exposed, they have the ability to dissipate excess heat, they  
3   have the ability to ride through the situations in the summertime, but that  
4   becomes a problem for instrumentation and operation during an extreme cold  
5   event.

6                   So, on both sides, it's funny, I was talking with one of the  
7   provinces recently up in Canada and they said we don't have a problem with  
8   cold at all, we're a little bit concerned about this heat wave that's coming up  
9   and whether or not our plants are ready for that too.

10                  So, it's a concern really on both sides of the border and  
11   really all across North America.

12                  And so we're looking at that from a standard perspective,  
13   but also from what are some essential actions that people can take outside of  
14   standards and be ready for this.

15                  FERC CHAIRMAN GLICK: Thank you, Mr. Gugel, that was  
16   a very helpful answer. I wanted to see if my colleagues had any questions  
17   and start with Commissioner Danly. Commissioner Danly had texted me,  
18   he's having some problems getting off of mute.

19                  So, I'll move down to see if Commissioner Clements has any  
20   questions.

21                  FERC COMMISSIONER CLEMENTS: Thanks Chairman  
22   Glick, that happened to me as well so I can understand. Thank you, Howard,  
23   for the presentation, one thing when you were talking about more variability  
24   and less fuel diversity and then mentioned --

25                  (Telephonic interference.)

26                  -- harnessing new resources to help with the issues of both



1 resilience and energy sufficiency and I'm curious what type of work NERC is  
2 focused on related to exploring the issues or opportunity around demand side  
3 resources.

4 MR. GUGEL: Really good question, you dropped out for  
5 the first part of that but I think I captured what you're asking there.

6 We are looking at creating what we call a 1600 data request,  
7 or a data collection capability through our rules and procedure to look more at  
8 demand response and be able to capture more of that information.

9 And so that's an area that we're looking at. Traditionally,  
10 we have not gone into the distribution system, not gone into practices there,  
11 that tends to be something that's I think more of a state issue than a federal  
12 issue.

13 But we need to be aware of what demand-side resources  
14 are there and demand-side actions are there because it does impact operator  
15 intervention and operator works that go on.

16 And so we're going to collect that data and be able to  
17 analyze it to see what future actions could be taken here. Does that answer  
18 your question?

19 FERC COMMISSIONER CLEMENTS: Yes, thanks, I think  
20 it is going to play an increasing role relative to the bulk electric system so I'm  
21 glad to hear it.

22 FERC CHAIRMAN GLICK: Thank you, Commissioner  
23 Clements. Commissioner Christie?

24 FERC COMMISSIONER CHRISTIE: No questions, good  
25 presentation on all the good work you all do at NERC. Thanks.

26 FERC CHAIRMAN GLICK: Commissioner Phillips?

1                   FERC COMMISSIONER PHILLIPS: Thank you Chair  
2 Glick. First of all, thank you again, Howard, for your presentation, it was  
3 excellent. I feel comforted knowing your leadership is involved with NERC  
4 on these important issues. I also want to applaud NERC for establishing the  
5 energy assurance taskforce.

6                   I'd love to hear more about that, the work product, timeline,  
7 and maybe participate in some meetings if that opportunity is available. I also  
8 want to go back to your fuel diversity point that you made.

9                   And what I think I'm hearing you say, as more variable  
10 energy resources come on to the system, you're stating that we're going to  
11 need to have more flexible resources available to accommodate those.

12                  Could you unpack that a little bit more for me, just to put a  
13 point on it? When you say more flexible resources, what are you talking  
14 about?

15                  MR. GUGEL: Resources that are more quickly able to  
16 adapt to rapid changes in output from the variable energy resources. So, I  
17 don't have a graphic here but it's a graphic that's used quite frequently.

18                  We refer to it as the duck curve because the back looks like  
19 a duck.

20                  But if you look at the load profile in California and see where,  
21 as the sun comes up and as you see the behind-the-meter generation come  
22 in and how it affects load, it begins to drop off.

23                  But then as the sun drops or as wind changes its patterns  
24 during the day, you can begin to see that rapidly change. And what looked  
25 like a normal load ramp now with that lack of resources behind the meter  
26 generation there too, it becomes very steep.

1                   And you get into a situation where if you are at that minimum  
2 load, let's say you get a lot of behind-the-meter generation, a lot of solar,  
3 rooftop solar, or that type of thing behind there and your load is at a minimum,  
4 there's only so much generation you can have on it at the time.

5                   And you've got all the generation that's available backed off  
6 to a minimum. And then when that generation begins to fall off and the load  
7 begins to pick up, you're running like crazy trying to keep up with that ramp as  
8 it's going there.

9                   And so it's a continual race to make sure your generation  
10 and load match as they go up and plateau as those resources come off. And  
11 so what we need is generation that can rapidly change for that.

12                  Typically, that's come from the gas fleet. For the most part,  
13 anything that involves steam and those rapid changes in temperatures gives  
14 you issues later on in your steam system and so we realize that most of that  
15 rapid response is going to come from gas.

16                  But we've got to look for other answers for that, that's only  
17 part of the answer. And so we've got to see are there other ways that  
18 generation can be modified to be able to adapt to that?

19                  Or actually, are there other storage capabilities, have we got  
20 a way to store that energy and be able to put it back on a system in other  
21 ways?

22                  Unfortunately, battery technology right now is only about  
23 four hours.

24                  And so it doesn't last as long as that ramp is necessary here,  
25 but I'm hopeful that the research that's being done right now and the different  
26 capabilities that are out there will give us the capabilities of being able to use

1 some of these storage facilities for 10 to 12 hours and be able to much more  
2 levelize that ramp.

3                   Until that happens, though, we've got to have flexible  
4 generation online.

5                   FERC COMMISSIONER PHILLIPS: Excellent answer,  
6 good to see you my friend.

7                   MR. GUGEL: Good to see you too and the offer is always  
8 there, anytime you want to be involved with that Energy Assurance Taskforce,  
9 you're more than welcome.

10                  FERC CHAIRMAN GLICK: Thank you Commissioner  
11 Phillips. Chair Hanson, do you introduce the next set of panelists or do we  
12 do that?

13                  NRC CHAIRMAN HANSON: I don't think it matters, if you'd  
14 like to go right ahead.

15                  FERC CHAIRMAN GLICK: Go right ahead, you all are  
16 hosting.

17                  NRC CHAIRMAN HANSON: Our next presenter is Ms. Elin  
18 Swanson Katz, who is the Director of FERC's new Office of Public  
19 Participation. And we're very interested and eager to hear what Ms. Katz has  
20 to say this morning so the floor is yours.

21                  MS. KATZ: Good morning. Just had a little trouble finding  
22 the mute button this morning. Thank you, it's such an honor to be here and  
23 to be able to speak with you.

24                  I'm Elin Katz, the Director of Public Participation which is a  
25 new office that was created in 2021, and I started in November. Next slide.

26                  So just a quick background, the OPP was actually created

1 pursuant to an amendment to the Federal Power Act in 1978 but it wasn't  
2 established until 2021 under the leadership of the current Congress, and  
3 obviously, Chairman Glick here.

4 I am the first permanent Director of OPP, which has been  
5 the honor of my career. I am a former consumer advocate from the State of  
6 Connecticut and former President of the National Association of State Utility  
7 Consumer Advocates.

8 I would also like to mention our Director, Nicole Sitaraman,  
9 who is also a former consumer advocate and has great contacts within both  
10 the sustainable world, the environmental world, and the environmental justice  
11 world.

12 So, the primary purpose of the office is to coordinate with  
13 members of the public to facilitate participation in and understanding of FERC  
14 proceedings. Next slide, please.

15 Let me just talk briefly about our areas of focus. We are  
16 currently focused on outreach to, and encouraging representation from,  
17 traditionally underrepresented communities and constituents who generally  
18 may not have experience with FERC.

19 The Commission held a listening session as they were  
20 standing this up, which involved a full-day listening session with the  
21 Commissioners and written comments. And there were over 100 individuals  
22 who spoke and over 100 written comments were also received.

23 And what we've heard is the key constituencies are  
24 environmental justice communities, citizens of Native American tribes, land  
25 owners impacted by infrastructure proposals, and consumer advocate,  
26 environmental, and community organizations.

1                   Of course, we are a place to call when you need information  
2                   and assistance and so we help anybody who calls, to the extent we can, with  
3                   understanding FERC and how they can participate in the process.

4                   Next slide, please.

5                   So, to date I consider helping constituents to be the bread  
6                   and butter of the office, and we get calls and emails from individual  
7                   constituents every day, from organizations asking how they can intervene,  
8                   how can they comment, what are the limits of FERC's jurisdiction and  
9                   procedural steps.

10                  We have lots of calls from people looking for information on  
11                  a particular project and how to understand the FERC process. We have  
12                  probably fielded at this point 200 to 225 constituencies.

13                  And I would note probably a third of the calls we get or  
14                  outreach we get is not about issues that are within FERC jurisdiction but I think  
15                  we should be a soft place to land, that's how I always conducted my office in  
16                  Connecticut.

17                  And so we actually have three former consumer advocates  
18                  working in the office and we have a pretty good network of contacts across  
19                  the country. And so most of the time, if we can't help someone, we can steer  
20                  them to someone who can.

21                  Usually, typically, it's an issue of state court jurisdiction.

22                  We are also engaged in a listening tour to hear directly from  
23                  public stakeholders about what the needs are rather than assume you know  
24                  them and making sure we are hearing directly from those constituencies, as  
25                  well as having meetings with industry participants to understand any concern  
26                  or questions they may have about the office. And we are also very much

1 working internally with FERC to understand the processes and trying to  
2 identify potential recommendations for improving opportunities for public  
3 participation.

4 Next slide, please.

5 So, ongoing priorities, we are identifying key partners and  
6 suggestions for continuing our outreach. We are at this point going to be  
7 moving to a more formal outreach plan, pushing out our outreach.

8 We are a small office, we are currently six people but we are  
9 growing and I call us small but mighty. And we've been pretty busy with  
10 people reaching out to us but we're going to turn the tables and start going a  
11 little bit deeper beyond and go to what we call the grasstops constituencies.

12 We're also looking at how we can build the technical  
13 assistance program.

14 We have heard during listening sessions a lot about how  
15 constituents, members of the public, they're looking not just for help on how  
16 to file something but, "How do I understand this report? I don't know how to  
17 read this."

18 And so we'll have options. It's a challenge for a small office  
19 to figure out what the options are but that is something we're also looking at.  
20 Of course, being able to demonstrate our success is incredibly important.

21 A year from now I would like to be able to come and tell you  
22 about all the things we've accomplished. So, we're looking very much for  
23 measures of success, how do we demonstrate progress and success?

24 How do we demonstrate that OPP has had a positive  
25 impact? I've already heard that FERC feels like a different FERC, not just  
26 because of OPP but by the commitment from the Commissioners.

1                   And at the last Commission meeting, there were remarks by  
2     several Commissioners about how the public comments matter and how  
3     they're read and how they impact decisions. And so I feel like people are  
4     responding already to the efforts that are being made.

5                   We're establishing a social media profile, Twitter feels like  
6     table stakes for getting information out quickly. So, we have established two  
7     Twitter feeds, one for FERC OPP and one for myself as Director Katz.

8                   And we're going to continue to figure out how to identify and  
9     reach constituents. I think we're going to a couple college interns who will  
10    really help with that effort this summer, so I'm excited about that.

11                  And looking at how do we push out information on key  
12    decisions and policies and mostly to the end of letting people know about  
13    potential deadlines. Now, the statute contemplated that intervenor funding,  
14    the Commission could set up an intervenor funding program.

15                  That was part of the amendments of 1978. So, we are  
16    developing models for potential intervenor funding, I'll talk just a bit more about  
17    that. But I do want to note that for anything to go forward, that is the decision  
18    of the Commission.

19                  So, in hiring to meet the mission, we are hoping to get to 20  
20    by the end of the year, that's an audacious goal but we are working. There's  
21    a lot of people we hope to touch. Next slide, please.

22                  I just would like to show you some of the changes we've  
23    made in the website. This is a snippet from the webpage and it shows how  
24    to contact FERC, how to intervene, file a comment. Again, step by step  
25    directions with pictures of the online template that you'll see.

26                  And we're looking at options for providing this in other



1 formats, videos, FERC has a YouTube channel that we're considering.  
2 There's currently a lot of discussion about potential and requests for  
3 information in other languages.

4 So, again, lots of things that are under consideration and on  
5 the table. Next slide, please.

6 Just briefly on intervener funding because this is something  
7 I get asked about all the time, the statute provides for the possibility of  
8 compensation for reasonable attorneys' fees, witness fees, or other costs.

9 And so I just want to note that is something that is for me a  
10 priority for developing potential models for the Commission to consider, but  
11 again, that will only move forward if that's an addition under the Commission.

12 And there would need to be a rulemaking at FERC to sort  
13 out the parameters of any intervener funding programs. There would be lots  
14 of opportunity for comment. Next slide, please.

15 Provision of technical assistance. We heard a lot from both  
16 Members of Congress and commenters about the need for technical  
17 assistance including technical engineering, FERC jurisdiction maps, some  
18 industry educational materials, the basics of natural gas or hydro-powered  
19 energy markets in facilitating hiring experts.

20 This is a real challenge in terms of size and resources but  
21 it's an area where we are continuing to have discussions and look at maybe  
22 potential partnerships with DOE in the National Labs to see if they can provide  
23 that level of technical assistance.

