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Quadrennial Energy Review Public Meeting # 5 07-11-2014

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QUADRENNIAL ENERGY REVIEW

PUBLIC MEETING #5:

Electricity Transmission,
Storage and Distribution - West

Friday, July 11, 2014

Portland, Oregon

Lewis & Clark College

0615 SW Palatine Hill Road

Portland, OR 97218

Reported by: Valori Weber,
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1 A P P E A R A N C E S

2 Daniel Poneman, U.S. Deputy Secretary of Energy

3 James Robb, CEO, Western Electric Coordinating
4 Council

5 Steve Berberich, CEO, California ISO

6 Patrick Reiten, President and CEO, Pacific Power

7 Elliott Mainzer, Administrator & CEO,
8 Bonneville Power Administration

9 Carl Zichella, Director of Western Renewable
10 Transmission, Natural Resources Defense Council

11 Joel Bladow, Senior Vice President, Tri-State
12 Generation & Transmission Association

13 John Savage, Commissioner, Oregon PUC and Chair,
14 Committee on Regional Electric Power Coordination,
15 Western Interstate Energy Board

16 Jim Piro, President and CEO, Portland General
17 Electric

18 Patricia K. Vincent-Collawn, Chairman,
19 CEO & President, PNM Resources Inc. and Co-Chair,
20 CEO Policy Committee on Energy Delivery,
21 Edison Electric Institute

22 Ronald L. Litzinger, President,
Southern California Edison

Jorge Carrasco, General Manager & CEO,
Seattle City Light

Dave Markham, President & CEO,
Central (OR) Electric Cooperative

21 Haresh Kamath, Program Manager, Energy Storage,
22 Electric Power Research Institute

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

2 Carla Peterman, Commissioner,
California Public Utility Commission

3
4 Geisha Williams, Executive Vice President for
Electric
Operations, Pacific Gas & Electric

5
6 Arlen Orchard, General Manager and CEO,
Chief Executive Officer,
Sacramento Municipal Utility District

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8 Steve Klein, CEO, Snohomish County (WA)
Public Utility District

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

2 MODERATOR KELLEY: We'll go ahead and
3 get started.

4 Well, good morning. I would like to
5 welcome those of you in the room to the
6 Quadrennial Energy Review public meeting in
7 Portland, Oregon here at the beautiful campus of
8 Lewis & Clark College. I'd also like to welcome
9 those of you who are joining us via live stream on
10 the web.

11 My name is Chris Kelley. I'm with
12 Energetics. We are a support contractor providing
13 support to the Department of Energy on this QER
14 effort. I have the distinct honor of being
15 today's facilitator. We're going to be hearing
16 from a number of speakers today, three different
17 panelists, but before we get started, I'd like to
18 share with you a few housekeeping notes.

19 The QER Task Force welcomes comments
20 from the public. If you'd like to make a comment
21 and have not yet signed up, please do so at the
22 front desk. And for those of you who are joining

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1 via live streaming, you can email your comments to
2 QERcomments@hq.doe.gov.

3 We have an outstanding set of speakers
4 today. Their comments and presentations can be
5 found after today's session at www.energy.gov/quer.

6 So before we get started, I have to read
7 a short statement about the purpose of today's
8 meeting.

9 Pursuant to the Federal Advisory
10 Committee Act, the purpose of today's meeting is
11 to ask for your individual input or your
12 organization's input regarding electricity
13 transmission storage and distribution with a
14 particular focus on the Western United States and
15 provide a forum to exchange information.

16 To that end, it would be most helpful to
17 us for you to provide these recommendations and
18 information based on your personal experience,
19 your individual advice, information, or facts
20 regarding this topic. The object of the session
21 is not to obtain any group position or consensus;
22 rather, the U.S. Department of Energy is seeking

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1 as many recommendations as possible from all
2 individuals at this meeting.

3 So with that, allow me to introduce Dr.
4 Karen Wayland, Deputy Director for state, local,
5 and tribal cooperation and for stakeholder
6 engagement at the Office of Energy Policy and
7 Systems Analysis at DOE. Dr. Wayland will
8 introduce our next speaker.

9 DR. WAYLAND: Thank you, Chris, and
10 thank you all for coming. This is a very
11 important part of the Quadrennial Energy Review
12 and the fact that Presidential Memorandum spends
13 quite a bit of time directing us to engage in a
14 significant and robust stakeholder engagement, of
15 which this is one of 16 meetings that we're doing
16 around the country, so I appreciate we have a very
17 high level of caliber of speakers and I'm very
18 excited to hear what they have to say. We learn
19 something new at every one of these meetings, so
20 it's quite exciting to be here.

21 And it's a privilege for me to introduce
22 Deputy Secretary for Energy, Daniel Poneman, who

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1 will be concluding the longest run as Deputy
2 Secretary in the history of DOE, which is a feat
3 that we attribute to his Iron Man training, and
4 he'll be finishing with us in September.

5 He told me not to read a standard bio,
6 so I'm not going to, but I did a little research
7 and I found an article in New York Magazine about
8 one of his four rock and roll bands that's called
9 Coalition of the Willing. And, it described the
10 Deputy Secretary as "having a glittering lightning
11 bolt on his guitar strap and office-neat hair."

12 In fact, in one of his recent meetings
13 at BPA, he ended a jam session, but I don't know
14 if we'll get any of that today. He's also the guy
15 you'd most want to be on your trivia team, having
16 won \$10,000 in Jeopardy in 1990.

17 But in all seriousness, sir, you are
18 going to leave a huge hole at DOE, and your bio is
19 not something's that's boring and should be
20 glossed over. Since you're going back to academic
21 oblivion, I'm going to just give some points about
22 your career.

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1 He'll be leaving us to go to Harvard,
2 where he got a degree, as well as at Oxford. He's
3 the author of three books, one of which received a
4 distinguished writing award. He was Special
5 Assistant to the President, Senior Director at the
6 White House National Security Council, chief U.S.
7 negotiator in talks with France, Russia, and Iran
8 over Iran's nuclear enrichment program.

9 DOE is losing a very dedicated public
10 servant who has a quite accomplished career. He
11 helps steer the Government response with a steady
12 hand through the Fukushima disaster in Japan,
13 Super Storm Sandy here in the United States. He
14 helped oversee the Department's massive and
15 historic new investments in the development and
16 deployment of clean energy technologies, both here
17 and around the world.

18 So it's a great pleasure for me to
19 introduce Deputy Secretary of Energy, Daniel
20 Poneman.

21 DEPUTY SECRETARY PONEMAN: Thank you,
22 Karen. I guess I'd better go out and clean up

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1 Google or something. I didn't know it had all
2 that stuff out there, but I still have that
3 lightning bolt, by the way.

4 And what you didn't hear from Karen is
5 that that jam session included Elliot Mainzer's
6 mean saxophone playing on Junior Walker & the All
7 Stars and other kinds of songs.

8 But, look, first of all, it's great to
9 be back in Portland. It's such a critical part of
10 our energy infrastructure. And I want to put this
11 in a little broader context, and I don't want to
12 talk long because as I always tell my kids, I
13 can't talk and listen at the same time. And as
14 you just heard from Karen, this is really about us
15 hearing from you what the issues are, what your
16 insights are, and how that can inform this QER.
17 But let me just talk a little bit about the QER,
18 its genesis, where it comes from and how this all
19 fits together.

20 It was really just about a year ago
21 today, and a sweltering day, you couldn't have
22 sort of scripted better just when you think about

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1 the overall dramatic challenges that we face in
2 terms of climate change, President Obama went to
3 Georgetown University and laid out an ambitious
4 Climate Action Plan. It's really a call to
5 action. It's facing the reality that we are
6 courting disaster potentially if we don't get our
7 arms around the critical moral, environmental,
8 technical, and political challenge of climate
9 change.

10 And in presenting this, he presented
11 three pillars. The first pillar of it was
12 mitigation. It is absolutely essential that we
13 continue the strong efforts that we have begun so
14 far to bring more renewable and clean sources of
15 energy to the floor. The President has challenged
16 us to come up with a doubling of wind and solar
17 and storage resource and we did so from 2008 to
18 2012. In the Climate Action Plan, he called on us
19 to double it yet again by 2020. He called upon us
20 to double down and improve our energy efficiency
21 by 50 percent by 2030.

22 And just yesterday, I had the privilege

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1 to go down and meet with some of your colleagues
2 and other people down at Lawrence Berkeley
3 National Laboratory where they're opening a first-
4 of-a-kind, a one-of-a-kind facility, the FLEXLAB,
5 which will now have the opportunity to integrate
6 multiple systems, HVAC systems, window systems,
7 different plug loads, all very finely censored so
8 that people can know as you're building and as
9 they're retrofitting buildings what precisely the
10 energy efficiency savings are going to be and they
11 can plan accordingly.

12 The President built into the Climate
13 Action Plan a second pillar, an essential pillar
14 on adaptation, because as everyone here knows, we
15 are already suffering the effects of climate
16 change. The drought in California, Governor Brown
17 has declared a state of emergency because of the
18 threat posed to the systems down there.

19 Obviously, we all suffered through and
20 watched the response to Hurricane Sandy, over 8
21 million customers out of power. And I have to
22 note that the West Coast stepped up to the plate

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1 in a very big way. And I see our friends from
2 PG&E are here. We were on the phone with Tony
3 earlier. We were on the phone with Ted Craver,
4 and we were on the phone with our BPA colleagues
5 at the time. And everyone provided bucket trucks;
6 they provided linemen; they provided trimmers, and
7 it really was an inspiring sight.

8 But it shows that you are going to have
9 local and dramatic climatic effects, but it's
10 going to require a national response because we're
11 all in this together, whether it's the drought in
12 the Southwest, the storms in the Northeast, and
13 every part of the country has been inflicted.

14 You know, we had the propane shortages
15 in the upper Midwest. And so it's going to be
16 critical that we understand how all of these
17 systems fit together. And that is really the
18 essential reason for this Quadrennial Energy
19 Review.

20 A few years ago, the President's Council
21 on Advisors on Science and Technology, which is
22 led by the President's Science Advisor, John

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1 Holdren, and at that time included a very
2 thoughtful energy expert on it, Professor Ernest
3 Moniz, came up with a concept that really -- it's
4 not a novel concept when you talk about a
5 Quadrennial Review.

6 The Pentagon has been doing Quadrennial
7 Reviews for a number of years, and it's based on a
8 very simple premise. When you have a major
9 problem with extraordinary complexity that's going
10 to require marshalling of resources, it's going to
11 require many different stakeholders to understand,
12 come up with solutions and execute those over a
13 long and sustained period, it will not due to just
14 kind of gloss along from year to the other.
15 You've got to stop. You've got to take a long
16 over-the-horizon look. That's what the
17 Quadrennial Energy Review is all about. That's
18 what the President's Council on Advisors and
19 Science and Technology recommended, and that is
20 what President Obama put into the Climate Action
21 Plan that he announced in Georgetown last year.
22 Now, I want to be clear, this --

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1 although the Department of Energy, obviously, and
2 you know from Karen, that we're doing these 16
3 sessions, we are working very hard to support the
4 Quadrennial Energy Review. It is not a Department
5 of Energy review. It's mandated by the President.
6 It is co-chaired by the Domestic Policy Council
7 and the Office of Science and Technology policy in
8 the White House, Dr. Holdren and Dan Utech right
9 now. And we are involving all of the other
10 Federal agencies who are involved in energy. And
11 we are coming out here, and we're talking to the
12 communities, to the stakeholder, to the utilities,
13 to the RTO's, the ISO's. I promise never to get
14 into the alphabet soup, but you know who you are.
15 And it's critically important that we get the
16 input that you've got to offer.

17 Now, when it comes to energy, the
18 question, it is such a leviathan, it is such a
19 massive, complex, interactive situation for all
20 people. All Americans are affected. Frankly, all
21 citizens of the world are affected. Where do you
22 begin?

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1 We've got power generation issues.
2 We've got a vast number of new and interesting
3 opportunities and challenges presented by the
4 profound transformation that our energy economy
5 has been experiencing over the last 10, 15 years,
6 where the hydrocarbon production of this country
7 has just actually skyrocketed. We hit 8.4 million
8 barrels of oil production per day in the month of
9 May. We're now the leading natural gas producers
10 in the world. Our shale gas share of our national
11 economy has increased from 1 percent in 2000 to
12 over 40 percent today out of a 23, 24 trillion
13 cubic foot annual gas economy. So it's a profound
14 moment of change.

15 But we're starting with infrastructure.
16 And the reason why we're starting with
17 infrastructure is because that is where all of
18 these different systems come together. That is
19 where we need to really take a grid that is dated
20 in the 20th Century, and mid-20th
21 Century at that, and transform it to a
22 grid that is suitable to the challenges of the

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1 21st Century where we're moving from a system of
2 one-way transmission of electricity to a system in
3 which you have two-way communication flows from
4 the consumers back to the grid and from the
5 generators into the grid, electric vehicles that
6 will be putting charges into the grid and all of
7 the balancing challenges as you have:

8 increased distribution of distribution
9 generation, the new challenges that that presents
10 in terms of terra structures. This is an
11 incredibly complex and incredibly important and
12 incredibly burdensome issue for all of us because
13 we're talking about trillions of dollars of
14 investment that are going to be required in the
15 years to come, and we're talking about the deep
16 interstices that exist among energy systems.

17 Karen was talking in the introduction
18 about Hurricane Sandy. I'll tell you that one of
19 the first big insights that we had we was I think
20 many of us did not realize how deeply intertwined
21 the fuel side and the electric side were with one
22 another. In some -- the most production ways like

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1 getting diesel fuel into the trucks to repair the
2 lines and thousands of other connections besides.
3 We need to understand how all of these connections
4 work, and frankly, we need to understand where
5 they don't work.

6 And so it made sense that in this first
7 instance to take this huge energy challenge, break
8 it into constituent parts and start with that,
9 which is really essential to all systems: the
10 infrastructure, the transmission, the storage, the
11 delivery -- on the electric side, on the fuel
12 side, gas, and oil and refined products.

13 And so that's why we called you all
14 together here. We are very, very interested in
15 what you've got to say. And as Karen has told me
16 and as Melanie Kenderdine, who is spearheading our
17 efforts for Secretary Moniz inside the Department
18 of Energy tells me, every one of these sessions
19 has produced new insights, new understanding. And
20 this is the time when we are most plastic in terms
21 of taking all this data, shaping the thoughts that
22 are going to inform this review, and this review

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1 we hope will then inform the country because it
2 will be a national dialogue that's going to be at
3 the federal, state and local level.

4 Believe me, we understand that the
5 assets that are being talked about here are
6 largely in private hands. Two-thirds of the
7 assets are in private hands, and we have dealt
8 with that in a number of vectors. And we also
9 have to understand the interactions, not just
10 among the different energy forms, but between
11 energy and telecommunications and other systems of
12 transportation: trucks, railroads, barges. It's
13 an enormously complex system.

14 We'll learn a lot from this session here
15 today. We'll take it all down. I will bring it
16 back to our colleagues in Washington. We will
17 come back to you, and I'm going to be true -- I
18 hope to my word of not going on too long -- and
19 I'm going to stop there.

20 But before I sit down and listen and
21 take notes, I'd be happy to entertain any
22 questions from you. But the main thing I've got

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1 to say to you here today is we are very, very
2 grateful. We are deeply aware of the expertise
3 that's represented here in this room. And we want
4 to thank you very, very much for taking time out
5 of your very busy schedules to share this time
6 with us, to share your thoughts with us, and to
7 help us put together what we hope will be -- it
8 certainly will be a first of a kind, I think,
9 comprehensive look at energy that takes an over-
10 the- horizon look and one that I think will help
11 us create the kind of world that we want to leave
12 to our kids with the prosperity and the jobs that
13 come with a dynamic energy economy and also to
14 work on the future that we're all trying to build
15 to save the planet from what could be otherwise a
16 catastrophic climate change.

17 So thank you very much for being here
18 and I look forward to the discussion.

19 MODERATOR KELLEY: Thank you.

20 Any questions from the audience for
21 Deputy Secretary Poneman? If you have a question,
22 please stand up. Matt's got a microphone here,

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1 and he will bring it to you. Any questions?