24 Next slide. I do want to emphasize that even though we  
25 have a number of consumer advocates, we are not an advocate office. We  
26 develop resources and educational materials; we are here to help the public

1 bring their voice into FERC proceedings and understand FERC.

2 And that, as you heard, is an emphasis on under-  
3 represented communities. But we don't take positions in proceedings at  
4 FERC on behalf of constituents.

5 We see and we understand that because now we see  
6 constituents on both sides of the issues who are seeking help from us and at  
7 this point, there's a lot of work to be done to facilitate participation in their  
8 voices.

9 But as I said, I think it's an important distinction because we  
10 are policy-neutral, really only helping others present their perspectives.

11 Next slide, please. I'm so really appreciative of the  
12 opportunity to speak with you and I'm happy to answer any questions.

13 NRC CHAIRMAN HANSON: Thank you Ms. Katz.  
14 According to my agenda, I think we'll hear from Mr. Ortiz, Mr. Smith, and Ms.  
15 Polzin first, and then we're going to come back and we'll have questions I think  
16 for all of you.

17 So, with that, I think we'll hand it over to the three of them  
18 and get a deeper understanding of their Regional Entity Inquiry about the 2021  
19 cold weather outages. Mr. Ortiz?

20 MR. ORTIZ: Just confirming, given the technical issues  
21 some have had, that you can all hear me?

22 NRC CHAIRMAN HANSON: Yes.

23 MR. ORTIZ: I want to introduce our team and I appreciate  
24 the opportunity, Chairman.

25 In February of 2021, a severe cold weather event, also  
26 known as Winter Storm Uri, caused numerous outages, de-rates of facilities,

1 or failures to start at plants across Texas and the south-central United States.

2 Beginning early in the morning of February 14, 2021, in the  
3 face of increasing generating unit outages, the Texas grid operator ERCOT  
4 ordered rolling blackouts that ultimately resulted in a total of 20,000 megawatts  
5 of load shedding to prevent grid collapse.

6 This represents the largest manually controlled load  
7 shedding event in U.S. history. More than 4.5 million people in Texas lost  
8 power, some for as long as 4 days. Tragically, the loss of electricity caused  
9 the deaths of over 200 Texans.

10 Neighboring regions, MISO and SPP, also had to shed load,  
11 though significantly less and for less time.

12 On February 16, 2021, the Commission and NERC  
13 announced a joint inquiry into the event and we're very lucky to have Dave  
14 Huff and Heather Polzin, FERC's team leaders of this inquiry here, to provide  
15 an overview and to answer your questions.

16 I'll turn it over to Dave and Heather now and I look forward  
17 to the presentation and questions.

18 MS. POLZIN: Good morning.

19 The Office of Electric Reliability and Enforcement Staff are  
20 pleased to present the findings and recommendations of the joint FERC,  
21 NERC, and regional entity inquiry into the February 2021 cold weather event,  
22 in the Electric Reliability Council of Texas, or ERCOT, and the Midcontinent  
23 Independence System Operator, Inc., MISO, and Southwest Power Pool, Inc.,  
24 or SPP. The inquiry team consisted of nearly 50 subject-matter experts from  
25 the Staff of the Commission, NERC, and all of its regional entities as well as  
26 the Department of Energy and the National Oceanic and Atmospheric

1 Administration, or NOAA.

2 Next slide, please. I'm sure you're all familiar with the fact  
3 that we don't speak for the Commissioners, the Commission, or any other Staff  
4 in this presentation. Next slide, please.

5 The inquiry which led to the report arose from an event  
6 which occurred from February 8 through 20 in 2021, during which the extreme  
7 cold weather and precipitation caused large numbers of generating units to  
8 experience outages, de-rates, or failures to start, resulting in energy and  
9 transmission emergencies, which we referred to throughout these slides as  
10 the event.

11 The event was most severe from February 15 to February  
12 18, 2021, and it contributed to power outages affecting millions of electricity  
13 customers throughout ERCOT, SPP, and MISO South, as shown on this slide.

14 And we'll refer to that as the event area. The total event from  
15 load shed was the largest controlled firm load shed event in the United States  
16 history and it was the third largest ever in the quantity of outage megawatts of  
17 load, after the August 2003 Northeast Blackout and the August 19, 1996  
18 Western Interconnection Blackout.

19 The February 2021 event is the fourth event in the past 10  
20 years which jeopardized both power system reliability and the others were in  
21 2011, 2014, 2018, and of course this one in 2021.

22 In each of the four bulk electric system events, planned and  
23 unplanned generating unit outages caused energy emergencies and in 2011,  
24 2014, and 2021, they triggered the need for firm load shed.

25 On February 16th, while the event was still ongoing, the  
26 Commission and NERC announced the joint inquiry with the regional entities

1 to, quote, examine the root causes of the reliability events that occurred  
2 throughout the country.

3                   Next slide, please. Temperatures began to drop below  
4 freezing in ERCOT and SPP on February 8th but the low temperatures  
5 dropped even lower during the week of February 14th.

6                   Daily low temperatures for February 15th in the event area  
7 were as much as 40 to 50 degrees lower than average daily minimum  
8 temperatures for February 15th, as shown in the figure on the slide.

9                   In addition to the Arctic air, the cold front brought periods of  
10 freezing precipitation and snow to large parts of Texas and the south-central  
11 United States, starting on February 10th and extending into the week of  
12 February 14th, 2021.

13                   Comparing events of 1983, 1989, 2011, 2018, and 2021,  
14 there were cold weather conditions in every event, and average daily  
15 temperatures fell below freezing in Dallas, Houston, and Jackson for at least  
16 three days.

17                   1983 was colder than 2021 on multiple days in Dallas,  
18 Houston, and Jackson, Mississippi. 1989 was still the coldest recorded  
19 winter for Houston and Galveston with 14 days below freezing over 2 to 3  
20 weeks.

21                   1983, 2011, and 2018 events all had significant freezing  
22 precipitation like the 2021 event. Next slide, please. Most producing  
23 regions of the United States saw a sharp decline in recovery associated with  
24 temperature.

25                   When the temperatures fell, the regional natural gas  
26 production dropped and as temperatures rose after the event, the regional

1 production recovered ultimately to pre-event levels by late February.

2                   Unplanned outages of natural gas while has due to freeze-  
3 related issues, loss of power, and facility shut-ins to prevent imminent freezing  
4 issues beginning on approximately February 7th, as well as unplanned  
5 outages of natural gas gathering at processing facilities resulted in a decline  
6 of natural gas availability for supply and transportation to many natural gas-  
7 fired generating units in the south-central U.S.

8                   Next slide, please. I'm now going to turn it over to Dave.

9                   MR. HUFF: Thanks, Heather.

10                  From February 8th through February 20th in the event area,  
11 a total of 1045 individual generating units, 58 percent of those natural-gas-  
12 fired, 27 percent wind, 6 percent coal, 2 percent solar, and 7 percent other  
13 fuels, and less than 1 percent nuclear experienced 4,124 outages, de-rates,  
14 or failures to start.

15                  Similar outage percentages by fuel type were found by  
16 numbers of outages and by megawatts as shown in the figures on the slide.  
17 Next slide, please.

18                  ERCOT, SPP, and MISO all faced emergency conditions  
19 simultaneously.

20                  During the early morning hours of February 15th, ERCOT  
21 was initially able to recover its frequency to normal levels through deployment  
22 of load management measures, but it continued to suffer generating unit  
23 outages and needed to order its first 1,000 megawatts of load shed.

24                  As system frequency continued to fall, ERCOT BA  
25 operators, balancing authority operators, ordered an additional 1,000  
26 megawatts of load shed but generating units continued to fail and frequency

1 declined to the point that ERCOT operators had only 9 minutes to prevent  
2 approximately 17,000 megawatts of generating units from tripping due to  
3 underfrequency relays, which could potentially cause a complete blackout of  
4 the ERCOT interconnection.

5 By 7:00 p.m. on February 15th, ERCOT had ordered 20,000  
6 megawatts of manual firm load shed which had sustained load shed for nearly  
7 three days. ERCOT, unlike MISO and SPP, did not have the ability to import  
8 many thousands of megawatts from the Eastern Interconnection and thus  
9 needed to shed the greatest quantity of firm load to balance electricity  
10 demands with the generating units that were able to remain online.

11 SPP shed 610 megawatts of firm load for 1 hour on  
12 February 15th and on February 16th, SPP shed in two separate steps 1,359  
13 megawatts totaling over 2,700 megawatts for 3 hours.

14 MISO declared an energy emergency for MISO South on  
15 February 16th and needed to shed a maximum of 700 megawatts firm load  
16 during its evening peak to provide sufficient reserves.

17 Next slide, please. Of the 4,124 generating unit outages,  
18 de-rates, and failures to start, 75 percent were caused by either freezing  
19 issues at 44 percent or fuel issues at 31 percent, as shown in the upper figure  
20 on the slide.

21 Primary subcauses of freezing issues included frozen  
22 instrumentation such as transmitters and sensing lines, and icing on wind  
23 turbine blades, protecting sensing lines and instrumentation as well as wind  
24 turbine blades against icing could have cut the megawatts of generating units  
25 experiencing freezer-related outages by 47 to 67 percent.

26 Of the 1,293 unplanned generating unit outages, de-rates,

1 and failures to start that were due to fuel issues, 1,121 or 87 percent were due  
2 to natural gas fuel supply issues.

3 Natural gas fuel supply issues included the combined  
4 effects of decreased natural gas production, the specific terms and conditions  
5 of natural gas commodity and pipeline transportation contracts, and other  
6 issues like low pressure.

7 Natural gas fuel supply issues led to a total of 357 individual  
8 natural-gas-fired generating units experiencing either an outage, a de-rate, or  
9 failure to start.

10 The natural gas fuel supply issues' root cause was natural  
11 gas production declines at wellheads, gathering and processing facilities due  
12 to wellhead shut-ins to prevent freezing issues at 18 percent, freezing issues  
13 at 25 percent, and power outages at over 21 percent, which were a  
14 combination of distribution outages due to weather and outages caused by  
15 manual load shed.

16 Next slide, please.

17 While all recommendations are important to prevent  
18 reoccurrence of the event, there are nine key recommendations in the report  
19 focused on revisions to reliability standards, actions to prevent electric  
20 generating unit and natural gas infrastructure freezing issues, grid operations,  
21 and gas-electric coordination measures for cold weather preparedness.

22 The recommendations also include five areas for additional  
23 study, black start unit availability in ERCOT, additional ERCOT connections  
24 to other interconnections, potential measures to address natural gas supply  
25 shortfalls, potential effects of low frequency events on generators in the  
26 Western and the Eastern Interconnections, and guidelines for identifying



1 critical natural gas infrastructure loads.

2 Each recommendation is assigned a timeframe in which it  
3 should be implemented. The reliability standards, the implementation is that  
4 they're proposed to the Commission for approval within the timeframe in the  
5 report.

6 Next slide, please.

7 Key Recommendation 1, which consists of  
8 Recommendations 1A through J, covers recommendation for new or revised  
9 reliability standards which are above and beyond the standard revisions that  
10 the Commission approved in August 2021 on generator cold weather  
11 preparedness.

12 Key recommendations 1A through 1F include identifying  
13 and protecting cold weather critical components and systems for each  
14 generating unit which are those components and systems that are susceptible  
15 to freezing or otherwise failing due to cold weather, and which could cause  
16 the unit to trip, de-rate, or failure to start, as well as implementing corrective  
17 action plans for generating units that fail due to freezing issues.

18 Annual training for cold weather preparedness and retrofit  
19 generating units to operate to specified ambient temperature and weather  
20 conditions based on available extreme temperature and weather data, and I'll  
21 also account for the effects of precipitation and the accelerating cooling effect  
22 of wind.

23 Next slide, please.

24 Key Recommendations 1G through 1I include generator  
25 owner operators providing percentage of total capacity that the balancing  
26 authority can rely upon during local forecasted cold weather, including

1 reliability risks related to natural gas fuel contracts and entities involved in load  
2 shedding to protect critical natural gas infrastructure loads from losing power.

3 Those are critical natural gas infrastructure loads that if they  
4 were de-energized could affect the provision of natural gas to BES natural-  
5 gas-fired generating units, thus adversely affecting BES reliability.

6 Also, 1J recommends separation of circuits that would be  
7 used for manual load shed from under-frequency load shed. Next slide,  
8 please, and at this point I will turn it back over to Heather.

9 MS. POLZIN: Thanks, Dave. Regarding natural gas fuel  
10 supply issues, Key Recommendations 5 and 6 are both aimed at having  
11 natural gas infrastructure be prepared for the effects of cold weather.

12 Recommendation 5 seeks mandatory requirements while  
13 Recommendation 6 recommends voluntary measures.

14 For Recommendation 6, examples included implementing  
15 freeze protection measures such as burial of flow lines and ensuring  
16 necessary emergency staffing including surge capacity or having available  
17 equipment on supplies or staff available, reviewing contracts, whether you  
18 have firm or interruptible retail electric power, reviewing whether all electrical  
19 equipment has been designated as critical load and taking proactive steps to  
20 procure quick turnarounds on requests on environmental waivers for backup  
21 generators needed during cold weather events, enhancing emergency  
22 operations plans to incorporate extreme cold weather response, and  
23 producers, gatherers, and processors conducting training and drills to  
24 exercise their emergency operations plans. Next slide, please.