2 Don't be shy.

3 DEPUTY SECRETARY PONEMAN: Didn't put
4 anyone to sleep I hope.

5 MODERATOR KELLEY: It's early, yeah.

6 We have a question over here.

7 MR. KAMATH: Hi. I'm Haresh Kamath from
8 Electric Power Research Institute. And so -- just
9 a general question on funding levels for the
10 Department of Energy in general for research,
11 especially in some of these same areas.

12 Given the current legislative climate,
13 it looks like there may not be the same level of
14 budgets that we had in the last few years,
15 obviously, in the post-recovery -- in the recovery
16 period for the same kind of investments in
17 demonstration projects and the like. How do you
18 see this playing out over the next few years, and
19 do you think that -- that it's likely to hold up
20 through the research that we're going to be doing?

21 DEPUTY SECRETARY PONEMAN: It's a great
22 -- it's a great question. I will tell you the

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1 sort of commonplace comment that we hear around
2 government, not just in energy, but among the
3 agencies is: "Flat is the new up."

4 And so in one of our early sessions of
5 the President's Management Council where we're
6 trying to bring in CEO's from private companies
7 and help bring some of those best practices and
8 disciplines to government, the watch word of one
9 of them was to try to do more faster with less.
10 And in some respects, we're trying to do that.

11 But look, actually, within the
12 parameters of that very constraining budget
13 environment, Department of Energy has not done
14 badly. We have very substantial resources, and
15 we're still the largest funder of the physical
16 sciences in the country on the order of \$5 billion
17 a year. We still have very important investments
18 taking place through our Energy Efficiency and
19 Renewable Energy Office. But I would say the
20 following.

21 We have, in the form of the Recovery
22 Act, a one-shot opportunity to take those

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1 resources, in the case of Department of Energy,
2 and there were \$35 billion, and try to do some
3 very important work with them. But it was work
4 that was consciously -- some of it was consciously
5 just to get people to work again. But some of it
6 was a down payment on things that we understood
7 would have to be taken up by the private sector.

8 For example, the Loan Guarantee Program.
9 We deployed capital that itself, our loan
10 guarantee capital of \$30 billion has leveraged
11 another \$50 billion of investment, and we have to
12 show for it the first five ever grid scale
13 affordable tariff projects in the country. We had
14 zero. The private sector then, having seen that
15 these are actually financeable deals, they're
16 backed up by long-term power purchasing
17 agreements, they've come in and financed the next
18 ten.

19 I have now seen that that model's
20 actually beginning to translate overseas. We have
21 one of -- right here in the Pacific Northwest and
22 I visited Caithness, one of the largest wind farms

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1 that's been developed with loan guarantee funds.

2 We have significant geothermal. We have
3 significant biomass refinery, and we have Ivanpah
4 and others, very major concentrated solar power,
5 concentrated solar thermal as well.

6 So one thing that we've done is try to
7 take those down payments from the Federal
8 Government, and then we're trying now to work with
9 companies and say, hey, now that we have developed
10 this class of now operating, in this case,
11 generating assets, can we somehow scale that kind
12 of investment and find ways to, for example,
13 standardize power purchasing contracts so that it
14 would be easier to secure ties for those loans?
15 Why? Because, when it comes to the deployment --
16 the increased deployment of renewable energy, it's
17 going to be very, very important to lower the cost
18 of capital, especially for things like wind and
19 solar where the commodity is free, effectively, as
20 long as the wind blows and the sun shines.

21 So that's the kind of thing we're trying
22 to do. And we had \$4.5 billion, of course, we've

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1 put through the Office of Electricity, bought a
2 lot of synchrophasors with that. And that in turn
3 has stimulated a lot of activity in the private
4 sector in terms of taking the data from that and
5 trying to help people improve.

6 Just the very modest investment that we
7 made yesterday, \$15.8 million in this FLEXLAB down
8 at Lawrence Berkeley Laboratory is already
9 collecting sponsorship. And you may hear from
10 Geisha Williams here later today about their work
11 down there to find ways to bring cheaper, better
12 energy solutions to the PG&E clientele and their
13 customer base. And once that's done and
14 demonstrated there, it becomes something that can
15 be replicated in Omaha, in Detroit, in places
16 right across the country.

17 So we're trying to be smart about the
18 investments that we place. There's still
19 significant resources. We are now in the second
20 round of Energy Frontier Research Centers. We're
21 still seeing, I think, good uptake on the grants
22 that have been given to ARPA-E where you're still

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1 having significant private investment follow for
2 every dollar that we've put into ARPA-E that goes
3 out. We're finding multiples of that coming back
4 in terms of private investment.

5 And so we're going to try to make the
6 strategic investments in some of the seminal
7 technologies, battery storage and so forth, in
8 some of the homes, and then try to do this in a
9 way that we fill a gap, one of the sort of, you
10 know, sort of a valley of death, for something
11 where we've got to go from something that is still
12 so far away from commercial realization that it's
13 not reasonable to expect private investors to take
14 that risk and bring them to a level of maturity
15 where it's less risky and therefore starts to
16 attract more private capital, because at the end
17 of the day, our job is not to displace private
18 capital but rather to capitalize it and bring much
19 more of it into the picture because we're going to
20 need vast, vast resources to make that kind of
21 investment work.

22 MODERATOR KELLEY: Thank you, great

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1 question.

2 We have time for one more. Any other
3 questions from the audience? No? All right.

4 Well, thank you, Deputy Secretary
5 Poneman.

6 (Applause.)

7 MODERATOR KELLEY: So at this time, I'd
8 like to ask our first panel to join me up on the
9 stage and we'll be getting some name cards set up.

10 And while we're setting up, I just want
11 to remind everyone, if you do have some comments
12 as Deputy Secretary Poneman mentioned, we're very
13 interested in hearing from the public. So please
14 do note on the sign-in sheet that you would like
15 to provide some commentary.

16 And for those of you who are joining via
17 live streaming, you can email your comments again
18 into QERcomments@hq.doe.gov.

19 (Panel 1 takes the stage.)

20 MODERATOR KELLEY: So while we're
21 getting settled in here, I'll just note that we
22 have a tremendous group of panelists here today.

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1 We've got CEO's, presidents, directors,
2 administrators from here in the Pacific Northwest
3 and from all over the West.

4 Our first panel has been asked to
5 address: "Transmission - Can We Build and Operate
6 the Appropriate Amount for Future Needs?" We'll
7 hear prepared statements from all of the speakers,
8 but I ask that you please hold your applause until
9 the end.

10 I'd also like to share with you that the
11 views expressed by panelists are their own views
12 and not the views of the U.S. Department of
13 Energy.

14 So our first panel includes Jim Robb,
15 CEO of the Western Electric Coordinating Council;
16 Steve Berberich, CEO of California ISO; Patrick
17 Reiten, President and CEO of Pacific Power;
18 Elliott Mainzer, Administrator & CEO of the
19 Bonneville Power Administration; Carl Zichella,
20 Director of Western Renewable Transmission,
21 Natural Resources Defense Council; Joel Bladow,
22 Senior Vice President of Tri- State Generation &

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1 Transmission Association; and John Savage,
2 Commissioner, Oregon PUC and Chair, Committee on
3 Regional Electric Power Coordination, Western
4 Interstate Energy Board.

5 And I think I covered everybody.

6 So we'll go ahead and get started with
7 Jim Robb, if you'd like to start us off with your
8 comments.

9 MR. ROBB: Sure.

10 MODERATOR KELLEY: I need to -- before
11 you do, just let me note to all the speakers that
12 these microphones are automatic. So, we are
13 listening.

14 MR. ROBB: Does that mean we don't have
15 to be close to them too? Can you hear me okay?
16 Okay, fine.

17 So, thanks, Chris.

18 I thought maybe what I would do since
19 I'm the first up would maybe just to -- kind of
20 set the table a little bit for the West.

21 Let me first explain who the Western
22 Electricity Coordinating Council is for those of

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1 who aren't familiar with us. We're the regional
2 entity responsible for compliance, monitoring,
3 enforcement of NERC reliability standards in the
4 West. We also do a substantial amount of
5 reliability assessment and planning activity for
6 the Western Interconnection.

7 We're unique in the West in that we're
8 the only entity that actually looks across the
9 entire Western Interconnection. So we have the 14
10 western states, BC, Alberta, as well as Baja,
11 California. That gives us a relatively unique lens
12 into the industry in the West.

13 In our planning activity, we execute
14 that through a stakeholder committee, which we
15 refer to as TEPPC, the Transmission Expansion
16 Planning Policy

17 Committee. And that group has produced
18 over the last three years two long-term
19 transmission plans, a ten- year plan, which is a
20 deterministic view of the industry that looks at
21 committed resources, committed transmission
22 projects, and seeks to the answer the question:

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1 will there be adequate generation and
2 deliverability to meet load under reasonable
3 scenarios?

4 And then we also do a 20-year, which is
5 a much more scenario-based view of the
6 Interconnection, looking at plausible resource
7 mixes and load mixes against a series of
8 internally consistent scenarios and seeks to the
9 answer the question, you know: can we build a
10 system that will remain policy compliant and meet
11 the resource needs of the region?

12 One thing I would say about WECC is that
13 we are an independent organization. We underwent
14 a fairly substantial restructuring earlier this
15 year.

16 We do not own, operate, develop, or
17 invest in transmission assets nor generation
18 assets. We do not compel anyone to build. We
19 look at the industry through the lens of electric
20 reliability and really are trying to answer the
21 question: will the bulk power system be there when
22 the region needs it?

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1 There are four, and I think important,
2 considerations as you think about the Western
3 Interconnection that's very different than the
4 East. And I think it's important to lay out for
5 the Department of Energy because from our view,
6 and from my view, a substantial amount of national
7 energy policy is heavily influenced by the
8 structure in the East. So let me just kind of lay
9 out a few things that are important to bear in
10 mind.

11 First of all, the Western
12 Interconnection does not have an organized -- a
13 uniformed organized market across the
14 Interconnection. We do have a well- functioning
15 market in California and in Alberta, but beyond
16 that, it's a series of traditional vertically
17 integrated utility markets.

18 There is a very active wholesale trading
19 market in the West and has been for some time.
20 But in general, planning, development, and so
21 forth of transmission and generation assets tends
22 to be done at the utility level, not at a regional

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1 level.

2 The second point is that the West is
3 extraordinarily diverse. You know, we have a
4 large number of IOU's, a substantial presence of
5 public power, two very large public power
6 marketing agencies, a number of rural co-ops
7 across the region that creates an extraordinary
8 diversity of interests and biases towards what's
9 important as it relates to energy, and I'm sure
10 you'll hear plenty of that from my colleagues on
11 the panel.

12 The West is also extraordinarily
13 politically diverse. I don't need to say anything
14 more than we have, you know, Utah and Arizona
15 sitting next to California, Oregon and Washington.
16 So the political ideologies and how people think
17 about the tradeoffs between economics and
18 environment are going to be very, very different
19 as you go across the West.

20 One other point I think it's important
21 to bear in mind about the West is that the Western
22 Region, much more so than the East, has grown up

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1 around resources. In the West, we generate power
2 for the resources and we wheel it to load. It's
3 very different than the East where the vast
4 majority of electricity comes from fuel, which is
5 transmitted to the load pocket and generated
6 locally. That gives us a transmission system
7 which can be characterized as having very, very
8 long lines, bringing resources from the Pacific
9 Northwest, from Wyoming-Montana Coal, from
10 Southwest Solar to load. So the importance of the
11 transmission system here is very, very different
12 and the stability of the system because the length
13 of the lines is different.

14 And the last point I would make before I
15 hand this over to Steve is that the fuel mix in
16 the West is extraordinarily dependent on weather.
17 Twenty- seven percent of the generation mix in the
18 West is hydro, wind, or solar. If you throw in
19 natural gas as a weather-dependent commodity,
20 which you have to in the West as we've had
21 interruptions in gas supply to power plants when
22 it's been cold, like 65 percent of our fuel is not

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1 secure in the typical sense of having a uranium
2 pile, a coal pile -- or uranium when it's coal
3 piled in front of a solid fuel plant.

4 With that, I'll pass it over to Steve.

5 MODERATOR KELLEY: Thanks, Jim.

6 Steve?

7 MR. BERBERICH: Thanks, Jim.

8 I'm Steve Berberich. I'm the CEO of the
9 California Independent System Operator. We're
10 responsible for the bulk power system reliability
11 as well as operating the markets in California.

12 I applaud the Department of Energy for
13 taking on this task. I know it's quite a task to
14 listen to all these various inputs. But what I'd
15 like to do is to kind of take an overall view from
16 California, which I think is a microcosm, perhaps,
17 of things to come for the rest of the country.

18 Certainly transmission spurs more
19 emotions than a number of things associated with
20 the NIMBY issues, the costs and siting issues, and
21 then obviously, we have to apply the reliability
22 and economics on them. And it's long been a

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1 challenging element for development now, but we
2 are in a position where we are going to have to
3 build new transmission to bring reliable power
4 into load centers.

5 In California, to set some stage here,
6 we spent approximately \$7 billion in the last
7 several years on transmission development, but
8 much of that has been to bring the renewables to
9 market.

10 And to give you some flavor of that, on
11 our 50,000 megawatt system, solar has grown from
12 1,000 megawatts about 18 months ago to about 4,700
13 megawatts today that we see on peak. Another
14 3,500 megawatts is coming in the next 18 months.
15 We now have wind of about 4,500 megawatts. And
16 some days we see total renewable energy of about
17 10,000 megawatts, almost a third of our system on
18 many a days now. So transmission has been
19 critical to welcoming those renewables on the
20 system.

21 In addition to that, San Onofre Nuclear
22 Plant in Southern California has really driven

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1 home the point of the need for speedy and agile
2 transmission development, words that aren't often
3 associated with transmission development. The
4 need to quickly respond and maintain renewable
5 power in such massive population centers in
6 Southern California was critical and the ability
7 to site and upgrade the transmission system in
8 short order was necessary to make sure we maintain
9 power down there. So speed and resilience is --
10 speed and agility is critical.

11 You know -- and with the caveat that we
12 need to modernize and invest in the system, a
13 couple of other thoughts.

14 First, the growth in consumer-produced
15 energy is clearly going to have be something that
16 we take into account. We see a number of
17 consumer-owned systems that are partially or fully
18 insulated from the grid. Many of them are
19 reluctant though to actually cut their power or
20 their link to the system.

21 But we have a question I think before us
22 now, the balance that we're going to have create

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1 is how can we build -- it's no longer how do we
2 build enough transmission, but how do we strike
3 the balance between avoiding transmission that
4 gets stranded and stranded assets in the face of
5 new grid models while we continue to build a grid
6 resiliency?

7 An example of that is I recently asked
8 our transmission planners to look at how the
9 system would operate with 20 percent distributed
10 generation on the system. That may seem a lot,
11 but I can tell you in San Diego, as an example,
12 they add 1,000 new rooftops of solar every month.
13 It's growing in exponential rate in Southern
14 California, obviously because it's very sunny down
15 there, and we're going to have to take that into
16 consideration in our transmission planning.

17 The loads are rising, renewables are
18 growing, the system is changing.

19 So we need to certainly be dedicated to
20 rebuilding our systems, but we also have to be
21 careful not to over-build our systems too. We're
22 going to have to take these new paradigms into

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1 account. Regionalism has got to be an important
2 factor -- a more important factor on that. We can
3 no longer operate 38 balancing authorities in the
4 West. It's not efficient. It's not effective.
5 It's not reliable. So we're going to have to take
6 that on as well. Most importantly, we need to
7 remain nimble.

8 And with that, I'll turn that over to
9 you, Mr. Reiten.

10 MODERATOR KELLEY: Thank you, Steve.
11 Patrick?

12 MR. REITEN: Great, thank you.

13 Secretary Poneman, really appreciate you
14 being here. You've assembled a wonderful group of
15 folks. I appreciate being asked to participate
16 along with them.

17 I'm Pat Reiten. I'm the President and
18 CEO of Pacific Power. We are the western
19 distribution part of PacifiCorp which serves 1.8
20 million customers across six western states.