25 Key Recommendation 7 involves establishing a forum in  
26 which state legislators and/or regulators with jurisdiction over natural gas

1 infrastructure in cooperation with FERC, NERC, and regional entities which  
2 collectively oversee the reliability of the bulk power system, bulk electric  
3 system, and with input from the balancing authorities which are responsible  
4 for balancing load and available generation and the gas infrastructure entities  
5 could together identify concrete actions consistent with the forum participant's  
6 jurisdiction to improve the reliability of the natural gas infrastructure system  
7 necessary to support bulk power system reliability during cold weather.

8                   The team identified some of the options for establishing the  
9 forum and said that ideally forum participants could produce one or more plans  
10 with deadlines for implementing the concrete actions.

11                   Next slide, please.

12                   The report also includes 24 other recommendations to  
13 prevent recurrence of similar events which cover multiple issues as shown  
14 here, and includes the 5 recommendations for further study.

15                   Next slide, please. With that, we are available for  
16 questions. The report is posted on the Commission's website and we would  
17 be happy to answer your questions, thank you so much.

18                   NRC CHAIRMAN HANSON: Thank you, Mr. Ortiz and Mr.  
19 Smith and Ms. Polzin for the really very informative presentation about the  
20 cold weather event. We'll start with questions on I think our side with  
21 Commissioner Baran.

22                   NRC COMMISSIONER BARAN: Thank you all for your  
23 presentations. NRC is in the midst of a systematic environmental justice  
24 review and one of the things we're looking at is what other federal agencies  
25 are doing in this area.

26                   I've been very impressed with FERC's initiative to stand up

1 the Office of Public Participation.

2 Ms. Katz, can you talk a bit about your office's outreach to  
3 environmental justice communities and how you see the office's work  
4 contributing to FERC's overall environmental justice efforts?

5 MS. KATZ: Absolutely. Our outreach efforts in general,  
6 as I said, we've primarily been reacting to those who have contacted us and  
7 that's been a very steady flow; it's constant meetings.

8 But we're in phase two of developing an outreach plan,  
9 where we will be reaching out to what we refer to as the grasstop leaders,  
10 people who are a level away from the leaders of the organizations who are in  
11 D.C. for example, or might be the more nationally known faces, down more  
12 into the community level, and trying to get a little bit closer to the individual  
13 constituents who we are responsible for helping. And we are doing that both  
14 through -- the national leader who is the head to the organizations, but we're  
15 also starting to look at how can we go more directly?

16 We have heard and I would note that the Commission  
17 submitted a report to Congress following the listening sessions that really goes  
18 into detail on the different constituencies.

19 But the one thing we've heard is that people would like to us  
20 to bring the government to them rather than trying to virtually or figuratively  
21 come to D.C. So, in our next phase, we're also going to be looking at doing  
22 some direct outreach meetings in key locations where we've heard our issues.

23 We're considering all our options including a potential  
24 listening tour to go visit some communities that have identified themselves as  
25 being particularly impacted, potentially looking at working with landowner  
26 organizations to do some sort of outreach in key areas maybe in the Midwest

1 where there's been a lot of issues.

2 And so that's the next phase. We're also currently doing a  
3 lot of panels, we're just talking about setting up a fireside chat with an entity  
4 that represents landowners. We were on calls earlier this week introducing  
5 ourselves and getting feedback.

6 It's not just about introducing ourselves but getting feedback  
7 from environmental justice organizations, working with other leaders in this  
8 area, and also trying to understand the focus.

9 It's very much to us about building these relationships ahead  
10 of time and building an area of trust rather than trying to parachute into a  
11 community when there's a particular issue.

12 I would also want to note the work of Montana Cole, who is  
13 FERC's Senior Counsel for Environmental Justice and Equity, who has done  
14 tremendous work internally at FERC looking at the options for bringing that  
15 thought leadership into the FERC processes.

16 I would say OPP has served more of an outward focus in  
17 engagement and Montana's work has been focused internally. So, I hope that  
18 answers your question and I'm happy to go a little bit deeper.

19 NRC COMMISSIONER BARAN: That's great, and NRC  
20 and FERC are similar with respect to the complexity of some of the technical  
21 and adjudicatory issues our agencies address.

22 Our environmental justice staff team has heard from some  
23 stakeholders who think NRC should be providing technical assistance to  
24 interested stakeholders so they can more easily participate in Agency  
25 proceedings.

26 Can you tell us a little bit more about what the Office of

1 Public Participation is exploring -- it sounds like it's at the exploration stage --  
2 to potentially provide in terms of technical assistance to FERC stakeholders?

3 MS. KATZ: You're right, it's an exploration. It's  
4 determining the art of the possible at this point. There are really a couple  
5 options for FERC or NRC or any options.

6 We try to develop the expertise in-house or you try to  
7 develop potential partnerships that can provide some level of outreach and  
8 technical support to people who have questions.

9 And so our current thought, although it's always up for  
10 further discussion, is we certainly don't have the technical expertise right now.

11 It is something we could develop but because of the  
12 diversity of issues that come before FERC and our desire to make sure we  
13 are seen as a neutral source of information and not providing too much detail  
14 or something that could feel like it's floating into advocacy if we're talking about  
15 solar issues or pipeline issues or any of the transmission, any of the diversity  
16 of markets, the diversity of issues that come before FERC.

17 We are looking at other entities particularly focused on other  
18 federal partners who could be a place that we could send someone who has  
19 a particular question.

20 So, there's been some interest from some of the national  
21 labs so we're continuing to explore that and looking at the possibility of an  
22 MOU.

23 And so that's kind of where we are right now. I think there's  
24 options, I do think there's options but we're all going to have to be creative and  
25 it's going to require a lot of cooperation between the partners.

26 NRC COMMISSIONER BARAN: Thank you so much,

1 very, very interesting.

2 NRC CHAIRMAN HANSON: Thank you, Commissioner  
3 Baran. Commissioner Wright?

4 NRC COMMISSIONER WRIGHT: Thank you, Mr.  
5 Chairman. Ms. Katz, it's good to see you. Real quickly, when were you  
6 president of NASUCA?

7 MS. KATZ: I was President of NASUCA from 2017 to  
8 2019.

9 NRC COMMISSIONER WRIGHT: I have a NARUC  
10 background, I'm a former president, and you had two Commissioners there,  
11 Tony Clark and Colette Honorable, who were FERC Commissioners, and they  
12 basically sandwiched me in the presidency of NARUC, and I was 2011 and  
13 2012 as president.

14 And you've got Commissioner Phillips now who is on the  
15 Commission with a NARUC background.

16 So, I'm very familiar with what you did and how well NARUC  
17 worked with NASUCA in trying to be collaborative and communicative on the  
18 things that were important and making sure that people were heard properly,  
19 and issues were disposed of in a very fair way.

20 So, thank you for what you did then because it's a very, very  
21 important organization and I think it sets you up great for what you're doing  
22 now. I think it's a great background, because really, collaboration and  
23 communication are great but it's got to be proper collaboration and  
24 communication as well.

25 And I know you have a real handle on that. I really like the  
26 idea of the listening tour that you talked about and the goal behind it, and I

1 know that you touched on it a little bit with Commissioner Baran.

2 Can you tell me a little bit more about the tours, when you've  
3 done them how they worked out, and whether you plan to do more of them in  
4 the future, or expand them maybe to more substantive areas of what FERC  
5 does?

6 MS. KATZ: First of all, thank you for the kind words about  
7 NASUCA and NARUC.

8 I agree they have developed a great working relationship  
9 and I have the honor of serving as president of NASUCA, and I'm from  
10 Connecticut, at the same time that Commissioner Betkoski from Connecticut  
11 was President of NARUC.

12 So, that was really fun, and having been president, you  
13 understand how that working relationship works. So, let me just give you  
14 some examples of what we've been doing so far on our outreach tour.

15 We've spoken with many groups that have been organized  
16 both by places such as the Niskanen Center and then some more informal  
17 groups with landowners who have been impacted by, and had experience  
18 with, infrastructure in particular.

19 And earlier this week, we had a meeting with, as I said,  
20 some climate justice entities, a number of them, and the fascinating thing for  
21 me in these discussions is hearing the issues but then when we drill down and  
22 hear from the individuals who have been impacted or are struggling.

23 We also had a meeting with a number of environmental  
24 justice organizations and heard from some of their members earlier this week  
25 as well.

26 I was giving an example that one of the things I heard that



1 we hadn't really thought of is that many individuals who have full-time jobs  
2 need to access the FERC website and the e-library on the weekends and in  
3 the evenings.

4 And it's a real barrier and frustration for them when the  
5 website is down and they're not aware of it. So, just thinking about how do  
6 we let people know when there's maintenance on the website and when they  
7 can access e-library.

8 It's been fascinating to us to hear how the smallest details  
9 have been barriers or challenges for the individuals who are really trying to  
10 interact with FERC. So, those kinds of details are the things I think that are  
11 going to really make impactful changes.

12 And some of that is low-hanging fruit, it's really easy for us  
13 to treat when there's going to be maintenance on a website or something like  
14 that. And for example, we hear from entities and some of the people who are  
15 most interested don't have access to the Internet.

16 And bridging the digital divide has always been a passion of  
17 mine and so really thinking, yes, it's great we're on Twitter but what if you don't  
18 have access to the Internet and what if you can't access the FERC website?  
19 How do you get information in your hands?

20 And so those are the kinds of details that I think are very  
21 illuminating and like I said, some of the smallest tweaks can have a  
22 tremendous impact. And then of course, behind that is the educational and  
23 the outreach.

24 And so I hope that answers your question. There's a lot to it  
25 there.

26 NRC COMMISSIONER WRIGHT: There is a lot to it and

1     thank you for doing that. And Jack Betkoski is a good friend, I put him on my  
2     executive committee when I was president. He stayed there until he finished  
3     up his presidency as well.

4                     So, I'm going to move to Dave and Heather because I want  
5     to get them in here in the limited time I've got here. So, I guess, Heather, this  
6     is probably for you because I think you addressed it in Key Recommendations  
7     5 and 6 is what I'm going to focus on.

8                     So, 5, that key recommendation, I think would involve action  
9     by Congress and probably state legislatures as well. I'd be interested to hear  
10    a little bit about how those discussions are going on this.

11                    And are you getting different feedback depending on the  
12    state or the region? Or are there areas of common ground or concern?

13                    MS. POLZIN: As you may know, Congress, there is  
14    something actually underway with Congress as far as at least a potential for  
15    having some jurisdiction over interstate reliability of the interstate pipelines.

16                    And then as far as the states, Texas, which was the  
17    epicenter, there's been a fair amount of action taken there towards reliability  
18    of the gas infrastructure there. A lot of that is still in progress but they are  
19    working on that quite actively in Texas.

20                    And Texas, as you may know, has quite a bit of the natural  
21    gas in the lower 48 so that's good to see that's happening there. As far as  
22    other states, we're in the early stages of our follow-up with other states beyond  
23    Texas.

24                    So, I can't speak as much to what other states are doing  
25    right at this moment.

26                    NRC COMMISSIONER WRIGHT: Dave, do you have

1 anything to add to that?

2 MR. HUFF: No, Commissioner Wright, I think Heather  
3 covered that very well.

4 NRC COMMISSIONER WRIGHT: And Mr. Chairman, if I  
5 could, one last quick question. Key Recommendation 6 involves natural gas  
6 infrastructure entities undertaking voluntary measures to prepare for cold  
7 weather.

8 Is Key Recommendation 6 in concert with or in lieu of Key  
9 Recommendation 5?

10 MS. POLZIN: That would be in concert with.

11 NRC COMMISSIONER WRIGHT: Thank you so much.

12 NRC CHAIRMAN HANSON: Thank you, Commissioner  
13 Wright. Ms. Katz, I want to pick up on something I think Commissioner Baran  
14 raised, which is this translation function of technical information.

15 And I think as technical agencies, that's always something  
16 we can be doing better, particularly for us when it comes to the innards of a  
17 complex machine like a nuclear power-plant.

18 But I wanted to hear a little bit more about this. There's this  
19 translation of technical information, there's the line that you really want to have  
20 about not veering into advocacy, and then there's the adjudication function of  
21 both of our Commissions as well.

22 And enabling participation, particularly in what can be pretty  
23 arcane processes, if you're standing outside the Agency, particularly.

24 Can you talk a little bit more about when it comes to  
25 adjudication how you're drawing that line about not veering into advocacy for  
26 folks who really want to understand and participate in those functions?

1 MS. KATZ: Yes, I think I should draw a distinction between  
2 what I would call more basic technical information, and there's already a little  
3 bit of that on the website but we are working on what we are calling explainers.

4 What are the basics of these particular industries, what do  
5 some of these terms mean? Even trying to get to the level of what is an ISO,  
6 what is an RTO, what is rate-making, what is a formula rate?

7 That's what I consider to be more basic information that we  
8 are developing internally, I would say, in partnership with the brilliant people  
9 who work at FERC in these areas.

10 So, we are trying to get it right as far as making it simpler,  
11 plainer English, but making sure we get the details correct.

12 Versus when there is a docket or a proceeding that has a  
13 very technical issue that people have questions on, I view that as outside the  
14 scope of our expertise and potentially even our jurisdiction, if that makes  
15 sense.

16 The adjudicatory function I think is very important to  
17 constantly keep that in mind and we are being very sensitive to the ex-parte  
18 concerns and very much looking at how do we help constituents who have  
19 questions without getting --

20 A lot of times people just want to tell their stories, that's the  
21 first thing they want, they want to tell you about what happened and so we  
22 want to make sure we're able to listen, but then make sure that person who is  
23 the listener from my staff is not then involved in any adjudicatory proceedings  
24 to be aware of the ex-parte function.

25 And so I think that's one of the ways we're trying to draw the  
26 lines. There's the basic general information and then there's the technical

1 that might be perceived particular to a particular open proceeding or  
2 something that's coming.

3 And I think that's where we could look more to find partners  
4 outside of FERC who could provide that information if it's not appropriate to  
5 send them to a member of the staff who might have some general information  
6 not in the context of anything that's contested.

7 Is that helpful? Does that answer your question?

8 NRC CHAIRMAN HANSON: That's very helpful, I really  
9 appreciate that. I think that's very, very helpful. Chairman Glick, I wanted to  
10 hand it back to you for questions from your Commissioners.

11 FERC CHAIRMAN GLICK: I don't have any questions. In  
12 the interest of time, I know we have a lot more to cover but more than glad to  
13 ask our other FERC colleagues if they have questions.

14 I'll again start with Commissioner Danly if he's solved his  
15 phone problem.

16 FERC COMMISSIONER DANLY: I think I have and, no,  
17 Mr. Chairman, I don't have any questions, thank you.

18 FERC CHAIRMAN GLICK: Thank you, Commission  
19 Danly. Commissioner Clements?

20 FERC COMMISSIONER CLEMENTS: No questions,  
21 thank you.

22 FERC CHAIRMAN GLICK: Thank you, Commissioner  
23 Clements. Commissioner Christie?

24 FERC COMMISSIONER CHRISTIE: No questions, thank  
25 you.

26 FERC CHAIRMAN GLICK: And Commissioner Phillips?

1                   FERC COMMISSIONER PHILLIPS: No questions, I will  
2 pass. Thank you.

3                   FERC CHAIRMAN GLICK: Thank you. Well, I think we  
4 just solved our time problem.

5                   NRC CHAIRMAN HANSON: Well, if I had known that, I  
6 could have gone a lot longer. Chairman Glick, thank you. We'll move on to  
7 the next part of the presentation. We're going to hear next from Andrea Kock  
8 who is Deputy Director for Engineering in the Office of Nuclear Reactor  
9 Regulation here at the NRC.

10                  She's going to talk about nuclear power-plant contributions  
11 to the grid. Andrea, the floor is yours.

12                  MS. KOCK: Good morning, Chairman Hanson and  
13 Commissioners, I'd like to welcome Chairman Glick, the FERC  
14 Commissioners, FERC Directors and Staff, and NERC Staff. My name is  
15 Andrea Kock, I am a Deputy Office Director for Engineering in the NRC's  
16 Office of Nuclear Reactor Regulation.

17                  I'm pleased we can meet to discuss areas of joint  
18 responsibility and interests that have been highlighted already during the  
19 presentations. I, too, hope that the next time we can meet in person.

20                  NRC's primary focus is continued nuclear reactor safety and  
21 security. A cornerstone to our commitment is our partnership and  
22 cooperation with other federal agencies such as FERC and NERC.

23                  And through this partnership we've continued to ensure  
24 cooperation and open communication on topics of mutual interest such as grid  
25 reliability and stability that have already gotten a lot of discussion.

26                  This continued partnership remains strong and it does

1 contribute to the safety of our nation's nuclear power plants. Today you'll  
2 hear about some key activities of mutual interests to our agencies.

3 After I provide a brief introduction regarding contributions of nuclear  
4 power plants to the grid, Eric Benner, who is our Director of Engineering and  
5 External Hazards in the Office of Nuclear Reactor Regulation, will provide an  
6 overview of our strong coordination with FERC and NERC.

7 During the discussion on cybersecurity later on, Jim  
8 Beardsley, who is our Acting Deputy Director of our Division of Physical and  
9 Cybersecurity in our Office of Nuclear Security and Incident Response, will  
10 provide an update on NRC's cybersecurity accomplishments and our  
11 continued focus on risk-informing our approaches in this area.

12 The NRC's mission, protecting public people and the  
13 environment, continues to be focused on the safety and security of commercial  
14 nuclear power plants.

15 We regulate the civilian use of radioactive material such as  
16 commercial nuclear power plants, the production of nuclear fuels, and the safe  
17 storage, transportation, and disposal of high-level radioactive waste and spent  
18 fuel.

19 And though our licensees have the primary responsibility to  
20 ensure safety of their facilities, the NRC is responsible for independent  
21 oversight of these facilities.

22 The NRC has been allocated about 2,800 staff and those  
23 are allocated between the 4 regions that you see on the slide, our  
24 headquarters office and our training center in Tennessee.

25 As depicted on the map on the slide, we regulate 93 nuclear  
26 power reactors that operate in 28 states at 55 sites. Next slide, please.

1 Nuclear power continues to serve a significant role in the stability of our  
2 nation's electrical grid.

3 Nuclear power plants operate at the highest capacity factor  
4 compared to other generators and each unit typically delivers power to the  
5 grid about 90 percent of the time.

6 They are shut down for about a month every 18 to 24  
7 months for refueling and these are in the spring and fall timeframe when  
8 electrical power demand is low.

9 The plant maintenance and upgrade activities that are  
10 conducted during these outages coupled with planned activities during normal  
11 operations allows the nuclear power plants to operate safely at a high capacity  
12 factor.

13 And as Chairman Glick noted, since 1990, nuclear power  
14 plants have produced 20 percent of the total annual electricity in the United  
15 States. The average rating per unit is about 1,000 megawatts.

16 Next slide, please. While the makeup of the nuclear fleet  
17 does remain dynamic, nuclear power plants continue to be a significant  
18 contributor to base load power to the grid.

19 This slide shows some examples of potential additions and  
20 subtractions from the grid. As you're probably aware, there are two new  
21 reactors under construction in Georgia, which are pictured on the upper  
22 left-hand corner of the slide.

23 The owner of the plant, Southern Nuclear Company, is  
24 finalizing the construction of Vogtle Units 3 and 4.

25 Each unit will produce about 1,100 megawatts and after our  
26 staff ensure that all criteria have been met, the Commission will decide



1 whether to allow the plant to operate and load nuclear fuel into the reactors.

2 Commercial operation is slated for the fourth quarter of 2022  
3 or the first quarter of 2023 for Unit 3 and the third or fourth quarter of 2023 for  
4 Unit 4.

5 To speak to Commissioner Christie's question about small  
6 modular reactors, another potential addition to the grid is the licensing of small  
7 modular reactors or reactor designs that generate about 300 megawatts or  
8 less.

9 It's expected that these small modular reactors would have  
10 multiple units at each site and we are currently in various stages of pre-  
11 application engagement with multiple developers in preparation for future  
12 licensing activities.

13 Then NRC staff has approved the NuScale design in 2020  
14 and we did receive notification that a facility using the NuScale design is being  
15 planned at the Idaho National Laboratory complex and expects to submit a  
16 combined license application in January of 2024.

17 We are engaged in significant pre-application interactions  
18 with NuScale on a new standard design approval that's expected this  
19 December. In fact, a team of NRC staff and managers met with NuScale in  
20 Corvallis, Oregon just last week.

21 We also expect application and construction permits for four  
22 other designs through 2028. One activity which has caused a reduction in  
23 the base load power to the grid, of course, is decommissioning of nuclear  
24 power plants.

25 And since our last joint Commission meeting in 2019, 4 units  
26 across 3 sites, which represent a capacity decrease of about 3,500

1 megawatts, have begun the decommissioning process.

2                   There are an additional 3 units that have notified the NRC  
3 of pending premature closures by 2025. These plant closures could further  
4 decrease the electricity capacity by about 3,000 megawatts.

5                   We've also extended the period of operation of existing  
6 power plants through license renewal and we are preparing to safely license  
7 advanced reactors, both of which could add power to the grid.

8                   I'll discuss both of these on the next slides in more detail.  
9 Next slide, please.

10                  The Atomic Energy Act and the NRC regulations allow for  
11 licensing of nuclear power plants for an initial term not to exceed 40 years, but  
12 they do allow for licenses to be renewed.

13                  The average age of a reactor unit in the current fleet is about  
14 40 years and the NRC's review of renewal applications, which extends the  
15 license renewal an additional 20 years, focuses on maintaining plant safety  
16 and specifically considers the effect of aging on important structures, systems,  
17 and components.

18                  The NRC conducts inspections before and after initial  
19 renewed licenses are granted to make conclusions regarding whether plants  
20 are safe to operate an additional 20 years.

21                  In addition, renewed plants continue to receive independent  
22 oversight. This includes routine periodic inspections from our region-based  
23 inspectors, as well as inspections by our resident staff who report to the site  
24 daily.

25                  The plant's aging management programs which are  
26 established, approved, and inspected by the NRC during license renewal,

1     complemented by existing preventative maintenance programs, ensure that  
2     plant equipment continues to perform safely.

3                     To date, 79 of the 93 operating facilities have renewed  
4     licenses for 60 years and we're expecting initial applications for 3 more units  
5     by the first quarter of calendar year 2024.

6                     We do solicit input from our stakeholders including our state  
7     partners to seek feedback as part of the renewal process.

8                     There has been interest for subsequent license renewal to  
9     allow plants to operate to 80 years, and just as with initial renewals, it's the  
10    industry's responsibility to develop the technical basis, demonstrating safety  
11    for long-term operations.

12                    For these reviews, the NRC has over 40 technical experts  
13    review the application using a process that we've refined over 20 years and is  
14    supported by decades of independent research.

15                    This includes a review of the aging management of various  
16    reactor components to ensure they can be safely operated for the additional  
17    20 years requested for operation.

18                    The NRC staff has received applications for 15 subsequent  
19    renewal licenses since 2018 and we've issued 6 subsequent renewal licenses  
20    since the last joint Commission meeting in 2019.

21                    In February of this year, the Commission ruled that further  
22    environmental evaluations will be needed for four of those subsequent  
23    renewal licenses as well as for all units that have not yet received their  
24    subsequent renewed licenses.

25                    I'd also like to mention that the decision to seek license  
26    renewal or to continue operating after receiving a renewed license is voluntary.

1 It rests entirely with the nuclear power plant owners.

2                   Next slide, please. The Agency is preparing to safely  
3 license advanced nuclear reactors. There is strong Congressional interest  
4 and support for these designs, for example, under the Nuclear Energy  
5 Innovation and Modernization Act, the NRC's developing a new rule for the  
6 licensing of advanced reactors that's technology-inclusive and  
7 performance-based.

8                   Congress has also funded and required the Department of  
9 Energy to partner with the private industry to put into operation two  
10 demonstration advanced reactors by 2027.

11                   We're also seeing clear commercial interest in multiple  
12 designs of advanced reactors and this slide gives some of the statistics on the  
13 status of our licensing activities.

14                   Vendors and utilities are working to deploy grid-connected  
15 advanced reactors by the late 2020s and the electricity generation from an  
16 advanced reactor will vary depending on the design and the number of units  
17 deployed at the location.

18                   Similar to small modular light-water reactor designs that I  
19 spoke about earlier, the flexibility of advanced reactors to meet local electricity  
20 needs such as by progressively adding reactor units to meet increasing  
21 demand over time in a modular manner is an advantage compared to existing  
22 large light-water reactors.

23                   We received two applications, one from the Oklo and Aurora  
24 power reactor, which is a heat pipe reactor, and a second from the Kairos  
25 Hermes research and test reactor, which is a fluoride salt-cooled high-  
26 temperature reactor.

1                   The Kairos Hermes research and test reactor is currently  
2 under review and it will support an eventual commercial power reactor  
3 application. Over 10 advanced reactor technology developers are in various  
4 stages of pre-application review with the NRC and we expect over 13  
5 applications by 2027.

6                   In addition to developing the technology-inclusive regulation  
7 that I spoke about earlier, we continue our preparations for advanced reactor  
8 applications through our continued stakeholder outreach, performing revisions  
9 to our guidance, developing new approaches to licensing, ensuring our staff  
10 are trained and have the appropriate skills, and reviewing a variety of topical  
11 reports that can be referenced in license applications.

12                  We are also developing various technology tools to track our  
13 progress in licensing reviews. I'll now turn the presentation over to Eric  
14 Benner. Next slide, please.

15                  MR. BENNER: Thanks, Andrea. Good morning,  
16 Chairmen and Commissioners.

17                  It's my pleasure to be here today to provide an overview and  
18 examples of the strong coordination between the NRC, FERC, and NERC,  
19 including procedures that are in place to ensure nuclear safety in the event of  
20 any grid reliability issues, the NRC's dam safety program, and the progress  
21 that has been made in support of Executive Order 13865 on coordinating  
22 national resilience to electromagnetic pulses.

23                  Next slide, please. Because our regulatory footprints  
24 overlap, the NRC has a number of interagency arrangements with FERC and  
25 NERC listed on this slide.

26                  The primary NRC-FERC memorandum of agreement, or

1 MOA, facilitates interactions between the NRC and FERC on three main  
2 subjects, grid reliability, cybersecurity, and physical security. This MOA is  
3 currently under revision.

4 We also have an additional MOA on dam safety that I'll  
5 discuss when I discuss our dam safety program.

6 The critical energy electric infrastructure information, or  
7 CEII, memorandum of understanding, or MOU, defines the basic parameters  
8 under which the NRC and FERC cooperate to protect information in NRC's  
9 possession that may be CEII and ensures the safety and security of the  
10 electric grid.