21 I also have responsibility for the
22 systems operation and transmission system for

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1 PacifiCorp as a whole, that comprised of 16,000-
2 plus line miles. We're interconnected with 13
3 other balancing authorities. We touch some parts
4 of 10 western states.

5 And we're also an originating partner of
6 the recently FERC-approved energy and balance
7 market in partnership with the California ISO, and
8 so -- nice to have my partner in that, Steve, here
9 this morning.

10 As an integrated utility, we share a lot
11 of the issues you'll hear about from other
12 panelists, but obviously want to focus my remarks
13 on transmission.

14 Certainly, the Nation's bulk electric
15 transmission system is subject to changing
16 landscape and roles, and so I'd like to start
17 there.

18 As I mentioned, or as I should mention,
19 PacifiCorp is the largest subsidiary of Berkshire
20 Hathaway Energy. And we have a sister subsidiary
21 called MidAmerican Transmission. They are a
22 merchant independent transmission company

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1 established in 2011, run by my former transmission
2 VP John Cupparo, and established really as a
3 result of evolving markets and the way
4 transmission in some sectors of some parts of the
5 country is being constructed.

6 So speaking on behalf of the holding
7 company, I'd like to make a few points on their
8 behalf.

9 Incumbent transmission providers like
10 PacifiCorp will always have a significant role,
11 but we do expect independent transmission to have
12 a growing role in future transmission development
13 due to competitive processes that are in part a
14 result of FERC's Order 1000, and as vertically
15 integrated utilities seek complementary partners.
16 In a world where we have evolving regulation and
17 competition for scarce capital that may create
18 difficulties for integrated utilities, independent
19 companies do have the ability to provide flexible
20 financing and structure and ownership options, can
21 dedicate capital to longer term transmission
22 development cycles, and I think also can play a

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1 constructive role in regional planning processes.

2 It's worth noting that MidAmerican
3 Transmission has been most successful actually in
4 organized markets -- ERCOT, the California ISO,
5 SPP -- that have allowed for partnerships and
6 appropriate cost allocation.

7 Turning to transmissions siting and
8 permitting. Simply put, we need federal agencies
9 to truly work together to assure consistent
10 application of permitting requirements. And we
11 have a lot of experience permitting and now
12 building segments of our energy gateway
13 transmission project. We rolled that out in May
14 of '07, 2,000 new line miles, eight key segments.
15 We've actually constructed two of those and are
16 substantially under construction on the third.
17 We're 1.3 billion into a \$6 billion set of
18 projected investments.

19 The obvious lesson so far: federal
20 permitting has proven to be very time intensive.
21 We need clear communication requirements between
22 field and state and D.C. offices prior to the

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1 start of permitting processes.

2 Unlike the East, as is obvious, many of
3 the states we operate in are more than 50 percent
4 owned by the Federal Government. We deal with
5 multiple agencies across multiple states. Things
6 work best where we have a single agency as a lead
7 permitting agency, where we have a single project
8 coordinator on the Federal staff side, where we
9 have clear guidance from D.C. on the need, and
10 where we have strong interagency coordination.
11 You know, lack of those factors in some instances
12 have cost us years of delay on some of the
13 segments we've been involved in and has really
14 huge implication in terms of the ability to site
15 new renewables, use resource diversity to meet
16 load without siting new thermal plants closer to
17 load, and sometimes actually on reliability.

18 So while we're not looking to cut
19 corners, we know that siting has to adapt to
20 public need and the prospect for lengthy siting
21 delays, coupled with rapidly changing policy
22 landscapes, reduces the incentive for companies to

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1 commit capital to develop new critical
2 infrastructure for fear of stranding cost in the
3 middle of the process.

4 We have a good example: Hemingway to
5 Boardman, which is a project spanning Idaho and
6 Washington. We're now three years past the
7 initial draft EIS issuance, which is just the
8 first critical step in the NEPA process.

9 So the stakes are high. Lack of the
10 ability to site that and access the Mid-Columbia
11 market may require building new thermal plants
12 closer to load.

13 So, you know, just a final set of
14 thoughts. You know, as we deal with the evolving
15 policy landscape, Regional Haze, statement over
16 portfolio standards, 111(d), those will drive
17 changes in the generation portfolio. And we will
18 have to react to those from a transmission
19 perspective, both in terms of adding new
20 infrastructure investment to maintain grid
21 stability as well as new infrastructure in order
22 to deal with the intermittency of new renewable

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1 resources. And, you know, those -- that policy
2 agenda is changing very, very rapidly and so does
3 not accommodate a 7- to 10-year design, permit and
4 build schedule.

5 So, just in conclusion, you know, the
6 ability to be more nimble, to have clear guidance
7 from the D.C. side all the way down to the field
8 office is imperative if we're going to be able to
9 maintain voltage stability and a bulk electric
10 system that can accommodate the kind of challenges
11 I think you're talking about in this process.

12 So again, appreciate the opportunity to
13 be here and lend our thoughts.

14 MODERATOR KELLEY: Thank you, Pat.

15 Elliott, your five minutes.

16 MR. MAINZER: Yes. Good morning,
17 everybody. I also really appreciate the
18 opportunity to be here today.

19 Transmission has certainly been an
20 important topic in the Western United States for
21 the past decade. And I think we've made some
22 significant progress on multiple fronts. At BPA,

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1 we operate over 15,000 miles of high voltage
2 transmission lines and play an important role in
3 maintaining system reliability in the Pacific
4 Northwest. In recent years, through our
5 experience planning, financing and building
6 several new high voltage transmission lines and
7 integrating over 4,500 megawatts of wind into our
8 grid, I think we've learned a few lessons that I'd
9 like to share this morning.

10 Certainly, transmission investments are
11 very capital intensive, and they must be based on
12 a solid business case with clear cost recovery and
13 cost allocation mechanisms.

14 This means carefully understanding
15 current and future demand and identifying
16 creditworthy counterparties who can provide the
17 necessary financial security to bear the cost of
18 construction over the long term. Regulators and
19 policymakers who want to see the grid expanded can
20 certainly help support the necessary investments
21 by providing their utilities with appropriate cost
22 recovery assurances and mechanisms.

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1 At BPA, we're now in the process of
2 constructing two new 500 kV transmissions lines
3 from the Columbia and Snake Rivers and permitting
4 another in a very densely populated Interstate 5
5 corridor. The siting and permitting challenges are
6 enormous. I would say it's unequivocally the
7 responsibility of utilities to work closely with
8 affected communities, sovereigns and stakeholders
9 to ensure that new transmission facilities are
10 sited with minimal impact to local resources. But
11 we also need the same type of increased
12 coordination between federal, state and local
13 permitting organizations that Pat talked about in
14 order to build the necessary infrastructure to
15 maintain reliability and integrate new resources
16 in a timely and cost-effective fashion.

17 Now, the traditional transmission
18 planning paradigm has focused on building new
19 facilities. I think we've also found that non-
20 wires solutions can be equally important in
21 certain circumstances and the use of demand
22 response and distributed generation to manage grid

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1 congestion can also help to make best use of
2 existing transmission resources.

3 Entities such as NTTG, ColumbiaGrid and
4 WestConnect provide very valuable coordination
5 among and between the members to help plan the
6 grid on a one-utility basis. WECC also provides a
7 very important overall planning look at needs and
8 impacts across the entire Interconnection. I
9 think we definitely need to continue to improve
10 coordination among utilities, subregional entities
11 and WECC.

12 Back in 2002 at BPA, we had 175
13 megawatts of wind energy connected to our
14 transmission grid. Today we have 4,500 megawatts
15 and our partner utilities in other parts of the
16 West are experiencing similar growth in
17 renewables, especially solar.

18 So while providing zero-carbon energy to
19 the system, wind and other variable energy
20 resources increase the demand for system
21 flexibility. And whereas traditional resource
22 adequacy planning has focused on capacity and

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1 energy, that third dimension of flexibility is now
2 equally important to overall system reliability.

3 Like other parts of the West, utilities in the
4 Northwest must now ensure that their new capacity
5 resources can also operate flexibly in tandem with
6 variable energy resources.

7 Operation of coordination among
8 utilities is as important today as it has been in
9 the past. Coordinated balancing authority
10 operations can help spread volatility over a wider
11 system footprint, which can help reduce the
12 overall demand for system flexibility and make
13 best use of existing resources.

14 At BPA we've been working with our
15 colleagues at PacifiCorp and the California ISO to
16 help them implement their new energy imbalance
17 market while also ensuring that there are not
18 negative operational or economic impacts on
19 Northwest customers.

20 I think we're learning quite a bit
21 through this partnership and hope to apply these
22 learnings to our work on market design through the

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1 Northwest PowerPool. Building on the legacy of
2 regional coordination that goes back to the
3 1940's, we're developing new reliability tools and
4 exploring a potential sub-hourly market within the
5 Pacific Northwest that will address longstanding
6 concerns about governance and local decision-
7 making.

8 A couple last points. Real-time
9 situational awareness is another critical
10 requirement for today's transmission system.
11 Working with our colleagues at DOE and other
12 partners in the West, BPA has installed the
13 largest network of synchrophasors in the country,
14 giving us much-enhanced ability to anticipate and
15 respond to grid disturbances.

16 We're also working closely with the
17 West's new Reliability Coordinator to develop new
18 tools to forecast and respond to actual flows
19 across the Northwest's transmission system.

20 I think it's for certain that technology
21 innovation will be an important driver as we
22 continue to modernize the transmission system.

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1 BPA is part of the \$178 million DOE-funded Pacific
2 Northwest Smart Grid Demonstration Project.
3 Through this collaborative effort, we've been
4 testing distributed generation, storage and demand
5 response technologies with the potential to
6 increase transmission system reliability,
7 integrate renewables and lower costs for
8 customers. And BPA's own \$17 million a year
9 Technology Innovation Program has also discovered
10 breakthrough technologies in voltage stability and
11 demand response.

12 So I think the western United States
13 certainly faces significant opportunities and
14 challenges in designing the future of its
15 transmission system. At BPA, we're certainly
16 pleased to be working with our colleagues at both
17 the regional and subregional level to further
18 enhance the reliability, flexibility and technical
19 sophistication of our transmission system.

20 Thank you very much. Good to see
21 everybody.

22 MODERATOR KELLEY: Thank you, Elliott.

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1 Next we have Carl.

2 MR. ZICHELLA: Thank you. Before we
3 started, we were sort of joking that we could
4 shuffle each other's presentations around, and
5 certainly a lot of what I was intending to say has
6 been said, so I'm trying not to be too repetitive.
7 In fact, Elliott's presentation, a lot of it, I
8 can just go, "What he said," because it's right on
9 the money.

10 The electrical system is undergoing
11 historic change. We haven't seen anything like it
12 in many decades. The changing resource mixes is
13 occurring very rapidly, a combination of things,
14 including lowering resource costs for renewables,
15 and gas I might add, but also this new
16 characteristics of operating system that has a lot
17 more variable generation in it.

18 The very changes that we have to make to
19 incorporate this clean energy to deal with the
20 climate change issues that Secretary Poneman so
21 articulately set forth are the very changes we
22 need to make the system more reliable. So there's

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1 a really -- a good payoff here as we get more
2 flexibility in our system, as it can operate more
3 quickly, as we can schedule and dispatch power
4 much more quickly, as we coordinate and
5 consolidate between and among our balancing area
6 authorities in the West. That's all good news for
7 reliability as well.

8 The very situational awareness we need
9 to integrate renewable energy resources is the
10 same situational awareness we need to help bring
11 the system back when there are disruptions and to
12 avoid disruptions in the first place.

13 Flexibility, resilience, and security
14 are the most critical needs for the system going
15 forward. More consolidated, better coordinated
16 systems, a less vulnerable system. I think we'll
17 hear more about that in other workshops. I won't
18 go into that too much here. But the whole cyber
19 security and physical security questions
20 confronting the grid are also important.

21 I think the key environmental
22 perspective I'd like to bring to this, it does

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1 echo some of the things we've already heard -- but
2 really revolve around efficiently using the system
3 we have, building what we need and not building
4 what we don't need. Looking at the non-wires
5 alternatives that Elliott was just talking about
6 is a key component of that.

7 But in order to really understand what
8 it is that we need and what we don't need, I think
9 we have to answer a few simple questions.

10 The first is, how do new investments
11 reduce greenhouse gas emissions? This is the
12 unavailable reality, the inconvenient truth that
13 we're all confronted with right now. Future
14 generations will continue to endure the
15 consequences of the actions we take today. It is
16 one of the key drivers. Polling across this
17 country have shown people are extremely concerned
18 about that.

19 And that leads to the second question,
20 of what we -- what we build is -- and how we
21 modernize the system is: what does the 21st
22 Century consumer want? Of course, they want

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1 reliable service at a reasonable cost, but they
2 also want a system that's clean. In the polling
3 that we've seen across the country, and actually
4 in a poll released yesterday about the Pacific
5 Northwest, indicates strong majorities into the
6 70th percentile really supporting strong, clean
7 action on climate change.

8 So I think we're seeing, and people are
9 voting with their wallets in large parts of the
10 West as they integrate renewable energy onto their
11 own homes and businesses in record amounts, as
12 Steve Berberich indicated, that that's clearly a
13 key preference.

14 So there's transactional relationship
15 between consumers and the utilities. It's a new
16 development. It does influence the grid that we
17 have on the distribution grid. And the line
18 between the distribution system and the bulk
19 electricity system is blurring. How we control
20 the distribution grid will influence how we
21 operate the bulk electricity grid in the future.
22 Some posit that the bulk grid may once -- one time

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1 become a backup system for the distribution grid.
2 I believe that because of the climate challenge,
3 we're always going to need a very robust bulk
4 electricity system. Our best renewable energy
5 resources are not close to communities. We have
6 an unparalleled richness of renewable energy
7 resources across the West.

8 So taking advantage of those will
9 require a well-thought through, planned bulk
10 electricity system. That means justifying those
11 decisions of what to build very clearly and
12 relying on and expressing how we've considered
13 non-wires alternatives as is required by FERC
14 Order 1000, but, as Elliott mentioned, is part of
15 the business plan for how you set the case for
16 your new transmission.

17 I think, clearly, the footprint of new
18 resources and minimizing that will help enhance
19 the acceptability of it to most consumers and the
20 stakeholders who are affected by those resources,
21 so it's going to be important to make the case.

22 And Bonneville over the years, by paying

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1 attention to non-wires alternatives, as Elliott
2 mentioned, have been able to build transmission in
3 some tough places. And I think that's a lesson
4 the rest of us can observe about how to make that
5 case.

6 So build what we need; don't build what
7 we don't need. Let's use resource zoning for
8 resources to help optimize the locations of
9 transmission. That's something we haven't done
10 yet. It's a big gap in how we approach the
11 overall system.

12 Steve Berberich mentioned how balkanized
13 the system has become in the West with 38
14 balancing area authorities. It makes it difficult
15 to look about where you would look at locating
16 resources so that wind power in one part of the
17 region supports and compliments wind power in
18 another, and similarly, you have more geographic
19 diversity and less interruptions in solar
20 resources when you may have clouds passing over
21 part of the system and another part of the system
22 is operating even in a surplus capacity.

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1 So I'll stop there. I think a lot of
2 what I intended to say, my predecessors have
3 already said. The grid's got to be faster. It's
4 got to be more flexible and resilient. It's going
5 to be accommodating a much more diverse fuel
6 generation stack. It's going to be much more
7 renewable.

8 And it's supported by the public.
9 That's the good news. This transition, people
10 want it, and it is actually happening. A lot is
11 occurring. A coordination of federal agencies and
12 state agencies, and even local authorities --
13 because some of the western states, siting is done
14 by counties, as in Colorado, for example.

15 This level of coordination is something
16 we really have to continue to focus on. We're not
17 standing still on it. The Administration has set
18 up the Rapid Response Team for Transmission to try
19 to focus on ways to facilitate that coordination.

20 Frankly, we have a lot more to do in
21 that space. They are the correct first steps.
22 But I think as other panelists have mentioned, we

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1 don't get to the finish line on the right
2 decisions for what to build and how to modernize
3 the system if we don't involve all of these key
4 stakeholder groups.