11 This MOU is also currently under revision. The NRC-NERC  
12 MOU facilitates coordination between the NRC and NERC regarding  
13 cybersecurity requirements for the protection of digital assets and physical  
14 security at nuclear power plants.

15 As Commissioner Wright indicated, this MOU was  
16 established in 2015 and it doesn't expire unless one party wishes to change  
17 it. We're certainly open to a dialogue as to whether there would be any  
18 changes to strengthen our communication and coordination.

19 These arrangements provide the framework for our strong  
20 coordination with FERC and NERC. We regularly consult with each other  
21 regarding technical, regulatory, and policy information that we possess that  
22 may be useful to each other in fulfilling our regulatory missions.

23 As example, the NRC staff consults with FERC and NERC  
24 staff for a transmission system status when nuclear power plant licensees  
25 request enforcement act discretion during critical equipment maintenance  
26 activities.

1                   We also actively coordinate during responses to natural  
2 events impacting the grid and nuclear power plants such as Hurricane Laura  
3 in 2020 and Hurricane Ida in 2021.

4                   We also recently met with FERC to share our procedures  
5 and lessons learned regarding incident response. NRC believes that nuclear  
6 safety and security is enhanced by our effective use of these interagency  
7 arrangements and result in strong coordination.

8                   Next slide, please.

9                   As you heard from Heather and Dave from FERC, the Texas  
10 cold weather event in 2021 had a significant impact on the Texas grid,  
11 especially that portion of the grid operated by the Electric Reliability Council  
12 of Texas, or ERCOT.

13                  Within that portion of the grid operated by ERCOT, there  
14 were two nuclear power-plants each with two units, Comanche Peak Units 1  
15 and 2 and South Texas Project Units 1 and 2.

16                  Both sites experienced degraded grid conditions during the  
17 event, but these conditions did not impact nuclear safety. Specifically, there's  
18 a sustained degraded frequency condition.

19                  These plants are designed to operate at a grid frequency of  
20 60 Hertz and lower frequencies impact pump flow rates, basically by the pump  
21 slowing down.

22                  However, the lower frequency does not cause any  
23 immediate damage to these pumps and the frequency was not low enough to  
24 reach any trip set points. Thus, the degraded frequency condition did not  
25 challenge safety systems or result in any units tripping.

26                  Comanche Peak proactively started one of their two onsite

1 emergency diesel generators as a precaution in case grid conditions got  
2 worse. South Texas Project Unit 1 did trip but this was due to a frozen  
3 instrument line which did not impact plant safety.

4 The NRC Staff is aware of the FERC, NERC report related  
5 to the February 2021 cold weather outages in Texas and the south-central  
6 United States. From a nuclear safety perspective, we are currently  
7 evaluating FERC, NERC, and ERCOT recommendations for hardening the  
8 power plants for protection against cold weather and the proposed  
9 underfrequency trip settings for degraded grid conditions.

10 Our preliminary findings are that the current NRC  
11 regulations coupled with guidance documents based on operating experience  
12 meet or exceed the recommendations in the report.

13 Next slide, please. While the NRC regulations don't  
14 specifically address cold weather, they do ensure plant safety for a wide range  
15 of severe weather conditions and potential effects, such as the loss of the grid.

16 As part of the regulatory process, plant operators are  
17 routinely trained and tested using written examinations and simulated  
18 scenarios to demonstrate their competency to maintain plant safety during  
19 abnormal conditions resulting from internal or external events.

20 The NRC oversight program includes onsite resident  
21 inspectors at nuclear power plants who oversee licensees' preparation from  
22 pending severe weather conditions.

23 Implementation of these requirements gives us confidence  
24 that the plants can safely shut down and stay in a safe state if power from the  
25 grid is not available.

26 Also, we have requirements that licensees protect



1 equipment that could cause a reactor trip and procedures to oversee  
2 licensees' preparations for severe weather events, included but not limited to  
3 winter storms.

4                   These activities increase the likelihood that nuclear power  
5 plants will reliably provide power during severe weather events. Next slide,  
6 please. NRC has regulatory authority over eight dams that pose a  
7 radiological hazard should they fail.

8                   These include uranium mill tailings dams, storage water  
9 pond dams at in situ leach mining facilities, and dams integral to the operation  
10 of licensed facilities or the possession and use of licensed material.

11                   As I mentioned at the beginning of my presentation, we have  
12 an MOA with FERC on dam safety. Under this MOA, FERC has greatly  
13 assisted the NRC in fulfilling our mission by providing expertise to conduct  
14 inspections of these dams, which is the primary method to demonstrate  
15 continued compliance with federal guidelines.

16                   As an example, following the events at Fukushima, the NRC  
17 proactively coordinated with the Interagency Committee on Dam Safety,  
18 including FERC, as we developed guidance on assessing flooding hazards  
19 due to dam failures.

20                   Dams at nuclear power plants have been inspected by NRC  
21 and FERC every two years and dams at uranium tailings mills have been  
22 inspected every three years. Going forward, the NRC will be developing  
23 inspection schedules using risk information.

24                   All eight NRC regulated dams were inspected in 2021.  
25 Several had been scheduled to be inspected in 2020 but these inspections  
26 were deferred because of COVID-19.

1                   Completion of these inspections demonstrates the effective  
2                   coordination with the FERC in this area and demonstrated that all dams over  
3                   which NRC had regulatory authority continue to meet the federal guidelines  
4                   for dam safety and are safe.

5                   Next slide, please. The last topic I'd like to discuss with you  
6                   is our implementation of the Executive Order 13865 on coordinating national  
7                   resilience to electromagnetic pulses, or EMPs.

8                   The executive order required an assessment of critical  
9                   infrastructure systems, networks, and assets which are most vulnerable to the  
10                  effects of EMPs, both manmade and naturally occurring.

11                  The Department of Homeland Security, DHS, has the lead  
12                  and NRC is working closely with other agencies such as the Department of  
13                  Energy, DOE, to respond to the executive order by further evaluating the  
14                  impact of EMPs on nuclear power plants.

15                  Through previous analyses, the NRC conclude there's  
16                  reasonable assurance that nuclear power plants can safely shut down and  
17                  maintain reactor core cooling in response to EMPs.

18                  We are building on previous evaluations to continue to refine  
19                  the NRC and interagency assessments of nuclear power plant resiliency to  
20                  EMPs. Specifically, NRC Staff is presently collaborating with DHS and DOE  
21                  to validate evaluations and analytical studies to assess nuclear plant safety  
22                  following an EMP event.

23                  This collaboration includes biweekly interagency meetings.  
24                  The NRC is also providing technical input into new assessments and testing  
25                  of typical nuclear power plant components being formed by Sandia National  
26                  Laboratory for DOE to further validate nuclear power plant resiliency.

1                   The NRC staff continues to monitor EMP research activities  
2 performed by some grid operators in coordination with FERC and DOE on  
3 transmission networks and power plants. The results of these findings may  
4 be leveraged for hardening offsite power systems at nuclear power plants.

5                   We have now completed our presentation and look forward  
6 to answering your questions, thank you.

7                   NRC CHAIRMAN HANSON: Thanks, Eric and Andrea for  
8 that. Chairman Glick, I'll hand it over to you for questions from you and your  
9 fellow Commissioners.

10                  FERC CHAIRMAN GLICK: Thank you Chairman Hanson.  
11 Thank you very much for the presentations, they were both very interesting.  
12 I wanted to start where I think Commissioner Baran had mentioned earlier in  
13 the introductory comments about load following.

14                  I remember at the first joint NRC and FERC meeting that I  
15 attended I think was 2018 and this issue came up a bit. I wanted to get a  
16 sense, and I know there were some technical limitations, also economic  
17 limitations, in terms of operating nuclear plants more flexibly.

18                  On the other hand, as was discussed earlier today, we're  
19 moving into a system that requires more flexibility in terms of the increasing  
20 amount of intergeneration, it's going to require more flexible generation as  
21 well.

22                  And I wanted to know whether we have capabilities but also  
23 whether there are things we could do to promote the use of nuclear plants  
24 more flexibly.

25                  So, I was curious, Ms. Kock, one, if the advanced  
26 technologies might have more capability in terms of operating more flexibly or

1 whether they might suffer from the same limitations as the current light water  
2 technologies that are in existence?

3 MS. KOCK: I can start out and then Eric might want to add.  
4 My understanding is that our current fleet of operating reactors are capable of  
5 load following and more flexible operations.

6 But as you mentioned, it's a little bit more difficult for the  
7 large light water reactors in terms of economics and their plans for fuel loading  
8 and things of that nature.

9 Your question about whether the advanced and small  
10 modular reactor designs are more capable, yes, we are getting an indication  
11 that they are more flexible in that way. And that is part of the designs that  
12 we're seeing.

13 Eric, did you want to add anything to that?

14 MR. BENNER: Just briefly because I think there was a  
15 good clarification made in some of the previous questioning of the rapidity,  
16 how rapid the load following can occur. So, the current fleet, it is limited  
17 somewhat by the limits on the reactor fuel.

18 So, that somewhat limits how rapid a load following can  
19 occur and some of the advanced reactor designs are looking at ways to build  
20 that into their design to allow both more extreme load following and more rapid  
21 load following.

22 FERC CHAIRMAN GLICK: That's very helpful. At FERC  
23 we're looking at potential market reforms in terms of our oversight of primarily  
24 the RTL markets around the country and what we can do to promote a more  
25 flexible approach to that and reward generation for being more flexible in terms  
26 of ensuring that they can recover their costs.

1                   And I know that's an issue as well, so that's something we're  
2   going to take a look at and obviously monitor the progress of the technology.  
3   I only had one other question, I asked earlier about extreme weather and some  
4   of the concerns about cold weather.

5                   As I understand it, there's two major operating reactors in  
6   the Western Interconnect, if that's correct, but I'm curious from the perspective  
7   of drought.

8                   The Western part of the West is suffering from extreme  
9   drought for a number of years now and I've been wondering whether that has  
10   any impact on nuclear plant operations, in particular as it relates to cooling  
11   water availability and so on.

12                  MR. BENNER: Yes, I'm going to give a two-part answer.

13                  The first part is we've constructed a design and licensing  
14   basis for these plants that envelopes a pretty wide range of conditions, and  
15   particularly in this area, these plants all do have what are called ultimate heat  
16   sink requirements and we ensure that they are able to operate under a number  
17   of circumstances.

18                  Now, certainly if you had a plant that's on a body of water or  
19   a river or a cooling pond and there were other pulls on those water sources,  
20   we would look at that real-time.

21                  In addition, post-Fukushima we implemented a process by  
22   which we are looking at it's called the process for ongoing assessment of  
23   natural hazards information, where we are looking at evolving data on natural  
24   hazard information to see if there need to be any changes to the design or  
25   licensing bases of these plants.

26                  FERC CHAIRMAN GLICK: Thank you, I appreciate the

1 answer. I'll move on to Commissioner Danly to see if he has any questions.

2 FERC COMMISSIONER DANLY: No, thank you, Mr.  
3 Chairman.

4 FERC CHAIRMAN GLICK: Thanks, Commissioner Danly.  
5 Commissioner Clements?

6 FERC COMMISSIONER CLEMENTS: Thank you,  
7 Chairman. Thanks for those presentations, they were helpful. I have one  
8 question around the process.

9 There was a list of the MOUs or MOAs that we have  
10 between our agencies and I'll save the cyber question for the next panel.

11 But from where you sit, Ms. Kock and Mr. Benner, are there  
12 needs related to extreme weather or these changing conditions on the system  
13 that suggest the need for updates to any of these memoranda or more  
14 collaboration on processes relative to the challenges at hand?

15 MR. BENNER: I think the MOUs and MOAs as we  
16 currently have them offer some flexibility. As I said, they're both under  
17 revision now; we are working on strengthening some areas. I don't know if  
18 they explicitly at this point need to be revised to allow for additional  
19 conversation in this area; I think they are pretty flexible.

20 So, I think particularly if we think there's more  
21 communication to do in this area, we could effectively do that communication,  
22 and then certainly in upcoming revisions of the MOUs and MOAs we could  
23 see if there needs to be anything more explicit in there.

24 I will say from my personal experience, whenever we've  
25 needed to talk for our counterparts in FERC and NERC, I haven't felt that  
26 there's anything restrictive about having those conversations.

1                   FERC COMMISSIONER CLEMENTS: That's good to  
2 hear. Thanks. Maybe a better way to ask the question is, is there anywhere  
3 we should be leaning in, any of the issues, whether or not they live inside or  
4 outside these MOAs, where FERC could be spending time in support of the  
5 work that NRC is doing related to extreme weather and system reliability?

6                   MR. BENNER: I'll take it as an action just to have us reach  
7 out. If nothing else, like I alluded to, we have a process post-Fukushima for  
8 looking at natural hazards information.

9                   We did just make that process publicly available, our  
10 procedures for that process, and we will be conducting some workshops.

11                  So, at a minimum, we can engage with our counterparts at  
12 FERC and NERC to make them aware of our interactions on that to allow them  
13 to participate in the public forum, and we could also discuss whether there is  
14 any government-to-government interaction we should have.