5 So I'll stop there.

6 MODERATOR KELLEY: Thank you, Carl.

7 Joel, you're up next.

8 MR. BLADOW: All right, thank you.

9 Joel Bladow with Tri-State G&T, and
10 we're -- you may be wondering what am I doing here
11 because I'm not from the West Coast. But as Jim
12 mentioned, Colorado is part of the Western
13 Interconnect. So what Steve does down there in
14 California does impact us in Colorado along the
15 eastern side of the Western Interconnect.

16 I have to disagree with Carl right off
17 the bat when he said there's not many communities
18 that have wind or solar next to them. In fact,
19 when you look at our territory for Tri-State, we
20 cover an area the size of Colorado -- or the size
21 of California, but we have 5 percent of the load
22 they have in California.

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1 And most of the loads in our areas are
2 served, Denver Metro, Albuquerque, they're served
3 by others. When you look at the couple hundred
4 thousand square miles, we have a rich ability to
5 have renewables out there, but there are very
6 small communities. So, Carl, there are
7 communities that are right next to a lot of these
8 wind farms.

9 And that's one of the things that we
10 have a challenge -- I'd want to emphasize a
11 little. I don't disagree with what others on the
12 panel have said, but when you look at rural and
13 spread out as we are, cost is a big challenge for
14 us. How do you deliver reliable power? As Deputy
15 Secretary pointed out, when the power goes out in
16 our small communities, the schools shut down,
17 can't do business, the stores shut down; everybody
18 is connected nowadays. And that's really an
19 important thing.

20 Also, I would caution, I think the grid
21 has done an incredible job of adapting over the
22 years. And we used to have different generation.

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1 We moved through nuclear. We moved through other
2 types of resources. And although it takes some
3 time, given the size of the investments, I do not
4 think having a little bit of a lag there is
5 necessarily a bad thing. I think it's important to
6 move forward but to be somewhat cautious.

7 I think Deputy Secretary did a good job
8 of pointing out the complexity of this. One of
9 the things when I look at how complex this is and,
10 you know, what do we -- how do you move forward,
11 what I really think about is some key
12 fundamentals.

13 One I have just mentioned is cost. Not
14 every great idea is economical. There's lots of
15 great technology that somebody says, "This is
16 going to be wonderful." And companies can move
17 very quickly, put that in place. But when you're
18 looking at a public asset or a public good, which
19 we tend to serve when we have the utility or
20 responsibility, you have to remember that somebody
21 is going to pay for that in their bill. And if
22 you miss it by a wide mark, they still have to pay

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1 for it in their bill.

2 And turning over assets every two to
3 three to four years like you can do in a private
4 company in a high tech, typically isn't what you
5 do. We tend to be a little on the conservative
6 side and that's because if the lights go out, we
7 hear it very loud and clear. If the costs get too
8 high, we hear it very loud and clear. If we build
9 or try to build stuff over the top of sensitive
10 areas, we hear it very loud and usually aren't
11 able to do it. So there's a lot of challenges we
12 have.

13 Another thing I would say is whatever we
14 project today, we're going to be for the most part
15 wrong. And I think if you look over the horizon,
16 I think in my tenure in the industry, you know,
17 too cheap to meter was nuclear. We're going to
18 run out of natural gas. Yeah, we sure found that
19 wasn't the case.

20 And I think the more certain we pretend
21 we are about what the future is and plow ahead
22 without allowing that flexibility, seeing the

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1 ideas and looking at what are some of the options,
2 putting those pieces in place that have multiple
3 benefits, I think is a great way to go. But we
4 have to be mindful that 10 years from now,
5 somebody will probably be sitting around the next
6 one of these -- 12 years, I guess it would be --
7 quadrennial -- and say, Hey, boy, they sure missed
8 the boat 12 years ago. And I think we just have
9 to be cautious and incremental.

10 Some of the points have been mentioned.
11 We're in four states, so we definitely see some of
12 the lack of coordination from the various federal
13 agencies. As we site and permit in multiple
14 states, I think having the Federal Government look
15 harder at how do we balance these various things
16 and get a little more consistency between the
17 agencies is an important thing.

18 And finally, I'll just look at some --
19 make one more mention. I think it's so important
20 really that cost benefit. There's a lot of things
21 have been talked about that we need to change,
22 should change, will improve stuff, and I think we

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1 have to be very mindful of the benefits and who
2 pays, really that cost allocation piece.

3 Give you an example. We're in five
4 balancing authorities. We're not one ourselves.
5 We're in two interconnects. We're both in the
6 East and the West.

7 But when you looked in energy imbalance
8 market, we said, Hey, that's a good idea. We're
9 in five BA's, why don't we change and be more
10 streamlined. We've talked to a number of our
11 partners that very much advocated, this is
12 something that's needed, we'll save billions for
13 consumers, and when we talk to them about helping
14 to pay our high transmission cost because our
15 interstate network very much facilitates that, the
16 answer we get from most of them is, Are you
17 kidding? We're not going to pay anything for
18 that. We'll figure out how to get it for free.
19 And I think that's what builds resistance to some
20 of these changes is not recognizing the value,
21 who's getting it, and how we allocate that
22 payment.

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1 So with that, I will just end with my
2 caution always is go slow, think about what we're
3 doing. Things don't tend to be as bad as we think
4 or as good as we hoped. And with that caution,
5 I'll stop there.

6 MR. SAVAGE: You're a utility guy.

7 MR. BLADOW: Absolutely.

8 MR. SAVAGE: So I chair actually three
9 Western Energy groups made up of state and
10 provincial officials, each focused on different
11 aspects of the Western grid, including grid
12 reliability, grid planning, integrating wind and
13 solar into the grid, promoting efficient use of
14 existing lines, and advancing promising
15 technologies and applications.

16 So I'm going to come at this from that
17 broader, western perspective of my groups. And
18 I'm going to make four points about transmission,
19 and I'm going to cheat and talk about the grid as
20 a whole and DOE role.

21 So, first point, I think we will build
22 what transmission -- going to the question that

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1 was posed for this panel, I think we will build
2 what transmission we need in the West. A few
3 years ago, the amount of new transmission that was
4 being built in the West was greater than all the
5 other regions combined.

6 On top of that, I think with what new
7 transmission that is planned and likely to be
8 built, which is called the Common Case Line in Jim
9 Robb's interconnection-wide plan, we could be good
10 for a decade or more.

11 What I don't think -- what we likely
12 won't see, at least in the short-term, are what I
13 call big, long-distance lines. We polled Western
14 utilities and Western utility players a couple of
15 years ago and asked them about, you know, sort of,
16 their interest in accessing remote, low-cost,
17 renewable resources. And at that time, they
18 expressed little or no interest. They had ample --
19 you know, they had the ability to tap the
20 resources they needed to meet their renewable
21 mandates.

22 Over time, I see two forces at work

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1 here. I see forces at work for less demand for
2 big transmission if load growth flattens, if we
3 develop more local and distributive generation and
4 we potentially free up existing power line
5 capacities through a variety of means, I think the
6 countervailing factor that could offset this trend
7 would be if utilities need to tap remote renewable
8 resources to meet targets.

9 Second point, and this is nothing new to
10 the people in the industry here, is I think the
11 biggest challenge for the grid is adapting to the
12 changing mix of power resources. This could be --
13 I think this will be a long developing trend, and
14 to me, obviously, it will vary from state to
15 state. But I think in general, we're going to
16 continue to see more variable wind and solar, more
17 distributed, more storage, more natural gas, and
18 probably less coal.

19 I see no letup in policies to encourage
20 the development and low -- null and low carbon
21 resources, and with the accompanying challenges
22 that these resources pose to our power system, the

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1 proposed EPA carbon regulations being the most
2 recent example.

3 So, in response, at least three things.
4 I think we need to do. One, I still think there's
5 a lot more we can do to effectively address
6 ramping challenges and to bring down the cost of
7 integrating variable wind and solar into the
8 system, from expanding our suite of flexible
9 resources, to shaping policies to create a western
10 marketplace that's bigger, faster, more
11 responsive, and more coordinated.

12 Second, I think we need to continually
13 assess the reliability impacts of the changing
14 resource mix, such as the impacts of implementing
15 the EPA 111(d) regulations.

16 And three, I think recognizing the line
17 between distribution and bulk power systems is
18 blurring or will blur over the long haul. I think
19 we need to better operate our visibility control
20 of the distribution system. I think we need
21 seamless, two- way information flows between the
22 system. And this is -- I always get to give one

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1 provocative, I think we may need to rationalize
2 FERC and state regulatory jurisdiction.

3 Third observation is that absent
4 intervention, coordinated action, or a crisis in
5 the rest, I think we'll under-invest in grid
6 innovation.

7 Last year, we hosted a transmission
8 technology forum in the West, and we heard from
9 some of the best minds in the business on
10 modernizing the grid. And one of the panels
11 explored the many uses of synchrophasor data.
12 They were excited about the possibility but less
13 so that we were going to take full advantage of
14 the technology. I don't think that we would have
15 made the investments we did as fast as we did
16 without the Federal funding. I think there's a
17 lot of reasons for that, but one prime reason is I
18 think many T&D investments have a quality of a
19 public good. Benefits are diffused. It doesn't
20 pay utility investment when they can't claim the
21 benefits.

22 So for these public good investments, we

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1 either need to take collaborative action or I
2 think we need a crisis such as Hurricane Sandy
3 which will trigger political action, or we need
4 the Government to step in, which leads to my last
5 point.

6 Federal funding for energy projects in
7 this region has made a huge difference and should
8 be a guide for future DOE action. With Federal
9 funds just recently, we made the major investments
10 in synchrophasors, as I mentioned, and we're doing
11 phase 2 now at peak reliability.

12 We created our first interconnection-
13 wide transmission plant. We produced the first
14 interconnection-wide assessment of the impacts of
15 increased natural gas generation on the West. We
16 examined the cost and benefits of a voluntary EIN
17 market and the design of such a market, all of
18 which led up to the first EIN becoming operational
19 in October.

20 We conducted the first ever survey and
21 evaluation of solar and moon forecasting in the
22 West.

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1 We investigated the use of dynamic
2 scheduling and ways to foster greater use.

3 We studied the potential for demand
4 response to provide ancillary services.

5 My point, and I'm going to write DOE, is
6 keep doing what you've been doing. Drive
7 innovation and fill the gaps and necessary
8 analyses and projects that won't be done without
9 your intervention.

10 MODERATOR KELLEY: Thank you, John.

11 Well, thank you all.

12 At this point, what we're going to do is
13 turn to a discussion. So I've got a few questions
14 here. Some common themes, some divergent opinions
15 I've heard. So why don't we go ahead and get
16 started with that.

17 So one of the divergent opinions I heard
18 was that when it comes to transmission, we need to
19 go slow and plan, think. But then I also heard we
20 need to adapt and be agile enough to bring on
21 these distributed generation renewables, variable
22 generation.

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1 So with the Federal Government here
2 listening, what is your guidance to the Federal
3 Government in helping you to strike that balance?
4 And what we'll do is we'll just start at this end
5 and kind of work our way down.

6 So, Jim?

7 MR. ROBB: Well, that's probably a
8 better question for more the principal investors
9 here than for me as an observer of the system.

10 I think the one quandary that you have
11 in electric, and any kind of energy
12 infrastructure, is we have a dynamic policy
13 environment that's changing. I mean, I think
14 directionally, thematically consistent but the
15 specifics change fairly regularly. Technology is
16 advancing relatively quickly, and we're still
17 stuck in 10-year life cycle project development
18 loads.

19 The challenge I think we have, and what
20 we're certainly trying to do at WECC, is to
21 develop, kind of, good, consistent, thematic views
22 of how the future looks or could look so we can

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1 start to figure out which set of projects would
2 make sense under any scenario so that those can go
3 forward.

4 Yeah, I think the comment was made on
5 the panel though that the risk of building
6 transmission that may get stranded in the future
7 is exceptionally high, particularly if you don't
8 know what the long- term future -- I think even
9 with the long-term future of the remote coal
10 plants and so forth in the region are, with a
11 timeframe for when those plants may eventually
12 come out of service has a big implication for
13 transmission investment. What they get replaced
14 with also will have substantial implications for
15 transmission investment.

16 One theory of the case is they should be
17 replaced with gas plants on the same site that
18 would make, you know, full use of the existing
19 transmission infrastructure.

20 There's also a wonderful opportunity
21 here to move some of those resources much closer
22 to load, which would create a much more stable and

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1 easy to operate system.

2 The interplay between the replacement of
3 those facilities and the expansion of solar and
4 wind resources that are electrically very, very
5 different needs to be understood and needs to be
6 studied.

7 I'd echo the point that John made that
8 the DOE, from our perspective, has been a
9 wonderful partner in helping to fund some of the
10 studies that we've done on these issues, and quite
11 frankly, there's a long list of things that yet
12 need to be studied going forward. So I'd echo the
13 -- kind of the request for, kind of, ongoing
14 support of the analytical agenda because we are at
15 a period of time where the system in the West is
16 going to be fundamentally reconceived over the
17 next 5, 10, 25 years. And we need to be very
18 thoughtful about the decisions that we're making
19 around long-lived infrastructure that's going to
20 be robust under a variety of scenarios.

21 MODERATOR KELLEY: Thanks, Jim.

22 Steve, any comments?

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1 MR. BERBERICH: Well, I'd say this. I
2 think everyone needs to come terms with the fact
3 that the system is changing dramatically very
4 fast. And I think that's what we're going to have
5 be able to adapt to, and we're going to have to do
6 things quicker. And we do 10-year transmission
7 horizons. I don't see that materially changing.
8 These are long-lived projects and big assets on
9 big balance sheets, and we need to do our best not
10 to get them wrong.

11 But as we saw now in this case, we had
12 to be very fast because San Onofre, the nuclear
13 plant in Southern California, retired. But it's -
14 - frankly, it's a microcosm, I think, of things
15 that are to come. The system -- I realize
16 California is ground zero for this, but California
17 is 40 some percent of the load of the West. So,
18 so goes California, so goes a lot of the West.

19 And our system is transforming very
20 fast. We're going to have to be nimble about new
21 transmission, to bring renewables to market, and
22 to reinforce a system where we need to reinforce a

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1 system as these flows change because the system
2 flows are going to change and they're going to
3 change dramatically as you see distributed
4 generation, you see renewables, you see the
5 retirement of plants. And I think we're going to
6 have to factor all that in.

7 MODERATOR KELLEY: Thank you, Steve.

8 Pat?

9 MR. REITEN: Well, the premise was, you
10 know, do we need to speed up the permitting of the
11 lines once we've identified a need? And do we
12 need to be very deliberate and certain about our
13 planning? I think the answer is yes. I don't
14 think those things are in conflict necessarily.

15 We build transmission for many different
16 reasons. As an example, you know, I referenced
17 the Energy Gateway Transmission Project, the first
18 three of those originally planned eight segments
19 were essentially reliability projects, meeting our
20 reliability requirements and load. The rest of
21 them are being permitted with the idea of
22 accessing a more diverse set and of lower cost

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1 resources for customers over time. But we also
2 have the rapidly evolving policy landscape. So we
3 are keeping our transmission planning engineers
4 extraordinarily busy.

5 On our system, we went from owning 34.5
6 megawatts of wind eight years ago to 1700 both
7 owned and contracted for. Today, we have 2300
8 megawatts on our system. That, even outside the
9 big segments, has required fairly substantial
10 investment. We have a project in south central
11 Wyoming where we're putting in a synchronous
12 condenser at the price of about 47 million in
13 order to deal with volatility and maintain grid
14 stability there as a result of the concentration
15 of wind.

16 On the other hand, we're taking a coal
17 plant out in Utah, 147 megawatts of coal
18 generation in Carbon County Utah. And we're
19 having to invest 46 million there in order to
20 maintain grid reliability in the absence of that
21 generating resource. So, you know, it works on
22 both sides.

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1 As the policy landscape evolves and the
2 requirements evolve, that will change the
3 generation mix and we're going to have to stay
4 nimble, as Steve mentions, in terms of delivering
5 those transmission solutions. And the longer, you
6 know, after the need is identified, that you can
7 actually do something about it, the higher the
8 risk is in order to commit capital.