15                  FERC COMMISSIONER CLEMENTS: Thank you, that's  
16 all from me, Chairman Glick.

17                  FERC CHAIRMAN GLICK: Thanks, Commissioner  
18 Clements. Commissioner Christie?

19                  FERC COMMISSIONER CHRISTIE: Yes, Mr. Chairman,  
20 I'd like to address a question to Ms. Kock who touched on the modular nuclear  
21 technology. I'd just like to ask you to elaborate on that a little bit.

22                  I had an interesting meeting last year with regulators from  
23 Canada, one of the provinces in Canada, and they were very optimistic.

24                  And they were actually getting ready to start deploying  
25 modular nuke generators. So, I'm wondering if you could elaborate?

26                  I heard you say that you're working on a standard design,

1 and that's the whole point of modular nukes, is to have a standard design that  
2 can be duplicated quickly.

3 Can you give us a little bit more about when you think in your  
4 expertise we might be ready in America? I know we have a couple units in  
5 the West and one in Wyoming I think but Ontario was talking about actually  
6 rolling it out.

7 And I'm wondering where do you think we are in terms of  
8 being at that point in the technological development that we could actually  
9 start commercially deploying a modular nuclear generating technology?  
10 Thank you.

11 MS. KOCK: Thanks for the question. As I mentioned  
12 during my presentation, we have approved one design for the NuScale SMR.  
13 Part of our process is to go through a rulemaking process after a design is  
14 approved.

15 So, that's in process now and once we approve a design, a  
16 developer, an applicant can come to us and submit an application. So, again,  
17 we don't drive the timing but once we approve a design, we're ready to accept  
18 an application.

19 We do go out to licensees and ask for information on when  
20 they intend to submit applications. As I mentioned, we expect an application  
21 for a COLA for the NuScale design in January 2024.

22 And typically, it takes us a couple of years to work through  
23 those applications, so that would put us in the later 2020s when we see some  
24 of these designs come to fruition.

25 Based on the number of applications we've seen, we  
26 anticipate about 13 applications through the end of the 2020s, with the earliest



1 ones coming in, like I said, in 2024 with the NuScale COLA application.

2 And again, if you just project out a few years from that, that  
3 puts you in the late 2020s when we would start seeing deployment.

4 We are working very closely with our international  
5 counterparts, like you mentioned, Canada and other international counterparts  
6 to learn from each other, see where we can help each other out in terms of  
7 technical information and reduced duplication of efforts.

8 So, we're actually working very, very closely with Canada  
9 not just on SMR designs but also other advanced reactor designs and issues  
10 to make sure we're leveraging the expertise between our agencies wherever  
11 we can.

12 FERC COMMISSIONER CHRISTIE: Thanks you, that's  
13 good information and sounds optimistic. That technology really has  
14 tremendous promise if we can get it commercially deployable, so that's good  
15 to hear, thank you.

16 FERC CHAIRMAN GLICK: Thanks, Commissioner  
17 Christie. Commissioner Phillips?

18 FERC COMMISSIONER PHILLIPS: Thank you, Chair. I  
19 just want to thank everybody for the presentations, they were excellent. I also  
20 want to just note that I'm encouraged by the fact that communication and  
21 coordination between NERC, NRC, and FERC is good and ongoing.

22 And I think that's a very good and necessary thing, thank  
23 you.

24 FERC CHAIRMAN GLICK: Thank you, Commissioner  
25 Phillips. Turning it back to you, Chairman Hanson?

26 NRC CHAIRMAN HANSON: Thanks, Chairman Glick.

1 Commissioner Baran?

2 NRC COMMISSIONER BARAN: I don't have anything,  
3 Chairman. Thanks.

4 NRC CHAIRMAN HANSON: Commissioner Wright?

5 NRC COMMISSIONER WRIGHT: Mr. Chairman, I don't  
6 have any questions but I do want to thank Andrea and Eric, they really are  
7 great. They're in my phone-a-friend category so if I ever have a question,  
8 they're awesome and their presentations today really do capture what our role  
9 is and how well we coordinate with NERC and FERC.

10 So, I thank them both from my end.

11 NRC CHAIRMAN HANSON: Thanks, Commissioner  
12 Wright. I've got just one thing, I was wondering if maybe Andrea or Eric could  
13 give us a couple of thoughts, sentences, about NRC's engagement on fusion.

14 I've done a couple of things on fusion recently, I was up in  
15 Massachusetts at MIT recently and learned some things.

16 And it's never too early to start thinking about what the future  
17 may bring and consistent with Commissioner Danly's questions about new  
18 technology, even if it's a little farther down the road, I was wondering if Andrea  
19 could highlight some of the things we're doing on that front?

20 MS. KOCK: Sure, as a scientist it's a really exciting time.  
21 You think about fusion as something that we've talked about in the country for  
22 a long time but if you read the news recently, it seems like we're making strides  
23 to actually make that happen.

24 So, not just as an NRC staff Member, but as a scientist, it's  
25 very interesting to me. But the answer to Chairman Hanson's question, we  
26 are looking at fusion, we are engaging with some commercial entities who may

1 be interested in looking at fusion technologies in the future.

2 It is a little bit further out, as he suggested. I mentioned  
3 we're doing a rulemaking for advanced reactors as technology-inclusive and  
4 performance-based.

5 In concert with that we're looking at potentially looking at our  
6 regulations and what might need to be changed to allow us to more efficiently  
7 license fusion in the future.

8 It's a little bit more further out than the regulation we're  
9 working on with advanced reactors but we are seeing engagement there as  
10 well.

11 NRC CHAIRMAN HANSON: Perfect. Thanks, Andrea, I  
12 appreciate that. Next, we're going to turn to our session on cyber activities.

13 We're going to hear first from Barry Kuehnle, I hope I  
14 pronounced that correctly, from FERC, who's the Energy Infrastructure  
15 Cybersecurity Advisor for the Division of Cybersecurity.

16 So, Mr. Kuehnle, we'll start with you?

17 MR. KUEHNLE: Thank you, and you pronounced the  
18 name perfectly, thank you very much. It's an honor to speak today, thank you  
19 very much.

20 Before I jump into the lessons learned presentation, I saw  
21 on the agenda that you folks would like to have a little update on maybe some  
22 recent orders or anything that we have released.

23 I would just like to highlight the fact that we have recently  
24 released a notice of proposed rulemaking, a NOPR, specific towards internal  
25 network security monitoring.

26 And what that NOPR entails, we're looking for feedback

1 from industry and the public on whether or not internal network security  
2 monitoring within the protected environment of a cyber infrastructure within  
3 the CIP environment, if you will, is warranted.

4 Right now, the CIP specifically requires perimeter protection  
5 and protection on devices within the environment but there's no requirement  
6 to actually monitor the traffic within that environment between those devices.

7 So, the NOPR actually closed on the comment period within  
8 the last few days so we have a number of comments that we're going to be  
9 reviewing. And if any of your staff, and I work closely with Jim, so Jim, if  
10 you're willing to speak about the NOPR or some of the information we're  
11 getting in, we're more than happy to do that.

12 With that, if you could change to the next slide please, I just  
13 wanted to give a few highlights of where we are with the FERC-led audits.

14 And if you're not familiar with the FERC-led audits, NERC  
15 has the role of actually going out and performing audits and ensuring that the  
16 CIP standards are being adhered to properly.

17 Within the last few years, FERC also has put together some  
18 staff that's been going out and they've been conducting our own audits.

19 And it's mainly to ensure that the standards are not  
20 overburdensome and just to make sure that the path we're heading down in  
21 the future is something that makes sense as far as the way the CIP standards  
22 are.

23 So, we audit in the same process that NERC does and the  
24 regions do as well and at the end of that audit, we would actually submit any  
25 type of penalty, potential penalties, that would be submitted up to the regions.

26 And we also have what we call an ORI, which are called

1 other risks identified when we perform these audits. And those are just  
2 recommendations for the entity to follow once the audit is complete.

3 So, it's not mandatory they do that, but we highly  
4 recommend they do them because there could be potential in the future that  
5 these ORIs may actually lead to a potential violation.

6 So, I'm just going to go through and discuss some of the  
7 lessons learned from the last auditing period. The auditing period we're going  
8 to talk about is the fiscal years.

9 The information is all derived from a non-public report  
10 because the reports that we put together that go to the entity and to the regions  
11 and to NERC are non-public because they do contain some sensitive  
12 information.

13 Like I mentioned, they are issued on an annual basis, these  
14 lessons learned reports, and it goes all the way back to 2017.

15 I also mentioned that the reports contain recommendations  
16 to help the users, the owners, the operators, and also it helps our staff  
17 internally to understand the CIP standards and see if there's any gaps or  
18 maybe some requirements that may be overburdensome.

19 Next slide, please.

20 I just want to highlight the fact that we have been doing  
21 these reports now since we started the FERC-led audit program back in the  
22 Fiscal Year of 2017 and we have noticed as we've been going on our FERC-  
23 led audits that a number of entities have actually been looking at these reports.

24 We've been getting feedback and they've been extremely  
25 helpful. They have been implementing some of the recommendations or at  
26 least following to the best of their capability some of the recommendations

1 within these lessons learned.

2 What we also noticed over the years is that some of the  
3 more violated requirements within the CIP standards, in my opinion being a  
4 cybersecurity professional, some of the requirements are very difficult to  
5 implement.

6 And it's not because the CIP standards make these  
7 requirements difficult, it's because it's just a hard thing to do from a  
8 cybersecurity perspective.

9 And I'll just give a spoiler, in one of those ports and services  
10 -- I'll discuss what I mean by ports and services when we hit that within the  
11 lessons learned report.

12 There have been five lessons learned reports that have  
13 been completed over the years again from when we started, and those all can  
14 be found on the Internet and there's links to those in the presentation.

15 Next slide, please.

16 I'm going to walk through and hit some of the highlights, I'm  
17 not going to break down each one these individually but I just want to hit some  
18 of the highlights. I'm going to walk through the requirements in sequential  
19 order.

20 CIP-002, which is actually the baseline requirement in my  
21 opinion, where it is used to identify what the risks are of the components within  
22 the bulk electric system.

23 And what I mean by risks, what you do is you look at all of  
24 your assets and you determine how that device would actually impact the  
25 system if it were to be degraded or manipulated in some way or rendered  
26 inoperable.

1                   So, we have a category of high, medium, and low, where  
2                   high and medium have the most stringent controls put on them and where low  
3                   is actually very few controls.

4                   But because of the low impact rating, these low controls  
5                   were warranted with the initial designs of the CIP standards because the  
6                   thought was if you were to lose a low impact site, it would have very little  
7                   impact to the grid, as the name implies by low.

8                   So, I just want to identify with CIP-002, what we have  
9                   noticed is a number of entities have actually been adhering to the CIP  
10                  standards by the black and white language where they look at a particular  
11                  asset and they would say, okay, how does this impact the grid and what rating  
12                  should it warrant, high, medium, or low?

13                  We noticed over the years and specifically in this report we  
14                  highlighted in detail the fact that a number of entities, what they've been doing  
15                  as they evaluate, they're not considering the fact that -- they're only looking at  
16                  it from an unavailability and redundancy perspective.

17                  They're not looking at the fact that it may actually be  
18                  manipulated in some way and if it degraded over a period of time. CIP-003,  
19                  that is a management control and more of a policy requirement. It also  
20                  addresses low impact and what we noticed from the lowd-impact perspective  
21                  is there's these devices that are called transient cyber assets, or TCAs. And  
22                  basically what it is, it's a device that an operator would take into the field and  
23                  connect up to a device, say in a substation, if they needed to make changes.

24                  So, it's not a device that actually is connected up to the  
25                  infrastructure of the grid and allows the grid to operate, it's used to change  
26                  configuration settings and to monitor things from a field operator's perspective

1 when they go out and look at things.

2 What we've noticed is that a number of entities haven't been  
3 paying as much attention to the TCAs as they probably should have, so we  
4 just highlighted that because they are a pathway to get into --

5 Is everyone able to hear me okay? I just switched off my  
6 headphones.

7 Like I said, with the TCAs, what we noticed is the fact that  
8 since they do leapfrog the perimeter protections, there should be extra  
9 attention paid to the security controls around those TCAs.

10 And CIP-004 is personnel and trainings and I'll just leave it  
11 and let you read the language. It's basically wrapped around the personnel  
12 and training aspects. Next slide, please.

13 I had mentioned earlier about ports and services, probably  
14 one of the most violated requirements within the CIP standards. Ports and  
15 services goes into a little bit of technical detail.

16 As traffic moves through the network, it's assigned a specific  
17 address by which it is identified but it has these things that are called ports  
18 and they utilize the service.

19 And for example, when you browse through the Internet and  
20 you open up your web browser, there's a service associated with that and that  
21 service is associated with the address and that particular product that you're  
22 using, for example, a webpage.

23 What the CIP standards require is that those ports and  
24 services only be used that are needed because there's actually 65,000 ports  
25 that are available, roughly 65,000 ports that are available within the network  
26 environment for each device.



1                   You want to limit those ports. So, it's actually a very difficult  
2 thing to do. This is actually a repeat of lessons learned from previous reports.  
3 We highlighted it again here because again, we see this as one of the most  
4 violated requirements.

5                   And I'm sure from your auditing experience as well, from  
6 when your folks go out and look at your cyber network, you're probably running  
7 into the same issues with ports and services being a difficult thing to lock  
8 down.

9                   CIP-009, that's recovery and planning and we just noticed  
10 that from a recovery perspective, this was a problem when I was actually in  
11 the field as well before I came to FERC.

12                  It's one of those things that you really don't want to think  
13 about being compromised and having to recover from a system.

14                  So, it's one of those things that doesn't get as much  
15 attention and we noticed that from the audit perspective as well.

16                  So, what we do is we just highlighted and reminded people  
17 that being able to recover from an incident is very important and you should  
18 make sure your documentation is reviewed periodically, and that drills are  
19 conducted as well.

20                  Next slide, please.

21                  CIP-010, that's configuration of management and  
22 vulnerability standing requirements. This is a hard thing to do as well.

23                  Patching is probably one of the hardest things to do in an  
24 operational technology environment such as being able to go through a  
25 substation and patch devices, partially because of the fact that you have to  
26 have such high availability of these systems that you can't just take them

1 offline.

2 Sometimes when you implement a patch you need to take  
3 a system offline for that patch to be implemented. So, we noticed that it's still  
4 a highly violated requirement and in fairness it's a very tough thing to do.

5 So, we just made some recommendations of some of the  
6 things we're doing for folks that maybe could go through the lessons learned  
7 report and maybe enhance their security controls.

8 Next slide, please.

9 CIP-011, that's your information protection, and when we  
10 say information protection we're basically talking about the data. So, your  
11 network drawings, your configurations, your information such as log files and  
12 that type of thing.

13 We recommend to people and we see this as well, that  
14 some of the policies that are wrapped around defining what they consider  
15 information that is sensitive may not address some of the information that may  
16 potentially be sensitive.

17 And what we have in here is the term spillage, that's what  
18 we mean by that, basically folks are underclassifying their documentation.  
19 So, if that documentation were to get out, an adversary might be able to  
20 actually gain some knowledge to conduct a knowledgeable attack against that  
21 system.

22 And a good example of that would be if someone were to  
23 maybe put some detailed information into a presentation that they're doing in  
24 a public conference, not knowing that information potentially would be very  
25 helpful to an adversary in the event that they wanted to conduct an attack  
26 against that facility.

1                   So, we noticed that and obviously we highlighted that in the  
2 lessons learned report. Next slide, please. That's all I have and I'll wait for  
3 questions after Jim's presentation.

4                   Thank you very much for this opportunity.

5                   NRC CHAIRMAN HANSON: Thank you very much, Mr. Kuehnle.  
6 Next we'll hear from Jim Beardsley from our Office of Nuclear Security and  
7 Incident Response. Jim?

8                   MR. BEARDSLEY: Good morning, Chairmen and  
9 Commissioners. I'll be providing you an update on the significant progress  
10 the NRC Staff have made in the cybersecurity oversight program for power  
11 reactors since our last joint Commission meeting.

12                  Next slide, please.

13                  In order to provide some context on our current efforts, I'll  
14 briefly review the history of the program. In 2009, the NRC approved the  
15 cybersecurity rule. The rule required all licensees to develop a cybersecurity  
16 plan and submit the plans for Staff approval.

17                  Later that year, a potential conflict in cyber oversight was  
18 identified for digital assets associated with nuclear plant power production,  
19 otherwise known as balance of plant digital assets.

20                  As part of the discussion, NERC conducted an assessment  
21 of power reactor licensees and determined that NRC's cybersecurity oversight  
22 of balance of plant digital assets was acceptable if those digital assets were  
23 designated as important to safety.

24                  Subsequently, the NRC staff approved license amendments  
25 from all the nuclear power plant licensees that clarify the important to safety  
26 designation.

1                   This placed ongoing oversight of the balance of plant digital  
2 assets in nuclear power plants under the NRC's cybersecurity inspection  
3 program.

4                   The NRC oversight verifies that nuclear power plant  
5 licensees maintain cyber protections of the balance of plant digital assets  
6 equivalent to or greater than those required by the NERC critical infrastructure  
7 protection standards.

8                   In conjunction with the staff effort, the NRC and FERC  
9 memorandum of agreement on grid reliability noted in Eric's presentation was  
10 updated to include the roles and responsibilities for cybersecurity oversight.

11                  In 2010 and 2011, industry and the NRC recognized the  
12 complexity and significant effort required to implement the cybersecurity  
13 programs. As a result, they broke the licensee cybersecurity implementation  
14 into two phases.

15                  The first phase was completed in 2012 and inspected  
16 between 2013 and 2015.

17                  The full implementation of the nuclear power plant  
18 cybersecurity programs was completed by industry at the end of 2017 and the  
19 staff inspected each licensee's full implementation between 2017 and 2021.

20                  Although some findings of very low safety significance were  
21 identified during the inspection program, staff found with reasonable  
22 assurance that industry understood the cybersecurity requirements and  
23 implemented adequate programs.

24                  In 2019, the staff conducted an assessment of the power  
25 reactor oversight program. The assessment findings were used to develop  
26 an action plan that prioritized their follow-on activities.

1                   Initially, the action plan focused staff and industry on the  
2                   criteria used to evaluate which digital assets were required to be protected  
3                   from a cyber-attack and a graded level of protection applied to those assets.

4                   The next slide will discuss the efforts related to the digital  
5                   asset analysis and protection in more details. The assessment results also  
6                   identified potential opportunities to performance-inform the cybersecurity  
7                   inspection program.

8                   During 2020 and 2021, staff developed a new inspection  
9                   procedure that shifts from a three-week inspection centered on compliance  
10                  with program implementation to a one-week inspection focused on the  
11                  ongoing performance of the licensee's cybersecurity program.

12                  The revised inspection program started in February of this  
13                  year and the first biennial inspection cycle will continue through the end of  
14                  2023. Next slide, please.

15                  As previously noted, the 2019 cybersecurity program  
16                  assessment identified opportunities to further implement the graded approach  
17                  used to select which safety, security, and emergency preparedness digital  
18                  assets should be protected and their associated level of protection.

19                  Our analysis focused on the digital assets associated with  
20                  emergency preparedness, balance of plant, importance of safety, and physical  
21                  security. The proposed changes help focus the licensee's cybersecurity  
22                  program on the most safety- and security-significant digital assets.

23                  As part of this process, Staff and industry recognized that  
24                  the level of protection applied to the nuclear balance of plant digital assets  
25                  were more demanding than those in the NERC critical infrastructure  
26                  protection, or CIP, standards.

1                   As a result, industry proposed changes that aligned the CIP  
2 standards with the NRC's regulatory oversight.

3                   The revised protection for balance of plant digital assets is  
4 achieved through a combination of NRC regulation, the facility cybersecurity  
5 protective boundary, and the licensee's change management processes.

6                   Following receipt of the proposed balance of plant changes,  
7 the staff conducted a series of public meetings to discuss the proposal with  
8 stakeholders. Staff also met with FERC staff and managers on multiple  
9 occasions to ensure there was a clear understanding of the proposed  
10 changes.

11                  After a comprehensive evaluation, staff found the proposed  
12 guidance changes for balance of plant and the other areas noted earlier were  
13 within scope of the licensee's approved cybersecurity plants.

14                  The nuclear power plants are in the process of implementing  
15 the associated changes in their cybersecurity plants, and the staff is focusing  
16 on the resulting modifications to the licensee's cybersecurity plans in a new  
17 phase of cybersecurity inspections.

18                  Next slide, please.

19                  NRC cybersecurity staff in conjunction with federal agency  
20 partners as well as internal NRC resources maintain awareness of emerging  
21 cybersecurity threats.

22                  The Department of Homeland Security, Cybersecurity  
23 Infrastructure Security Agency, or CISA, acts as the sector risk management  
24 agency for the nuclear reactors, materials, and waste sector.

25                  CISA engages in a two-way dialog with commercial entities  
26 in the sector to ensure that cyber threats are communicated and assistance is

1 provided upon request.

2 As a regulatory authority, the NRC does not directly  
3 participate in the CISA industry dialogue but staff will be informed about  
4 potential cybersecurity threats to the nuclear sector through protocols with our  
5 counterparts in the interagency.

6 In addition, the power reactor cybersecurity reporting rule  
7 ensures that cyber-attacks are reported to the NRC in a timely manner.  
8 Historically, CISA and industry have routinely informed the NRC of  
9 cybersecurity-related incursions and shown appropriate engagement by the  
10 staff.

11 CESER, or the Department of Energy's Office of  
12 Cybersecurity and Energy Security and Emergency Response, leads the  
13 energy sector in emergency preparedness and coordinates response to  
14 disruptions including cyber-attacks.

15 The NRC staff have a close working relationship with our  
16 CESER counterparts and coordinate with them in the event of a cyber incident  
17 at a nuclear power plant.

18 The staff also participates in CESER-led working groups  
19 such as the Securing Energy Infrastructure Taskforce to ensure that efforts to  
20 protect the energy sector are appropriately applied to nuclear power plants.

21 In conjunction with the NRC Office of Research, the  
22 cybersecurity staff are evaluating the implications of emerging technologies  
23 on the commercial nuclear fleet.

24 Examples of these technologies include wireless networks,  
25 autonomous operation, digital twins and artificial intelligence.

26 These research efforts help prepare the staff for future

1     licensing oversight activities.

2                     The cybersecurity oversight team also work closely with our  
3     partners in the Office of Nuclear Reactor Regulation and the inspection staff  
4     from our regional offices to evaluate the cybersecurity aspects associated with  
5     digital instrumentation and control modernization.

6                     The cybersecurity staff also participated in engagements  
7     with a wide spectrum of international entities. Through our bilateral meetings,  
8     staff shared lessons learned from our cybersecurity oversight program with  
9     partner regulators.

10                    Staff also participated in International Atomic Energy  
11    Agency's cybersecurity guidance development. These activities provide  
12    opportunities to share lessons from the NRC's cybersecurity regulatory  
13    program and draw upon experience from our international partners.

14                    In fact, our efforts to develop a cybersecurity regulatory  
15    structure for advanced reactors has drawn upon some of the processes  
16    documented in recent IAEA guidance.

17                    Next slide, please.

18                    As part of the NRC's advanced reactor rulemaking, staff are  
19    developing a new cybersecurity rule that establishes a technology-neutral  
20    graded approach for future reactor licensees.

21                    The approach focuses on potential safety and security  
22    consequences to a facility to determine the appropriate level of cybersecurity  
23    protection required for digital computer communication systems.

24                    This approach builds off the graded concepts implemented  
25    as part of our existing power reactor cybersecurity rule and recognizes the  
26    more significant role that may be played by digital systems in future reactor



1 designs.

2 For example, advanced reactors may build cybersecurity  
3 into their design, potentially mitigating threat vectors, or future licensees may  
4 implement technologies that could introduce new cybersecurity threat vectors.

5 The proposed rule provides licensees and staff with a  
6 process for evaluating and protecting a broad spectrum of potential designs.

7 The preliminary rule text is publicly available and draft  
8 regulatory guidance will be made available for public comment in accordance  
9 with the advanced reactor rulemaking plan.

10 Before I complete, I just want to make a note that the staff  
11 looks forward to engaging with FERC on the internal network monitoring  
12 activity that was noted by Barry.

13 We are aware of it and we have looked at our regulations to  
14 ensure that the lessons that FERC has learned and published are included in  
15 our regulatory oversight.

16 This completes my remarks subject to your questions.

17 NRC CHAIRMAN HANSON: Thanks very much for that  
18 presentation, Jim. We're going to begin questions with FERC  
19 Commissioners. Chairman Glick?

20 FERC CHAIRMAN GLICK: Thank you very much, Mr.  
21 Chairman, and thank you very much to the staff for the presentations. I want  
22 to start out by noting that it's very helpful for the upcoming discussion we're  
23 going to have on internal network monitoring.

24 I think that's a very important subject. Obviously, this is an  
25 extremely timely and extremely significant subject with what's going on around  
26 the world and some of the announcements that we've seen from the White

1 House as well as obviously concerns raised by a number of other folks around  
2 the world about potential cyber-attacks from adversaries and so on.

3 And we certainly know the energy sector is one area that is  
4 a potential target. I wanted to focus a question I had on the supply chain.

5 I think this is an area that I think we're going to need to  
6 explore further, concerns about the threats to the supply chain, in large part  
7 because we're talking about very complicated machinery, very complicated  
8 systems that in many cases are made up of a number of component parts that  
9 sometimes are manufactured in different parts of the world.

10 And it's not very easy to assess whether a particular  
11 component has been infiltrated or not or has been set up to engage in a cyber-  
12 attack. I'm curious, Mr. Beardsley, how the NRC approaches supply chain  
13 issues, if that's any different than how it's done through the NERC process?

14 MR. BEARDSLEY: It's a great question and it's a very,  
15 very hard challenge. The licensee's cybersecurity plans, which are a  
16 condition of their license, include supply chain requirements.

17 So, we have a set of supply chain requirements built into  
18 their cybersecurity.

19 We recognize that there's a limit to which the licensees can  
20 manage their cyber supply chain, so what we've included is a requirement that  
21 they test any equipment that they bring in, and also that they work with their  
22 suppliers to verify the sources and the other related aspects of the equipment  
23 that they're buying.

24 The staff is involved in a number of interagency and working  
25 groups with the government and industry to try to look at the overall supply  
26 chain challenge and understand where the U.S. Government is going as a

1 whole, led by CISA.

2 And we'll continue to engage with that and make sure we  
3 understand how that fits into the overall regulatory process.