9 MODERATOR KELLEY: Thank you, Pat.
10 Elliott, any comments?

11 MR. MAINZER: I think just as sort of a
12 brief exclamation point, I think -- I agree that
13 those two thoughts are not -- are not
14 diametrically opposed. I think for certain we want
15 to be planful. We want to be adaptive. We want
16 to be flexible. We want to be mindful that the
17 world will change. I think I've lived through
18 three paradigm shifts in commodity prices in my
19 career in the energy industry, so things are going
20 to turn over.

21 But I absolutely agree that once we've
22 identified a need for a new transmission line, and

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1 we've determined that reliability and resource
2 integration is hinging on it, then it really is
3 incumbent -- I think, certainly, as I said before,
4 the utilities need to be acutely sensitive to the
5 local issues, work with communities, sovereigns,
6 affected stakeholders, but we really do need that
7 coordination on the permitting side because the
8 costs -- and literally you start running into
9 significant liability risks, so I really agree
10 with that.

11 MODERATOR KELLEY: Thank you, Elliott.

12 Carl, any comment?

13 MR. ZICHELLA: Yeah. There's an old
14 saying, "Sometimes you have to go slow to go
15 fast," and I think "look before you leap" also
16 winds up in that same category of aphorisms. But
17 I don't think we should have the luxury of lag. I
18 think, as Steve mentioned, things are happening in
19 real time. We don't have the ability to put the
20 genie back in the bottle here.

21 It seems to me that we could though, and
22 are and should be, paying a lot more attention to

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1 the full range of resources that are contributing
2 and meeting our needs. And if we do that, we have
3 a better justification for building what we need
4 to build. If we can get more out of the existing
5 system to meet our needs, that's really a benefit
6 for everyone. It costs a lot less money; it's a
7 lot faster. If we reconductor some lines or
8 increase the voltage rating of a transmission
9 asset by upgrading a substation and we can
10 interconnect renewable resources as a result of
11 that, well, it takes about three years to build a
12 renewable energy project, even pretty big ones,
13 and about seven to ten years to build a new
14 transmission line. That's if you can even find a
15 right-of-way.

16 As was mentioned earlier by Elliott
17 about the difficulties in the I-5 corridor,
18 Portland General Electric recently decided to,
19 instead of building a line across the Cascades,
20 share lines with BPA, upgrade lines together,
21 saving their customers hundreds of millions of
22 dollars and, in fact, avoiding environmental

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1 impacts of great consequence. They estimated
2 they'd have to spend about \$70 million just on
3 environmental mitigation alone. So getting more
4 out of the system, sharing resources, even between
5 public and investor-owned utilities, we're seeing
6 a lot more of that and it's a good thing.

7 So I also think, you know, we have to
8 look at some of the lessons that we've been
9 learning about where to put stuff.

10 For example, renewable energy resource
11 zoning, the Bureau of Land Management has adopted
12 a programmatic solar environmental impact
13 statement that builds resource zones in which
14 environmental review should be easier. We can
15 design transmission to the zones to get the power
16 to the load centers more efficiently. We can get
17 better utilization of the lines.

18 We talked earlier about the coordination
19 and balancing area of consolidation that's needed.
20 These operational improvements make a big
21 difference about how much we need to build. We
22 can get a lot more out of the system.

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1 The energy imbalance market that's been
2 mentioned allows us to share reserves in ways that
3 we really couldn't before because in the West
4 almost everything's done on bilateral contracts
5 rather than in markets. It's a very slow way to
6 do this. It's not very nimble. It's not very
7 flexible.

8 I think we have to pay attention, as
9 John Savage pointed out, to fixing that problem --
10 you know, having more of a market approach, and
11 EIN is a great start on proving the concept to
12 people that this can be a beneficial way forward.

13 The Northwest PowerPool's efforts on
14 market coordination that Elliott's helping to
15 lead, extremely important -- getting the 15-minute
16 scheduling, having more automation. And this
17 leads to, I think, one of the last points I wanted
18 to make on this topic about a role for DOE, and
19 that is taking some leadership in the R&D space
20 and helping with the grid control architecture.
21 We can have great information from all these
22 synchrophasors that we have out there. If we're

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1 not able to take advantage of that, to deploy that
2 information quickly in a way that responds to
3 system disturbances, we're really wasting our
4 investment.

5 So I think there's more investment. I
6 think there's a really distinguished role for the
7 ARPA-E project, other R&D programs at DOE, to help
8 fill that gap there.

9 And looking at where we put stuff to
10 avoid environmental conflicts and cultural
11 resource conflicts is a big part of this if we
12 really want to build these lines. As Joel
13 mentioned, you don't get to build them if you just
14 go trampling over things that people care about or
15 that are important national, natural resources.

16 So the zoning operations of the system,
17 looking before you leap at energy efficiency and
18 demand response -- let's build what we need, not
19 what we don't need. The public will be much more
20 willing to support that. Nobody likes
21 transmission lines, but if people can be convinced
22 that they're needed and the benefit towards the

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1 other things they care about, including climate
2 remediation, I think we can build what we need.

3 MODERATOR KELLEY: Thank you.

4 Joel, care to comment?

5 MR. BLADOW: Chris, you must have been
6 happy when I said go slow. I really gave you a
7 good question.

8 MODERATOR KELLEY: Thank you.

9 MR. BLADOW: And I think the predecessor
10 of folks have really hit it. I think there's some
11 technology things that aren't high cost one can
12 implement to give you benefits. But as you try to
13 plan too broadly, you know, "Here's five lines
14 we're going to build that's going to help so many
15 things. Let's get going," you've got to realize,
16 it's going to take you probably a decade to build
17 them. Getting going on them, that's not the
18 problem. You just have to realize you have to be
19 willing to change your plans as you go forward.
20 Technologies are going to change. You may find
21 more benefits and other factors out there which
22 will then change your plan.

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1 And sometimes folks get locked in:
2 "Here's what we're going to do. We're going to
3 build all this stuff because we've got the
4 answer." You don't even get close to the finish
5 line, and the answer -- the goal posts have moved
6 quite a bit in that timeframe.

7 So I don't think there is that much of a
8 conflict in terms of -- we just need to be very
9 thoughtful. And I like Carl's analogy, "look
10 before we leap," as we move forward in these
11 technologies because there's a lot of folks out
12 there that have a lot of financial stake in moving
13 quickly for whatever it is they're selling or
14 whatever it is their products are.

15 And I think we kid ourselves to think
16 that everybody stepping in is doing it for the
17 good of the public. There's some real commercial
18 interests that want us to go in a very certain
19 direction. And it's happened a number of times,
20 even on the recent FERC regulations on some of the
21 reliability things where smaller problems have
22 been elevated into requirements that are somewhat

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1 questionable when you really look at some of the
2 signs behind them.

3 So that's enough from me.

4 MODERATOR KELLEY: John, any final
5 comments?

6 MR. SAVAGE: Yeah, two. One is, in a
7 former life, I staffed a siting agency. And I
8 like Oregon's approach to siting, which has
9 basically said, "We're going to set standards, and
10 they're going to be rigorous. But they're going to
11 be known the developer. You meet the standards,
12 you get the license." To me the problem is
13 uncertainty, you know, from many different angles.
14 I don't know how I would build a transmission
15 line. I don't know if I'd have the patience to
16 build a transmission line and go through all of
17 this stuff, just because it's -- you don't
18 ultimately know what you need to do. So that's
19 one.

20 Second of all, now I'm going to put on
21 my Commissioner hat and I'm going to underscore
22 what Jim Robb said, is -- this is the one of the

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1 things I like about planning is that if you have
2 planning that looks at all the possible
3 alternatives and shows they've got a line that's
4 robust, a Commissioner is going to look favorably
5 on that for cost recovery.

6 MODERATOR KELLEY: Thank you.

7 So I'm going to turn now to technology
8 and I'll open this up to whoever would like to
9 respond.

10 So several of you have commented on
11 technologies and how DOE has provided for R&D and
12 technology specifically. There's your measurement
13 units that have been deployed for real-time
14 monitoring of the transmission system. A few
15 other technologies were touched on.

16 As you look forward, are there
17 additional technologies that DOE should be looking
18 at? Or is there a role that the Federal
19 Government should take going forward in investing
20 in R&D technologies? Anyone care to comment?

21 Steve?

22 MR. BERBERICH: Chris, if I could just

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1 make one comment. I think the synchrophasors
2 really drive home this issue.

3 The synchrophasors are fine
4 technologies. Frankly, they're not new
5 technologies for providing better situational
6 awareness on the grid.

7 The question though is what do you do
8 with that situational awareness? And I think
9 that's the gap that we need to close first before
10 we go beyond that because is it integrated with
11 energy management systems to be able to move the
12 grid around? I mean, what do you do with it? And
13 I know we have this information on our control
14 room floor, and I go down there and it's pretty
15 cool to see the situational awareness. And I ask
16 our operators, "Well, what do you do?" And from
17 our perspective, I don't really want the operators
18 to do anything. I'd rather technology did it.

19 So what -- that's I think the gap that
20 we need to close is, all right, here's the
21 technology. How does it integrate to better
22 operate the system? And ultimately --

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1 MODERATOR KELLEY: What is DOE's role
2 though in this?

3 MR. BERBERICH: Well, I think DOE has an
4 important role. It's, you know, to deploy the
5 technology but also the use of the technology.
6 How -- what's the use case for it? And before we
7 go deploy the technology, I think we need to work
8 out that use case.

9 DOE has had a lot of -- a significant
10 role. I know some of the folks that have looked
11 at, again, how energy management systems work.
12 Energy management systems are the bread and butter
13 of dispatching the system. We use telemetry
14 extensively now. It feeds into these systems,
15 these systems dispatch every four seconds to
16 balance.

17 The same thing ought to happen with the
18 synchrophasor information. And I think that's --
19 if I were looking for some -- it's an issue for
20 all of us though, it's not an issue for the
21 California ISO. It's an issue for everybody. It's
22 an issue for BPA and everybody in the West too.

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1 So I would encourage the closing of that
2 gap: well, what do you do with the technology?

3

4 MODERATOR KELLEY: Great, thank you.

5 Yeah, Jim?

6 MR. ROBB: I would have two investment
7 themes that I don't think we can spend enough
8 money on as you look into the grid of the future.
9 And the first, it has to continue to be to advance
10 storage technology.

11 In our kind of base case, common case
12 transmission plan that John referred to, we
13 replaced 25 gigawatts of conventional generation
14 with 13 gigawatts of wind and 12 gigawatts of
15 solar. That's a lot of intermittent resource to
16 be brought onto the system.

17 I'm sure you're all familiar with the
18 duck chart that Steve and his crew have developed
19 in California that shows the extraordinary burden
20 that starts to get placed on the balance of the
21 system with these resources that essentially turn
22 on and off instantaneously. So the ramp rates and

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1 so forth that the remainder of the thermal fleet
2 need to be able to meet are extraordinary.
3 Storage is one way to soften that cliff and allow
4 our resources to perform effectively. So that's
5 got to be a very, very important part of it.

6 The second piece, and maybe storage
7 obviates this, but again, I don't think we can
8 spend -- me talking -- I don't think you can spend
9 enough money developing safe, reliable, secure
10 nuclear technology. You know, particularly in the
11 system like the West where if we lose the large
12 coal plants which provide the majority of the
13 inertia on the system which helps provide
14 frequency, stability, and so forth, that needs to
15 be replaced with something.

16 And from my perspective, as much as I
17 love natural gas in so many dimensions, it's not a
18 fuel sitting in front of a power plant ready to
19 burn. And I sure would like to see us figure out
20 a way to make a nuclear solution that's
21 politically and publicly acceptable because it
22 obviously has extraordinary climate benefits to be

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1 brought to bear.

2 MODERATOR KELLEY: Thanks, Jim.

3 So we have time for a couple more brief
4 comments.

5 Yes?

6 MR. REITEN: Yeah, I just -- Carl made a
7 very, very important point, which is, you know,
8 from the perspective of the environment, from the
9 perspective of our customers, the first priority
10 is to use what we have most efficiently before we
11 engage in building a new power plant or building
12 new transmission lines. But the best ones we deal
13 with are the lines and the plants we don't build
14 from those perspectives. We have a real
15 responsibility to increase the efficient use of
16 the grid. Certainly, the energy imbalance market
17 project and the work going on in the Northwest
18 PowerPool that Elliott is co-chairing, solidly
19 fit into that direction.

20 And if you think about the impact DOE
21 has here in the region, you know, the largest is
22 clearly through the efforts of the Agency itself,

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1 not only as a major transmission owner but a path
2 operator in order to facilitate the beneficial use
3 of those paths in very efficient ways.

4 And so, you know, investments in --
5 technology investments, automating remedial action
6 schemes, integrating models, not only for more
7 efficient use of the past but more situational
8 awareness from a reliability perspective -- I know
9 those are all on Elliott's radar screen. I just
10 speak up, you know, in support of his
11 prioritization and efforts there.

12 MR. ZICHELLA: May I just offer a
13 thought here too about the technology thing. I'm
14 not as bullish about nuclear power. I have to be
15 honest with you. It takes too long to build them.
16 The technology's extraordinarily expensive. And
17 we never calculate the back end, the fuel cycle
18 costs, when we start talking about it.

19 One small nuclear power plant in
20 Northern California that was built in the 1960's,
21 the Humboldt Bay Plant, will cost over a billion
22 dollars to decommission. It was 63 megawatts.

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1 The idea that small modular reactors would have
2 enormous cost savings, I think is a chimera. And
3 it would take many, many years to actually
4 accomplish because we don't have a supply chain.
5 We don't even have a bench of nuclear engineering
6 students to rely upon. The idea that we're going
7 to have a big play on nuclear, I think, is maybe a
8 little bit of a waste of our time.

9 I think the other areas we need to focus
10 on are looking at some of the simpler things that
11 get us a big bang for our buck, the idea of
12 optimizing the system by locating your resources
13 correctly. That's an innovation there's a gap at.
14 We can do better at that. We tend to look at the
15 system in small bites rather than in how
16 resourcing in Wyoming might assist resources in
17 Colorado or California. We have to fix that
18 problem.

19 We can do some of that with forecasting.
20 Like I say, we've come a long way with resource
21 forecasting. I stood in the Xcel control room in
22 Colorado and watched them turn off a coal plant in

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1 favor of wind energy based on forecasts. They're
2 doing it now. They may be one of the only people
3 that are. The fact is I think if they can do
4 others can do it too.

5 And I think forecasting and the ability
6 to use and deploy resources, especially in shorter
7 term markets, as was discussed, really gives us a
8 real advantage here to take advantage of the
9 geographic diversity of the resources and the load
10 shapes they have to avoid having to build
11 additional, whether it's gas or other types of
12 flex resources.

13 Again, let's build what we need. If we
14 need some gas, let's build it. I like what's
15 being done with reciprocating engines that can
16 ramp to full power in five minutes. You know,
17 there's a really valuable flex tool to help match
18 wind in a smaller BA, for example.

19 Storage is a great place for DOE to be
20 putting its attention to both in the technologies,
21 chemistries, helping reduce the costs of
22 particular technologies for specific needs. And

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1 we know that flywheels give us very good, very
2 fast response time for regulation. We know we can
3 do load following with some of the new battery
4 technologies. There's more we can do with pumped
5 hydro if we build some transmission. That's one
6 of the things where transmission is a part of the
7 solution.

8 Power electronics, control
9 architectures. If we're worried about voltage
10 stability in the system, we know that having good
11 inverters, advanced inverters, both in the
12 distribution system, but also at the bulk
13 electricity system for solar installations, helps
14 solve some of those problems for us.

15 The wind industry has provided new
16 technologies and innovation and now provide
17 reactive power at wind generators that look a lot
18 like natural gas plants. So we're getting much
19 better on that and automating the controls. These
20 are the technology areas I'd love to see us put
21 our limited resources into because the effects and
22 the response and the rewards are immediate.

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1 Continuing to bet on yesterday's technologies,
2 Cold War technologies like nuclear -- unless
3 there's some sort of major and massive
4 breakthrough, I can't see them making a major
5 contribution in a decade or more.

6 MODERATOR KELLEY: Thank you, Carl.

7 So at this point, we have enough time
8 for just some closing comments from each of you.
9 And I want to remind you: we have the QER Task
10 Force before you. You've all provided some really
11 good insights and input to them. But if you have
12 a chance to give one recommendation, think about
13 what it would be. And I'd ask that you'd keep
14 your comments to one minute just to keep us on
15 time here.

16 So we'll start all way down at the end
17 with John.

18 MR. SAVAGE: Well, actually, I like
19 Steve's comment on -- and I'll go back to my final
20 line -- drive innovation and follow up.

21 MR. BLADOW: That was quick --

22 MODERATOR KELLEY: All right. Thank

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1 you.

2 MR. BLADOW: -- and terse and pithy.

3 You know, the one point I would -- and
4 it's technology, it's really the siting and
5 permitting. To me that's such a core issue. It's
6 political and it's local. I think whoever coined
7 the phrase "all politics are local" probably just
8 got done building a transmission line and
9 experienced that firsthand.

10 So whatever from a Federal Government
11 standpoint one can do to get -- kind of harmonize
12 the permitting, and John made a great point,
13 having -- knowing the rules, moving in so you can
14 satisfy them and the goalposts don't continue to
15 be moved would be very helpful.

16 MODERATOR KELLEY: Thank you, Joel.

17 Carl?

18 MR. ZICHELLA: I'm going to echo the
19 great John Savage and say drive innovation and
20 follow up. But innovation and technology, policy
21 regulation, business models, there's a convergence
22 of disciplines here that's occurring as part of

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1 this transition. Not all of it's in the DOE bag
2 of tricks, but nevertheless, I think we have to
3 keep the big picture in mind. So drive innovation
4 and follow up.

5 MODERATOR KELLEY: Elliott?

6 MR. MAINZER: I guess for me, I'm just
7 personally excited about the level of
8 collaboration that's happening in the West. I
9 think there's a lot of tremendous stuff going on.
10 I think you can see that here in this panel. The
11 Department of Energy has also been a big part of
12 that, and I think keeping those relationships
13 happening between the Federal Government and
14 utilities, the other stakeholders, I think will be
15 extraordinarily important as we continue to make
16 progress in the future of the grid. So, good to
17 be here today. Thank you.

18 MODERATOR KELLEY: Thank you, Elliott.
19 Pat?

20 MR. REITEN: Well, I think I've kind of
21 made my points already, so I'm not sure I have
22 anything else to add other than to say thank you

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1 for doing this. You know, we appreciate you being
2 out here taking into account Western issues,
3 which, you know, we're often fond out here of
4 saying things are different out here. That may or
5 may not be true, but in terms of the sheer
6 geographic spaces in the way our markets are
7 organized, it really is true. So appreciate you
8 as a partner as well as through the two agencies.

9 MODERATOR KELLEY: Thank you, Pat.
10 Steve?

11 MR. BERBERICH: I agree with what Pat
12 said. I think that having these conversations are
13 really important so that we can share issues and
14 ideas. And we certainly appreciate your support.

15 From a DOE perspective, I guess multiple
16 parts. Most of it has come up. As I said, follow
17 through on these technology investments.

18 Secondly, I'd echo what Jim said.
19 Storage is going to have to be part of the
20 solution. And we're going to have to find a way
21 to find breakthroughs in it. We're going to have
22 to find ways to reduce the costs of it to make it

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1 truly a viable resource on the grid. And I think
2 the DOE can take a lead in that for sure.

3 So I would also -- I'm going to advocate
4 for your power marketing agencies for a second.
5 They need more flexibility to make the investments
6 that they need, both in their controls' rules --
7 but also in their grids. So a shout out to my
8 partner, Elliott, down there.

9 MODERATOR KELLEY: Thank you, Steve.

10 Jim, you want to bring us home?

11 MR. ROBB: I'll try.

12 MODERATOR KELLEY: All right.

13 MR. ROBB: I kicked us off; I'll bring
14 us home.

15 Just a couple things. First, I think
16 the technology agenda we outlined here is very
17 sound, and I actually would push DOE to support
18 that.

19 I would underscore what Pat said, but
20 I'd make it stronger. I've worked in the other
21 two interconnections; the West is different in a
22 lot of different ways. And I think it's important

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1 to keep those differences in mind as you think
2 about, kind of, national energy policy.

3 And then the last point is we've
4 enjoyed, at WECC, a very good partnership with DOE
5 with the National Laboratories. There are a lot
6 of frontier technology questions and analytical
7 questions that need to be asked and being able to
8 work those in partnership with DOE is a big
9 advantage to the West. And I hope we can, kind of,
10 continue to do that.

11 MODERATOR KELLEY: Well, thank you, Jim.

12 Well, please, join me in thanking this
13 great panel that we've had.

14 (Applause.)

15 MR. McGOVERN: One last thing for
16 members of the media, the Deputy Secretary will be
17 available to take questions from media members
18 downstairs. Just meet back here at the back of
19 the room, and we'll take you down. Thanks.

20 MODERATOR KELLEY: Okay. I'd like to
21 ask the second panel to join me here on the stage.

22 So once again, a reminder for everyone,

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1 if you are in the audience and you'd like to ask a
2 question, make a comment at the end of the session
3 here today, please make sure that you note that in
4 the sign-in sheet at the front entrance. And
5 again, for those joining via live meeting, send
6 your comments to QERcomments@hq.doe.gov.

7 (Panel 2 takes the stage.)

8 MODERATOR KELLEY: I mentioned this to
9 the previous panel, we do have a little Colite
10 system here to indicate when your time is up. And
11 if you hear me start to cough, that's usually a
12 sign, so bear that in mind, please.

13 Okay. So we'll go ahead and get started
14 here. Our second panel is on "Distribution - How
15 Do We Cope with New Challenges and Opportunities?"
16 So joining me here on stage we have Jim Piro,
17 President and CEO of Portland General Electric;
18 Pat Vincent- Collawn -- am I saying that right?

19 MS. VINCENT-COLLAWN: Yes, you are.

20 MODERATOR KELLEY: Chairman, CEO and
21 President of PNM Resources, Incorporated, and Co-
22 Chair, CEO Policy Committee on Energy Delivery,

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1 Edison Electric Institute.

2 We also have Ronald Litzinger, President
3 of Southern California Edison; Jorge Carrasco,
4 General Manager & CEO of Seattle City Light; Dave
5 Markham, President and CEO, Central Oregon
6 Electric Cooperative; and again, John Savage, the
7 Commissioner of Oregon PUC and Chair, Committee on
8 Regional Electric Power Coordination, Western
9 Interstate Energy Board.

10 So, once again, I ask that everyone
11 please refrain from applause until the end of the
12 session and as compelling as I'm sure all of
13 comments will be. And I would like to remind
14 everyone that what you will hear from our
15 commenters are their own views and not the views
16 of the U.S. Department of Energy.

17 MODERATOR KELLEY: So, with that, let me
18 turn to Jim.

19 MR. PIRO: Well, good morning, everyone.

20 And I want to thank the DOE for coming
21 to Portland. This is our service territory, and
22 we're really proud to have you here and to discuss

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1 these energy issues. It's nice to get all of the
2 energy folks into the room and talk about some of
3 the issues we've got ahead of us.

4 So PGE is celebrating its 125th year
5 anniversary, and we pride ourselves on providing
6 our 830,000 customers safe, reliable, affordable,
7 and sustainable power, something we've done for a
8 long time and something that we take very
9 seriously. And as all utilities, we have that
10 responsibility to provide that high reliability of
11 service to our customers. We have an exceptional
12 set of customers in our service area, companies
13 like Intel, Nike, and a lot of great manufacturing
14 companies who expect reliable, affordable power.

15 When you think about our company, we've
16 had a history of innovation. And what I really
17 want to talk about is some of the things we've
18 done to enhance the distribution system and to
19 provide that reliable service.

20 First of all, in Oregon we use what's
21 called integrated resource planning. And I would
22 urge all people to use that type of process

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1 because it's that integration of generation,
2 transmission, distribution, and customers that
3 really provides a reliable supply of power to our
4 customers at an affordable price.

5 As part of that program, we have been
6 very aggressive in delivering energy efficiency to
7 our customers. Since 1991, we've -- at current,
8 we've actually acquired about 330 average
9 megawatts of energy efficiency. We've got another
10 350 megawatts that we plan to acquire by 2030.
11 These are, you know, lighting, efficiency
12 projects, many things you do to improve the use of
13 our product.

14 Oregon also has Renewable Portfolio
15 Standard of 25 percent by 2025. We are now at 15
16 percent. We have over 850 megawatts renewable
17 power on our system. And, again, the need to
18 integrate renewables with our customers is very
19 important, especially given the variability of our
20 resources.

21 We've also voluntarily decided to shut a
22 coal plant down and trying to look at how we'd

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1 replace that plant both efficiently and
2 effectively.

3 We've also deployed smart meters
4 throughout our service territory. We're now
5 learning how to use those smart meters and the
6 information from that to make better decisions on
7 the distribution system.

8 We have a very successful distributive
9 generation program where we access customers'
10 diesel generators. We have about 100 megawatts of
11 that. We use it for reliability and reserves.
12 And it's been a very effective cost program for
13 both our customers and our company in accessing
14 those distributed resources.

15 We have a demand response program that
16 helps curtail peak loads during heavy load hours
17 like we're going to experience over the next week.
18 And we've been very supportive of the electric
19 vehicles. In fact, Portland's been a key launch
20 site for many of the manufacturers that are
21 bringing their vehicles to market.

22 We've got a very innovative project that

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1 we're working with from DOE funding that's called
2 the Salem Smart Power Project. It's a five
3 megawatt battery system. So we're really trying
4 to understand how we integrate that into the grid
5 and create a self- healing microgrid. And so
6 we're doing a number of tests on that project as
7 we speak. It's been a very successful project for
8 us, and we're learning a lot about how you
9 integrate batteries into the grid. It's not yet
10 cost-effective, but that's really the purpose of
11 those pilots. And we're also doing some
12 innovative research around biomass and looking at
13 potentially converting Boardman to a biomass
14 facility.

15 What I want to talk about now is really
16 the process that we get there and how we get
17 there. Because we're a utility and we have a
18 responsibility to serve our customers, again, both
19 reliably and cost- effective, we have to really
20 think about making sure that these things work. A
21 lot of people have a lot of great ideas, but,
22 ultimately, we have to implement them in the

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1 system.

2 So we start by studying the technology,
3 identifying the cost and benefits. We love
4 running pilots to really prove out the technology,
5 see how it works and how it affects our customers,
6 build a business case -- you heard that this
7 morning. We need to ensure that what we're doing
8 is cost-effective and makes sense for our
9 customers.

10 We then collaborate with our
11 stakeholders, the regulators, our customers, the
12 interested parties to make sure that they're
13 supportive. We get agreement on those projects
14 and then we deploy and implement. We find that a
15 very proven way of doing these projects, and
16 there's a number of examples that we've used to do
17 that.

18 In terms of future opportunities where
19 the Department of Energy can be supportive, I
20 would suggest areas of helping us on the smart
21 appliances. We need code changes in that area.
22 Electric water heaters is a great opportunity for

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1 us if we can get changes to the codes to have
2 those become smart water heaters so we can access
3 the storage capability. Second-life batteries is
4 another interesting opportunity to support the
5 electric vehicle market.

6 You've heard about storage again this
7 morning, both the vehicles at the grid and at the
8 homes. We need to increase the density, reduce
9 the weight, and lower the cost.

10 And finally, more help on data
11 analytics. As we're getting more and more
12 information from our smart meters, taking that
13 data and turning it into useful information to
14 operate the distribution grid more reliably is
15 very key to us as we move going forward.

16 So, again, the idea is really to improve
17 our performance and really work with our customers
18 to make sure we provide them the reliable service
19 they expect from our company.

20 MODERATOR KELLEY: Thank you, Jim.

21 Pat?

22 MS. VINCENT-COLLAWN: Thank you. And

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1 thanks for this opportunity to participate in the
2 Quadrennial Energy Review.

3 As Chris mentioned, I'm from PNM
4 Resources. And we serve about three-quarters of a
5 million customers in New Mexico and Texas. And I
6 also serve as the Co-Chair for the Edison Electric
7 Institute Delivery Policy Committee and, along
8 with Jorge, have been on the board of the Electric
9 Power Research Institute since 2010.

10 And when you look at investor-owned
11 utilities today, we're really facilitating that
12 transition to a more modern and integrated grid by
13 making significant investments in the distribution
14 system. Since the beginning of 2000, the industry
15 has invested \$275 billion in the distribution
16 grid. Last year, we estimated to spend almost \$20
17 billion. And by 2017, that's going to grow to \$23
18 billion.

19 As I mentioned, I'm in New Mexico and
20 Texas, and I'm going to talk mostly about New
21 Mexico today. We're a vertically integrated
22 utility in New Mexico, so we have generation,

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1 transmission and distribution. And, unfortunately,
2 we are one of the poorest states in the nation.
3 But yet, we have significant renewable resources.
4 I believe NREL ranks the renewable potential in
5 New Mexico as number two in the nation.

6 So we work very hard to facilitate
7 increasing the balance of distributed energy,
8 especially solar, in ways that don't impact
9 reliability and, very importantly, do not
10 overburden our less fortunate customers. In
11 particular, we're shutting down about 137
12 megawatts of coal. And in response to that and
13 growing demand for our customers, we anticipate
14 putting a lot more distributed generation on the
15 grid.

16 You know, our customer expectations and
17 all of our public policies are focused on
18 reliable, low- cost, and more environmentally-
19 sensitive generation. And that accelerates our
20 distribution system's transition. We ask a lot of
21 our grid and a lot of our customers, right? We
22 want swift, sweeping, complicated, and capital-

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1 intensive, which can sometimes mean expensive
2 changes.

3 We're investing a lot in distribution
4 system upgrades and enhancements. We're adopting
5 advanced technologies, which I know Ron is going
6 to talk a lot about. And we're improving our
7 operational planning and coordination to better
8 meet the needs of our customers and our society.

9 So I'm going to comment on three
10 specific areas today: the value of the grid, the
11 fact that the grid of the future is going to
12 require proper integration and investment, and
13 what the future role of utilities should be.

14 You know, our distribution system is a
15 great enabler for emerging distribution level
16 technologies. The system provides linkages to
17 reliably and cost effectively benefit customers.
18 Think about variable and dispatchable distributed
19 generation, such as rooftop solar and
20 microturbines, plug-in electric vehicles,
21 distributed energy storage devices and energy
22 management systems.

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1 And not only does the grid support the
2 value proposition of all these technologies by
3 providing critical support systems, but it's also
4 a system to sell power back to the grid, but it's
5 crucial in providing power quality and reliability
6 at all times. And all of us up here can tell you,
7 that's job number one for our customers for us.

8 And at all times, that grid has to be
9 fairly valued and compensated, and everybody that
10 benefits from using the grid should pay for the
11 grid. We're concerned as an industry that that's
12 not happening. Many of you know about net metering
13 policies where we pay customers at retail for
14 costs that they -- or for power they sell back to
15 us, and they're still using the grid. They're
16 using all those fixed cross of transmission,
17 distribution, and generation. So we've created an
18 unsustainable subsidy that often times falls on
19 the least fortunate.

20 And proper integration to the grid, and
21 not just interconnection, is important, right?
22 Our grid was originally designed to send power

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1 from our power plants to our customers. It wasn't
2 designed to accommodate high penetration of
3 distributed generation or two-way power flows.

4 The Electric Power Research Institute is
5 investigating emergency technologies -- excuse me
6 -- emerging technologies and their integration in
7 an in- depth study. It's entitled "The Integrated
8 Grid." And EPRI's approach is not to favor any
9 particular technology, power system configuration
10 or market structure. They recognize that the best
11 solutions vary with local circumstances, goals,
12 and interconnections.

13 You know, the transition of this system
14 is going to drive investment needs. Our industry
15 is very willing and able to make the needed
16 investments. You hear how much we're spending.
17 But those investments need to be well planned and
18 the costs must be fairly shared. Our regulators
19 can help us by providing regulatory certainty and
20 fair and timely recovery.