4 FERC CHAIRMAN GLICK: Thank you, I appreciate it.  
5 Commissioner Danly, do you have any questions?

6 FERC COMMISSIONER DANLY: No, thank you, Mr.  
7 Chairman, I appreciate it.

8 FERC CHAIRMAN GLICK: Thank you. Commissioner  
9 Clements?

10 FERC COMMISSIONER CLEMENTS: Thanks Chairman  
11 Glick. Mr. Beardsley, I have two questions for you. It's also related to my  
12 frame of reference using NERC as the process by which we develop these  
13 standards.

14 What is the interaction like with industry and when the NRC  
15 is coming up cybersecurity regulations? Is it more just of a standard  
16 rulemaking process?

17 And then my second question is you mentioned that some  
18 of these rules get incorporated by condition of license and I'm wondering if  
19 there are other enforcement mechanisms for NRC's cybersecurity?

20 MR. BEARDSLEY: Good question.

21 The cybersecurity rule that went into place in 2009 is a  
22 high-level performance-based rule and the implementation of that rule has  
23 been done through a series of guidance documents that are developed by the  
24 staff and industry.

25 Those guidance documents provide a structure for a  
26 cybersecurity plan that the licensees submit to the staff, the staff reviews and

1 approves, and they become a condition of their license.

2 So, when we inspect the licensees, we inspect them against  
3 the rule and their cybersecurity plan and we can cite both as we conduct our  
4 inspections if we find a violation.

5 As we move forward and look at changes to the program,  
6 the regulations require them to submit changes to their cybersecurity plans to  
7 the staff for review and approval. So, that's one method we have to  
8 understand any changes they want to make or evolutions to the plan as they  
9 go.

10 When it comes to guidance, the staff and industry work  
11 closely together as the guidance is developed and changed so that we  
12 understand the changes industry is interested in making.

13 We make sure that it's within the bounds of their license and  
14 there's no surprises when we come and do inspections.

15 As I noted earlier, we're going to be inspecting every nuclear  
16 power plant every two years and so there's ample opportunity for us to review  
17 what they're doing and making sure they're still in compliance.

18 FERC COMMISSIONER CLEMENTS: Thank you.

19 FERC CHAIRMAN GLICK: Thanks, Commissioner  
20 Clements. Commissioner Christie?

21 FERC COMMISSIONER CHRISTIE: No questions.  
22 Thank you.

23 FERC CHAIRMAN GLICK: Thanks, Commissioner  
24 Christie. And Commissioner Phillips?

25 FERC COMMISSIONER PHILLIPS: Thank you Chair. I  
26 just want to note that with the foundation that we have in the electric industry

1 with NERC and all of the protocols, I can tell you from personal experience  
2 that the cyber audits that we do in the industry, they are robust, I think they're  
3 necessary.

4 So, I think we do have a great foundation. I also just want to  
5 note and echo the comments of the Chair that with what's happening in the  
6 world, we cannot underestimate the ability of our adversaries.

7 I believe the threats, as we've all noted, they continue to  
8 change, they continue to emerge and I think it is critical that we do all that we  
9 can as regulators to make sure that our focus is under the umbrella of overall  
10 reliability.

11 So, I just wanted to make that comment.

12 FERC CHAIRMAN GLICK: Thank you, Commissioner  
13 Phillips. Chair Hanson?

14 NRC CHAIRMAN HANSON: Thanks, Chairman Glick.  
15 Commissioner Baran?

16 NRC COMMISSIONER BARAN: Thanks. I'll be brief.  
17 I'm interested in hearing a little bit. Obviously, there are multiple CIP  
18 standards you went through and it's evolved over the years that is the process,  
19 the back and forth between NERC and FERC.

20 I'm just interested in hearing a little bit about whether the  
21 FERC staff thinks there are any aspects currently of the CIP standards that  
22 need to be strengthened and if so, can you talk a little bit about those at a high  
23 level?

24 MR. KUEHNLE: Sure, so I had mentioned the high,  
25 medium, low aspect of it and where high obviously would have the greatest  
26 security controls wrapped around it and low would have the least.

1                   Low-impact in my opinion from an attacker's perspective is  
2 the target of choice because the fact that those controls are minimal, that  
3 would be their avenue into the environment.

4                   And from there they can take their time and they can move  
5 laterally into a system that has more security controls such as medium or high  
6 because inherently, whenever you have a system that is connected, you have  
7 to trust that connectivity at some level.

8                   Even though they are high, medium, and low ratings, there  
9 must be some type of trust. An adversary knows that trust exists so they can  
10 take advantage of that trust between the low and medium or the low and high  
11 and potentially move into those systems and compromise it from that  
12 perspective.

13                  Obviously, I'm speaking for myself as a cybersecurity  
14 professional, it's probably one of my biggest concerns.

15                  Especially if you were to be able to compromise a number  
16 of low-impact, just by economies of scale, the more systems you take down  
17 that are low, the greater the impact would be to the grid as a whole of that  
18 reliability.

19                  So, that's a concern of mine and a number of my  
20 cybersecurity colleagues within the division share that same concern.  
21 Another one which the Chairman brought up was supply chain.

22                  When I was with the Department of Defense, supply chain  
23 was always a big concern because it gives the adversary the ability to actually  
24 leapfrog any type of security controls that you have around that perimeter.

25                  No matter how strong it is, you're basically jumping the gate  
26 and getting inside, and then you're giving yourself that opportunity to get out.

1 So, we need to continue to remind ourselves that's a pathway in and look at  
2 supply chain.

3 And just continue to look at the current threats and the  
4 technology that's out there and just examine that and look to see what gaps  
5 may exist within the CIP standards. Thank you.

6 NRC COMMISSIONER BARAN: Thank you very much.  
7 Thanks, Chairman.

8 NRC CHAIRMAN HANSON: Thank you, Commissioner  
9 Baran. Commissioner Wright?

10 NRC COMMISSIONER WRIGHT: Thank you, Mr.  
11 Chairman. Mr. Kuehnle, thank you so much for your presentation. As  
12 you've outlined on these lessons learned from 2021, we need to have  
13 everything updated.

14 It's critical that the policies and procedure are up to date,  
15 they're accurate, they're implemented as documented.

16 So, I really appreciate your focus on that today. Having  
17 said that, what do you think the most challenging lessons learned for the  
18 infrastructure community to adopt is?

19 What do you think it is?

20 MR. KUEHNLE: Oh, my goodness.

21 I think one of the most challenging things within the industry  
22 right now, and it's not even in the lessons learned, it's inherently in there just  
23 because we are having these issues with things that would maybe seem  
24 simplistic like making sure you update your policies. And that's staffing.

25 And it's so difficult to find qualified staffing and be fully  
26 staffed within this cyber environment. And I'm sure the NRC folks that go out

1 and perform their inspections, they're running into the same problem.

2 So, that I see as probably the biggest problem that allows  
3 these issues to build, is the staff. From a technical perspective, it's just being  
4 able to manage these systems.

5 These systems are so complex and there's so many legacy  
6 devices that are in there that it's not easy to just say, all right, I want to replace  
7 something or I want to patch something. It's more complex than that and  
8 that's a huge challenge within the industry as well.

9 You just can't fix something overnight, it takes a long time to  
10 evaluate it and test it and ensure that it doesn't affect the system at all. And  
11 that's from a technical perspective.

12 And then from a policy perspective or documentation  
13 perspective, there's just the volumes of that documentation. Because of the  
14 fact that you're understaffed potentially, those are the last things that always  
15 get done, is documentation.

16 So, that would be the order.

17 NRC COMMISSIONER WRIGHT: Thank you. Has  
18 COVID-19 added challenges to the lessons learned being implemented?

19 MR. KUEHNLE: I haven't seen that.

20 In fact, I think if anything some of the folks that I've spoken  
21 to, it actually helped a little bit because what it did is people that are now  
22 working for home more, they're spending more time working because they  
23 don't have that commute.

24 So, they're actually able to focus on maybe addressing  
25 some gaps in documentation or policy and are able to review things. So, the  
26 short answer would be I haven't seen it, the long answer would be I think it



1 may actually have helped in some ways, if that makes sense.

2 NRC COMMISSIONER WRIGHT: It actually does, thank  
3 you. Intuitively, I would agree with you I think, and my last question for you,  
4 and this is just your opinion, do you have any particular concern with the  
5 cybersecurity measures in place at nuclear facilities, be they power plants or  
6 fuel cycle facilities?

7 MR. KUEHNLE: I don't know them very well, but I work  
8 with Jim and his team enough to understand that, one, their team does a really  
9 good job, I'm really impressed with their work.

10 And two, the guidelines they have, or their standards they  
11 have in place, are very robust.

12 And when we were talking about that balance of plant, as  
13 Jim mentioned in his presentation, where our teams got together, we actually  
14 were a little envious of some of the controls that you folks have implemented  
15 and we were hoping that we could actually maybe get to that point someday,  
16 especially for the low-impact.

17 NRC COMMISSIONER WRIGHT: Thank you for that  
18 comment, that'll make Jim feel good, so thank you. Mr. Chairman, back to  
19 you.

20 NRC CHAIRMAN HANSON: Thanks, Chairman Wright.  
21 Mr. Kuehnle, I really appreciated the briefing on the 2021 audit report and I  
22 know you touched on this a little bit.

23 But could you just give us a snapshot of what you see as to  
24 the trends and are there particular themes or similarities in incidents that have  
25 cropped up through the audit process over, say, the last four or five years that  
26 you all have been doing this?

1 MR. KUEHNLE: If I could ask for a little clarifying for the  
2 question. Are you asking from an audit perspective, the violation trends, or  
3 are you asking from a cybersecurity technology perspective?

4 NRC CHAIRMAN HANSON: That's a good question. I  
5 think I would say probably both. If you could touch on those in succession,  
6 that might be great.

7 MR. KUEHNLE: I'll focus on the policy side. Compliance  
8 is hard and again, I'm sure that when you folks do your inspections you  
9 recognize that as well.

10 There's volumes and volumes of documentation and it's  
11 hard to do, on top of the technical aspect of actually implementing the security  
12 controls.

13 So, the trend I see is the systems actually become more  
14 complex, and they really are becoming more complex because I don't know  
15 anyone who says I don't care about good cybersecurity.

16 Everyone is really concerned about implementing and doing  
17 the best cybersecurity they can, they just might not be able to for whatever  
18 reason; resources, both staffing and money, whatever that reason may be.

19 And because of that fact, it goes back to that staffing issue  
20 that I talked about where the documentation is the last thing they end up doing.  
21 Engineers typically, and I'm speaking for myself because I'm an engineer, I'd  
22 rather do the work than document the work.

23 I think a lot of folks just by nature that's what they like doing.  
24 So, because of that history of how to maintain that system, that documentation  
25 is getting lost.

26 And especially with the churn rate within this environment,

1 that documentation is key to understanding so when someone comes in, they  
2 can look up and they can pick up that piece of paper and they say, okay, this  
3 is why they did this or this is what needs to be done for the future.

4 So, that's from a policy perspective. From a technical  
5 perspective, because these attacks have been sophisticated for years but I  
6 think that the robustness of the detection tools that we have are so much better  
7 now, and maybe people are even more aware of it now.

8 They're able to start detecting these things like Solar Winds  
9 and some of these other high-profile attacks that may have been in the  
10 systems for years that maybe were being overlooked before but now are being  
11 detected.

12 And now that people are more aware they actually exist,  
13 because of that, you have to implement actually more infrastructure or some  
14 other type of security tools in order to make sure that you're not being  
15 compromised by a supply chain attack or some type of very sophisticated  
16 attack.

17 Which builds on the problem of not having enough staff.  
18 So, just the complexity of the technology that's out there is problematic, if that  
19 makes sense.

20 NRC CHAIRMAN HANSON: That's very, very helpful and  
21 I really appreciate that perspective. That brings us to the end of our time  
22 together this morning. I want to thank my colleagues on the NRC and all the  
23 presenters.

24 I want to thank Chairman Glick and all the Commissioners  
25 at the Federal Energy Regulatory Commission as well as Mr. Gugel from the  
26 North American Energy Reliability Corporation.

1 I'm thankful that we had the opportunity to meet today, I'm  
2 glad we're getting back to this after a couple-year hiatus. I understand we  
3 used to do this in person and have a closed session and eat lunch and do all  
4 the things.

5 I'm hoping next year that conditions permit us to get back to  
6 that in-person-type event.

7 I'm really heartened, I think by the presentations this  
8 morning that really emphasize to me the strong level of cooperation and the  
9 strong relationships that our agencies have at the staff level.

10 I'm glad we have this opportunity to connect at an executive  
11 level. With that, I'll ask Chairman Glick if he's got any closing remarks he'd  
12 like to make?

13 FERC CHAIRMAN GLICK: Thank you very much,  
14 Chairman Hanson. I just want to thank you and Commissioner Baran and  
15 Commissioner Wright for hosting us, and I agree with you, hopefully the next  
16 time we'll be able to do this in person and have a deeper discussion on some  
17 of these very important issues.

18 But I also really wanted to thank the staff, both for FERC  
19 and the NRC. I know from a FERC perspective, we have just tremendous  
20 staff that are incredibly dedicated, very bright, help us on a daily basis deal  
21 with some very complex matters.

22 And I suspect that it's the same for the NRC, so I just want  
23 to thank you all for giving excellent presentations and the really helpful  
24 discussions that we had this morning.

25 NRC CHAIRMAN HANSON: I absolutely agree, thank you.  
26 Thank you, everyone, and with that, we are adjourned.

1 (Whereupon, the above-entitled matter went off the record  
2 at 11:57 a.m.)  
3