21 As I said, reliability is mission number
22 one for our industry. And we must ensure that

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1 these transformation efforts don't compromise
2 reliability or the safety of our customers and the
3 grid. Utilities possess unique knowledge and
4 expertise in system operations, configurations,
5 long-term planning, and local and regional
6 characteristics. And we have a proven track
7 record of meeting those responsibilities.
8 Therefore, utilities should continue to plan,
9 build, and operate the distribution system.

10 Utilities are there in the trenches with
11 our customers helping to meet their reliable needs
12 for today and in the future, and that's a great
13 place for us, and I think we'll continue to be
14 there.

15 So with that, I'll turn it over to Ron.

16 MODERATOR KELLEY: Thanks Pat.

17 Ron?

18 MR. LITZINGER: Well, thank you also for
19 inviting me to share our views on building the
20 distribution grid of the future.

21 By way of a little background, Southern
22 California Edison is one of the largest electric

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1 utilities in the U.S. We serve nearly 14 million
2 people through 5 million accounts and across a
3 50,000 square mile territory.

4 We also have a proud record and
5 tradition as being an industry leader as
6 innovative technologies take hold, such as demand
7 response, electric transportation, and energy
8 efficiency.

9 But as responsible leaders, we have to
10 look forward as well. Strategically over the last
11 several years, we've observed four trends. Demand
12 for utility power is flattening. That translates
13 to more self-generation and more energy
14 efficiency. Policymakers are pushing for a
15 sustainable energy grid. And I think it's
16 important to reinforce what Carl said earlier, our
17 customers want a sustainable energy grid as well,
18 and it's up to us to figure out how to provide
19 that. Costs for the alternatives, although high,
20 are coming down and trending down. And, fourth,
21 our customers are looking for more choice.

22 Through all of these trends, though, we

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1 still see the distribution grid not only as
2 remaining vital, but as Pat said, the facilitator
3 of these new customer trends. Since 2003, we've
4 literally invested billions of dollars per year
5 through infrastructure replacement, upgrading our
6 distribution grid, and adding new transmission
7 lines to access renewable power sources.

8 We will continue this, but as we do so,
9 we must modernize the grid to ensure that it is
10 ready for a distributed energy resource future,
11 which we think has a high potential to occur.

12 I'd like to take a step back for a
13 second and look at some California energy policies
14 that promote that sustainable energy system.
15 California's climate change legislation and our
16 renewable portfolio standards of 33 percent are
17 well known. But over the last several years, the
18 focus has gone a lot more towards distributed
19 resources and storage and preferred resources such
20 as energy efficiency and demand response.

21 Given the challenges for siting and
22 permitting large-scale renewable generation and

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1 transmission lines, I personally don't find this
2 that surprising. It's culminated in a requirement
3 for utilities to file what is called a
4 distribution resource plan by 2015. This
5 requirement was included in rate reform
6 legislation which passed last year.

7 We're developing that plan right now.
8 We are identifying the policy and technology
9 challenges we see ahead and the incremental
10 investment that we see required to modernize the
11 grid. Our engineers have also been studying this
12 for quite some time and determined that our urban
13 circuits are much better suited and positioned to
14 accommodate larger levels of penetration of
15 distributed resources at a lower price than our
16 rural circuits, so our plan will also include
17 optimal locations.

18 As Pat noted, modernizing the grid to
19 accommodate distributed energy resources is
20 fundamentally changing our radial system designed
21 for one-way power flow from central resources to
22 the customer to a more flexible system

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1 accommodating two- way power flows with
2 intermittent power and load resources.

3 I liken this into converting a system of
4 one-way streets to a system of two-way streets
5 with intersections and what do you'd need for
6 that? You need stoplights, preferably
7 synchronized stoplights to control the traffic
8 flows. And therefore, really, this is all about
9 advanced system controls and situational
10 awareness.

11 The old days of the simple switch
12 capacitor to control voltage that switched twice a
13 day, on-peak and off-peak, are over. We're going
14 to need much more dynamic voltage control in
15 storage technology going forward for the system to
16 operate properly.

17 We also need much more advanced
18 protection. It's going to look a lot more like the
19 transmission protection systems with directional
20 and distance relaying to properly isolate faults
21 on the distribution system rather than the simple
22 overcurrent systems we have in place now. Once we

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1 get to that advanced control, we'll be able to
2 start looping and networking the distribution
3 system more to make it even more resilient and
4 reliable.

5 I'd like to close with a couple of
6 thoughts on the utility's role going forward.
7 Clearly, we have to plan this transition. We have
8 to do it proactively rather than just merely
9 reacting to increased penetrations. And our
10 vision is more of a plug-and- play grid. We have
11 to design the grid where we take on the excess
12 power and supply the backup power that our
13 customers don't have to pay that much attention to
14 it.

15 There is a lot of discussions around a
16 transactional grid, a distribution system
17 operator, but some of the inherent scheduling and
18 curtailments as we talk to customers, they're not
19 really that excited about that, and they want us
20 to design a grid where they can just plug and
21 play.

22 So with that, I will stop and close it

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1 out until we get into the discussion session.

2 MODERATOR KELLEY: Thank you, Ron.

3 Jorge?

4 MR. CARRASCO: Good morning, my name's
5 Jorge Carrasco, and I'm the General Manager for
6 Seattle City Light.

7 I think I'm the only public utility
8 here, so I'd like to start by first thanking the
9 Department of Energy for providing the opportunity
10 to give you this input.

11 And I'd like to start by telling you a
12 little bit about our utility. We're a midsize
13 utility, unlike some of the large brethren to my
14 left. We have been in business for over 100 years.
15 We are municipally owned, so our governing body is
16 the mayor and city council. We serve about
17 420,000 customers and a population of about --
18 between three-quarters of a million and a million
19 people.

20 Seattle, in 2013, was the largest, or
21 fastest growing city in the country. It's very
22 urbanized; we're very compact, a very densely

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1 populated area. We have a very diverse customer
2 base. And we are 90 percent hydro. And at this
3 point, I believe we're the only utility in the
4 country that is net carbon neutral and have been
5 since 2005.

6 So there are three main points that I'd
7 like to make this morning, and the first has to do
8 with climate. And I'd like to take the
9 opportunity to commend the President and the
10 Administration for using this process to begin to
11 advance action on climate.

12 Seattle is very involved and very
13 committed to dealing with climate. Beyond the
14 utility being climate neutral, the city has
15 adopted a plan dated back to 2006, updated in
16 2013, to achieve net zero greenhouse neutrality
17 for the city, not just for the utility, but for
18 the city, by 2050 and to begin to prepare the city
19 for the likely impacts of climate.

20 Now, you might think why are we doing
21 this? We don't have coal plants. We don't have --
22 we don't even have -- we don't even generate gas,

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1 so why are we doing this? Well, the reason is
2 Seattle is located right next to the Puget Sound.
3 We are 90 percent hydro and climate is having an
4 impact on our capacity to generate from hydro
5 sources. So climate impacts on our watersheds, on
6 our hydro facilities, and even on our energy
7 delivery infrastructure are things that are of
8 concern to us, and for that reason, we're very
9 interested in what's done with regard to climate.

10 Just to give you an example, in the
11 Skagit River Basin alone, where we have several
12 hydro facilities located, the glacier area in the
13 Skagit has declined by about 19 percent since
14 1959. So we're seeing the real impacts of climate
15 in a very significant way. And we're also seeing
16 temperatures being warmer. We're seeing less snow
17 pack. We're seeing lesser flows in the spring and
18 the summer. And we're seeing a much greater
19 propensity for mudslides to take place. So that
20 is an issue that is of concern to us.

21 And in response to the question, how can
22 the Federal Government help, two suggestions. One

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1 is, I know that FEMA has recently proposed funding
2 for planning and hardening utility infrastructure.
3 If there are funds available, I think that would
4 be a big help.

5 More importantly, I think, and perhaps
6 less expensively for the Federal Government, we do
7 think that there's an opportunity to share best
8 practices among utilities on how to deal with both
9 regional and national climate impacts and creating
10 a forum to advance this type of conversation would
11 be of great value.

12 The second thing I'd like to address is
13 aging infrastructure. So one of the significant
14 issues we face in Seattle is the fact that we have
15 old infrastructure that needs to be fixed or
16 replaced. Over the next six years, we plan to
17 spend close to \$2 billion on infrastructure, and
18 two-thirds of that is committed or dedicated to
19 distribution-related infrastructure.

20 And there's a great opportunity as we
21 spend this money to do it right, and that means to
22 make sure that where there are opportunities to

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1 make this infrastructure smarter, that we take
2 advantage of that opportunity. And I think,
3 therein lays another opportunity for the Federal
4 Government to help with basic and applied
5 research.

6 And then the final item that I'd like to
7 cover because I'm running short on time here, is
8 the issue of energy independence by our customers
9 and greater customer choice. An, I think this is
10 a topic that others have alluded to. But the
11 reality is, in Seattle, customers want more
12 control over their energy use. And, in fact, they
13 want more control over who provides them with
14 energy.

15 Solar, despite the cloudy weather in
16 Seattle, is very popular. In fact, the payback in
17 Seattle for a typical installation is now 4.9
18 years. And that is largely the result of federal
19 and state incentives and net metering that are
20 making that possible. And I might add that in
21 Washington State, 25 percent of all the installed
22 solar capacity in the state is in Seattle itself.

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1 The second thing I would say is that
2 energy efficiency is very popular in the city, and
3 we have very extensive, aggressive energy
4 efficiency programs. In Seattle, on average, we
5 save about 1.4 percent of our load every year.

6 What's happened, however, is that our
7 load is very flat even though we're the -- in
8 2013, the fastest, largest city in the country,
9 and like my colleagues, we're faced with problems
10 in terms of revenue recovery because our rates are
11 not designed to recover our fixed costs. So many
12 of the investments that we're making, we're having
13 a difficult time recovering through our rate
14 design structure, and that's one of the
15 significant issues that we face.

16 I'd like to close with one observation,
17 and that is, that if there is an opportunity for
18 the federal government to help, I think that
19 opportunity is the electrification of the
20 transportation sector. That is an area that we
21 believe offers an opportunity for more load
22 growth, more revenue to deal with the issues that

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1 I alluded to before and an opportunity where I
2 think the Federal Government is well suited to
3 helping us figure out how to develop, finance, and
4 deploy a charging infrastructure to ensure that
5 this electrification of the transportation sector
6 can be successfully accomplished.

7 And with that, I'll stop.

8 MODERATOR KELLEY: Thank you, Jorge.

9 Dave?

10 MR. MARKHAM: All right.

11 Well, good morning, everyone. I'm Dave
12 Markham. I'm the President and CEO of Central
13 Electric Cooperative. And we're the distribution
14 utility that delivers electricity to rural
15 consumers, and that's over a 5,300-square-mile
16 service territory in Central Oregon. And if
17 you're not aware, co-ops, we're democratic. We're
18 local controlled organizations, and they're --
19 we're owned by our consumers. And they
20 participate in setting policies and making
21 decisions for the co-op.

22 And so today, what I really -- my focus

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1 is on is that importance of that local decision
2 making and the local control. And since you're in
3 the West, I'm going to try and talk to you a
4 little bit about some of the unique challenges
5 that we face here.

6 And, first of all, it's not easy to
7 delivery electricity to rural America. And the
8 density issues that we face, they're pretty
9 significant. Investor- owned utilities, they
10 serve an average of 34 consumers per mile of
11 distribution line, where electric co-ops, we serve
12 an average of 7.4 consumers per mile of
13 distribution line.

14 And give you a little bit of a flavor
15 for that, the vastness of our service territory, a
16 neighboring co-op to mine, they serve 3,900
17 consumers, and that's over a 20,000 square mile
18 service territory. Now, that's a service
19 territory that's roughly the size of the State of
20 West Virginia. And so you can see the challenges
21 there.

22 And another significant challenge that

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1 we face in the West, and I believe is this a
2 challenge this is also encountered by the IOU's,
3 it's maintaining our electric infrastructure on
4 federally managed lands. And for CEC, 56 percent
5 of our service territory falls on BLM and Forest
6 Service lands.

7 And just a couple months ago in May, I
8 testified at a hearing at the House Committee on
9 Natural Resources in Washington D.C. And I
10 reported on the unacceptable periods of time that
11 it takes to receive approval from our federal land
12 agencies to perform just routine maintenance and
13 then other things like upgrading our system or
14 replacing our power poles and lines.

15 And so we are also dealing with some
16 issues that are related to the Endangered Species
17 Act. In Oregon, the BLM, they're considering a
18 proposal for protecting the sage grass. And that
19 proposal calls for burying all the overhead power
20 lines that are in sage grass habitat. And these
21 are overhead power lines that have existed for 60
22 or more years. And for one co-operative, to bury

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1 all of their power lines, it would end up
2 resulting in \$400,000 per consumer cost.

3 So we need to ensure that we have common
4 sense when we look at implementing our federal
5 policies.

6 And at CEC, our consumers, they've told
7 us that they want additional options for
8 purchasing renewable energy. And my co-op, we're
9 in the design phase of a community solar project,
10 and this is going to allow our consumers that
11 maybe couldn't participate in a traditional method
12 of solar that they can easily be involved in this.
13 And we really want to continue to grow the
14 industry in Oregon. But unfortunately, the cost
15 of developing renewable energy, it's much higher
16 than other forms of traditional, conventional
17 generation.

18 And so I really urge the Administration
19 and the Department of Energy to continue to seek
20 out incentives that support Electric Co-op in our
21 efforts to deploy renewable energy.

22 But in the Pacific Northwest, our main

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1 energy supplier, I think you all know, is the
2 Bonneville Power Administration. And their power
3 supply resources are 95 percent carbon emission-
4 free. And I cannot overstate the importance of the
5 role that the Bonneville Power Administration
6 plays in the economic vitality of the Pacific
7 Northwest.

8 And we know that there was some recent
9 hiring problems at BPA that led to some -- DOE to
10 suspend some delegated authorities and implement
11 some -- several top-down directives, but -- and
12 this created a lot of concern that the
13 independence of BPA was going to erode and that
14 the regional decision making process was going to
15 suffer. But we're very encouraged by -- due to
16 the fact our Northwest delegation and our regional
17 stakeholders, after communication, that the DOE
18 has assured us that BPA's independence would be
19 respected.

20 Now, co-ops, we have a long history of
21 promoting energy efficiency and conservation. And
22 we've been doing this for years and long before it

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1 became mainstream. You know, our consumers have
2 told us that they want energy efficiency. And
3 they also want more knowledge so that they can
4 better control and manage their energy use and
5 costs at home.

6 In co-ops, we've delivered on that
7 request. Co-ops, we have the largest penetration
8 of advanced metering infrastructure with 31
9 percent. That's compared to 23 percent through
10 the country as a whole.

11 My co-op, in conjunction with AMI, we
12 offer a prepaid electric service, and it allows
13 our consumers to pay in advance for their
14 electricity. And then they can use it on their own
15 schedule and on their own budget.

16 And I also -- I don't want to neglect
17 thanking the Department of Energy for their role
18 in my utility's deployment of AMI through the
19 Smart Grid Investment Grant Award, and that was
20 made available through the American Reinvestment
21 Recovery Act. And so, you know, these
22 partnerships, they're what are really important

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1 for success for all of us.

2 And so just in conclusion, electric
3 cooperatives, we're going to continue to be
4 leaders and innovators as long as we're not
5 burdened by regulations. Now, last year,
6 government regulations, they impacted my utility
7 in the amount of \$20 million. And these costs,
8 they're ultimately -- they're passed on and paid
9 for by our consumers through higher electric
10 rates. And that \$20 million, that's equivalent to
11 \$632 per meter that we serve.

12 So my main message today is that I urge
13 the DOE to work closely with the American
14 cooperatives so that you can gain a better
15 understanding of how your policies, no matter how
16 well intentioned, they can come back and have an
17 impact on the electric rates to our consumers.

18 And so thank you for the opportunity to
19 participate on this panel. I look forward to
20 answering any questions.

21 MODERATOR KELLEY: Thank you, Dave.

22 MR. SAVAGE: Okay. So when I started

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1 out as a commissioner in 2003, we did not focus a
2 lot of regulatory attention on the distribution
3 system. We did our job. We wanted to make sure
4 there was high quality service, but I can't say
5 that we had docket after docket dealing with the
6 distribution system.

7 That's been changing. Just some
8 examples. We now require our utilities to submit
9 their modernization plans for distribution system
10 and hold regular briefings with them on their
11 investments. We conducted investigation and
12 adopted policies related to smart grid and
13 electric vehicles. We just completed an
14 assessment of the impacts of Oregon Solar PV
15 programs on customers and on the system. And
16 we're about to open a rulemaking into the use of
17 smart invertors, which was actually something that
18 came out of a Western Energy Industry Leader
19 group.

20 What's triggered the two, I think, the
21 change, is two things. One, we're beginning to
22 see in Oregon the same policy cost and technology-

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1 driven shifts that are occurring in California,
2 although on a much, much smaller scale in a much
3 smaller timeframe. For example, the amount of home
4 rooftop solar in Oregon has increased eightfold
5 over the last few years.

6 Our big box and high tech companies --
7 Walmart, Staples, Facebook, Apple, Intels -- all
8 want to go renewable either on site or by -- from
9 nearby plants. Two, we also saw the possibilities
10 from the new distribution automation technologies
11 and enhanced demand response to lower cost to
12 customers and improve system operation.

13 Now, I can't say -- we have --
14 California's leading the way. It's the microcosm
15 of everything in this. I can't say how far and
16 fast we'll move towards a more decentralized, more
17 digital, or more customer- oriented system in
18 Oregon and elsewhere in the West, but it's
19 occurring and we should plan for it.

20 So, I'm going to quote from a 2012 DOE
21 publication called "Addressing the Electric
22 Distribution System":

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1 "Integration of rooftop PV, electric
2 vehicles, microgrids, transactive building loads,
3 and other technologies in large amounts will
4 fundamentally change how the distribution system
5 must be planned and operated. Increased
6 variability from PV generation, the movement and
7 charging of electric vehicles and the rise of
8 prosumers, producers, and consumers of electricity
9 will require increased system flexibility and
10 control of building. There are also opportunities
11 for these technologies and assets to provide
12 system flexibility to the bulk transmission
13 system, concurrently it is vital with the right
14 sensor software and communication technologies are
15 available and in place."

16 This is a draft plan, so I just want to
17 be very specific -- this was a draft plan I quoted
18 from. I think it did a good and wonky job of
19 summarizing the challenges and opportunities that
20 are facing the distribution system over the next
21 couple of decades.

22 I think these include: accommodating

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1 potentially large amounts of distributed
2 generation in many areas; making the best use of
3 technology, such as advanced meters to increase
4 the quality, reliability, and efficiency of
5 service; expanding the cost-effective
6 opportunities for consumers to reduce peak store
7 or store energy and provide good services;
8 handling the charging of electric vehicles in a
9 way that benefits vehicle owners and the power
10 system; increasing operator visibility and control
11 over the distribution system; and seeking
12 technological breakthroughs in distributed gen,
13 electric end-use and storage.

14 So I'm going to end with one suggestion
15 for DOE action. DOE should take the long view, as
16 you're doing, and should help guide the evolution
17 of the grid. I think one of our needs is a
18 roadmap for modernizing the distribution system
19 over the long run.

20 And you have appeared to have a good
21 start on one in the draft distribution system plan
22 I quoted from, so my suggestion is: finish it.

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1 MODERATOR KELLEY: Thank you.

2 Okay. So now we are going to turn to
3 our discussion. We'll start off with, again, a
4 common theme that I heard and probably
5 encapsulated in Jorge's comments best was -- is
6 that the customers want a sustainable grid, a
7 reliable grid. But we're -- you're also faced
8 with increased renewables and the economic and the
9 operational impact associated with that. So what
10 is the role of DOE here in helping you to address
11 that issue in particular?

12 And I'll start with you, Jim.

13 MR. PIRO: Good question.

14 Well, you know, this whole idea of
15 integration of renewables is becoming a real issue
16 for the utility industry, whether it's solar,
17 whether it's wind resources. We've got a lot of
18 variability on the system. And so, more -- as we
19 talked about earlier, the need for storage is
20 really critical. But really, what we need is to
21 have more demonstration projects where we see
22 where there might be optimum technologies that can

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1 help and enhance the operation of the system and
2 have them work on those demonstration projects.

3 I mentioned water heater load control.

4 The electric utility industry has a tremendous
5 amount of load in the water heater space that
6 could be used for thermal storage, but we're going
7 to have to convert that technology and get it so
8 that it's connectable to the grid and get the
9 manufacturers to put the smart chips in those, or
10 at least the smart socket in those water heaters,
11 as part of the standards so we can convert that
12 fleet.

13 But my sense is that there are a number
14 of tools and capabilities out there to address
15 this. I think it's a matter of putting those
16 together and then demonstrating them. Our Smart
17 Power Project is another example of that where
18 we've got DOE funding. We're learning how storage
19 works. But ultimately, we're going to have to
20 drive the cost down to make those cost-effective.

21 MODERATOR KELLEY: Thank you.

22 Pat?

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1 MS. VINCENT-COLLAWN: And, I want to
2 echo what Jim said and then add another thing.

3 You know, storage is the holy grail to
4 all of us. We were fortunate at PNM to have a
5 demonstration project with DOE where we had
6 battery storage directly integrated with the
7 utility scale solar to help reduce the variability
8 of that, and that has been a very groundbreaking
9 project.

10 But the other thing I would say is, you
11 know, recognizing the role that utilities play in
12 distribution system operations, you know, we have
13 that obligation. We know how to do it. We're
14 already working on a lot of technologies,
15 invertors, things like that, that are commercially
16 available. The storage one is not yet
17 commercially available and cost-effective, but --
18 so it's helping on storage, where it just -- it
19 doesn't probably make sense for private enterprise
20 to put that money in and then recognizing the
21 utility's role and expertise in managing that
22 distribution system.

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1 MODERATOR KELLEY: Ron?

2 MR. LITZINGER: I would agree that
3 storage is a key thing, but I'm going to digress
4 and pick up on a point that Jorge made on
5 electrification of transportation in two reasons.

6 One is around, it provides you a lot
7 more flexibility around managing load on the grid.
8 As we evolve towards a smart grid, which I think
9 will be cheaper in the long run than storage, not
10 only do we need a smarter grid, but
11 electrification of transportation not only
12 provides you a storage resource but another way to
13 manage load going forward.

14 And then, the second benefit of -- on
15 electrification of transportation, having been
16 around the industry for 30 years, if you had asked
17 me 10 years ago whether I thought battery
18 technology was going to play a significant role, I
19 was in sort of a cost-prohibitive category. But I
20 think with electrification of transportation, that
21 just in and of itself, has advanced this strong,
22 declining price trend that we see in storage

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1 technology, s, we have to stay continued focus on
2 that as well.

3 MODERATOR KELLEY: Jorge?

4 MR. CARRASCO: So, I mentioned earlier
5 the notion that electrification of transportation
6 sector has multiple benefits, not only for
7 utilities, but for our customers. And I think
8 that that is a big opportunity that the Federal
9 Government is well suited to engage in and help us
10 with how best to accomplish that.

11 There's a lot of infrastructure
12 investments that utilities don't commonly make.
13 And I'm not talking about charging stations in a
14 customer's home. I'm talking about charging
15 stations that are going to be needed in locations
16 where normally utilities wouldn't be placing
17 charging stations for customers. So I would say
18 that is one area.

19 And the other area that I would call
20 attention to is the EPRI study that Pat made
21 reference to. This whole idea of an integrated
22 grid is really a concept that I think could have

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1 very positive impacts, again, for utilities and
2 customers.

3 There's been a tension, at least
4 recently, between utilities, certainly in our
5 area, and customers over the issue of them wanting
6 more independence and us feeling like they're not
7 paying all the cost of serving them, and there's a
8 tension there that we keep running into.

9 But if you stand back, those two things:
10 the issues that the utility has to undertake in
11 terms of reliability, investments and
12 distribution, et cetera, and the things that the
13 customer is doing to exert more independence and
14 to, kind of, use energy in the way they want to, I
15 think there is a tie between the two that could
16 actually result in a win-win if the technologies
17 can be developed and figured out.

18 And I think EPRI has done a great job of
19 essentially identifying the opportunity and
20 inviting a conversation about how best to have
21 these technologies interact so that it's a win-win
22 for both the utilities and the customers, and

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1 they're paying their fair share of the cost as
2 well.

3 So I would say those two things would be
4 important ways in which the Federal Government can
5 make a big difference.

6 MODERATOR KELLEY: Thank you, Jorge.

7 Dave?

8 MR. MARKHAM: Yeah, my answer is along -
9 - same along the lines, but from a co-op
10 perspective of, you know, I believe the DOE should
11 be involved in and investing in cutting-edge
12 technology, but it's a lot more difficult to
13 implement locally without assistance.

14 And so, I mentioned during my opening
15 remarks, that the DOE has partnered with co-ops on
16 smart grid. Mine was one of them and also cyber
17 security. We wouldn't have been able to push down
18 the road to where we are without DOE's assistance.
19 And what it's done with our system as far as
20 reliability, improvements, and giving our members
21 more control, more knowledge, which is exactly
22 what they want, has been very important.

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1 Everybody's talked about storage
2 technology. I believe that it has to be a high
3 priority. And until we get there, we can't take
4 renewables and these other issues to the next
5 level.

6 MODERATOR KELLEY: John?

7 MR. SAVAGE: Yeah, the -- actually, I
8 like a phrase that Jim Piro said to me before this
9 panel started about utilities, he wanted to be a
10 "fast follower," which I think is a great phrase
11 for utility. That's exactly where utility should
12 be. I mean -- so, the question is who's going to
13 -- so, who's going to lead them? And I think that
14 this -- you know, listening to this panel, there's
15 some great ideas, is that DOE should work together
16 with the industry and create a shared agenda on
17 demonstrations and investments, you know, new
18 technologies that should be -- applications that
19 should be worked on. I mean, I like -- smart
20 appliances, that has got a lot of potential. The
21 data analytics, the EV's, the storage, this is all
22 good stuff, but I think it'd be sitting down with

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1 the industry and creating that shared agenda, to
2 me would be really important.

3 MODERATOR KELLEY: Thank you.

4 So with that, let me turn to another
5 topic and that of security. So, probably, you've
6 all touched on this a bit in terms of reliability,
7 tangentially maybe.

8 But specifically, Dave, you mentioned
9 cyber security. And I'm curious to know your
10 thoughts on the Federal Government's role in terms
11 of cyber security. Is it -- you know, is it a
12 funding role? Is it an education role?
13 Communications role? All of the above?

14 So, anyone. I'll open this up to
15 whoever would like to comment first.

16 MR. LITZINGER: I'll go ahead and lead
17 off on that.

18 There's been a lot of discussions over
19 the last several years. Cyber security is a
20 significant issue. And probably the biggest thing
21 that we keep coming back to as the industry is the
22 Federal Government has the expertise and the

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1 resources for intelligence. And we've got to come
2 up with ways of sharing information. I think
3 progress is being made on sharing information back
4 and forth around threats, but that's probably the
5 larger role.

6 When it comes to resilience of the grid,
7 I believe the industry, you know, has a long, you
8 know, for us 128-year, track record of that. We
9 can always get better and improve. But I think
10 information sharing is the key on cyber security.
11 And I think all of these are solvable. We have
12 certainly spent a lot of resources and time and
13 effort on shoring up cyber security on our system.

14 But as we go to a more distributed and a
15 more smarter grid, we can't lose sight of the fact
16 that we are exponentially increasing the number of
17 portals into the system for cyber issues. And I'm
18 not saying that is a reason not to go there.
19 We're fully prepared to go there. We just have to
20 recognize it and deal with it along the way.

21 MODERATOR KELLEY: Yeah, Pat?

22 MS. VINCENT-COLLAWN: I'll echo a little

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1 bit of what Ron said. I'd like to remind people
2 that we are the only industry that is under
3 mandatory, enforceable, with very significant
4 penalty, standards around cyber security. And so
5 I always tell my commissioners they can rest
6 assured because when it comes out of the
7 pocketbook and it doesn't -- fines do not come out
8 of rate payer's pocketbooks, they come out of
9 shareholder pocketbooks that we work very hard on
10 this.

11 Part of it -- a lot of it is that
12 information sharing and not just the Government's
13 ability to share information with us, but the
14 Government sharing information within its many
15 agencies. We have a lot of, kind of, cyber folks
16 out there in the Government. And if they can
17 share with each other and then share with us, that
18 is very helpful.

19 I also think helping to set standards
20 for all of these folks that are interconnected
21 with us, because, you're right, the number of
22 points for cyber threat is just going up

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1 exponentially when they connect on the grid. So I
2 think -- and I think helping put that discipline
3 and possibly standards for those industries that
4 are making and connecting with us would be very
5 helpful.

6 MODERATOR KELLEY: Dave?

7 MR. MARKHAM: Yeah, for me, I believe
8 guidance and information is a top priority for
9 DOE. And internally, it's one of our higher
10 priorities at my co-op. Everybody has said it
11 here, but the ability to be in a position to share
12 information, BPA has been extremely helpful for
13 the co-ops. We have work groups, user groups,
14 whether it be in the state or nationally. But the
15 more information we can share the better, that we
16 can help somebody else so they can help us. And
17 really with cyber security, things are moving so
18 fast that you better have those work groups set up
19 and new information all the time.

20 MODERATOR KELLEY: Jim?

21 MR. PIRO: There's been a lot in the
22 press around physical security of the grid. And,

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1 you know, the industry has gotten very close in
2 working together on spare transformers, which is
3 the big issue. What would be helpful from the
4 Department of Energy as well as their other
5 agencies is, what is the credible threat that we
6 need to defend against? Because, you hear so much
7 about, you know, what are we going to defend
8 against?

9 NERC and FERC have started that
10 proceeding. I think we're starting to work through
11 that, but better clarity on what it is we need to
12 defend against. I think we need, as the utility
13 industry, continue need to work on resilience and
14 using our spare transformer program is a good way
15 to address that. And I think that's moving in
16 good step. I think we're adding more spares to
17 the system as we, kind of, see what the credible
18 risks are that we're trying to defend against.

19 MODERATOR KELLEY: Any other comments?

20 Jorge?

21 MR. CARRASCO: So I would agree that
22 information sharing is key and the more of that,

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1 the better.

2 The only other thing I would add is that
3 there's been an extensive amount of work done by
4 NERC and FERC putting in place protocols relating
5 to cyber security and physical security for that
6 matter. And I would urge DOE and the Federal
7 Government to build on that and not to start anew
8 additional requirements that are going to, I
9 think, ultimately stand in the way of progress.
10 And I think NERC, by and large, has done a pretty
11 extensive job that we should build on rather than
12 begin anew.

13 MODERATOR KELLEY: Anyone else want to
14 comment?

15 John, did we hear from you?

16 MR. SAVAGE: Right now, in terms of us,
17 it's whatever our utilities need and want because
18 I look to our utilities to make sure that we're
19 resilient. So that's pretty much all I would say.

20 MODERATOR KELLEY: So let's turn to a
21 regulatory perspective here. So we did hear a bit
22 about the challenges associated with the impact of

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1 regulation. But, maybe if we can look from a
2 different lens, do you see challenges associated
3 with any conflicts between federal, state, or
4 local regulation? And is there an impact there to
5 you? And if so, again, what is -- what should the
6 Federal Government be doing here? What is this
7 QER task force listening. So what should they be
8 doing differently, maybe, that they aren't doing
9 already?

10 Anyone care to take that one?

11 MR. SAVAGE: I could see -- I guess I'd
12 use the phrase that I was -- in the previous
13 panel, I was talking about the blurring of
14 transmission and distribution, which is going to
15 me, end up with some conflicts, and I think we're
16 already beginning to see the conflicts between
17 FERC and the state regulatory agencies. I don't
18 know if that leads to joint board -- more joint
19 boards out there to deal with some of these
20 issues. I think the immediate one of demand
21 response in the East in the markets and what that
22 pace meant.

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1 We don't -- you know, we only -- we have
2 regulated markets in California. So -- but I can
3 see more and more that if there's quite a bit of
4 generation that's at the distribution level, that
5 all of sudden you're going to get into some
6 stickier issues down the road.

7 MR. LITZINGER: One thing I'd add is --
8 I mean, largely, you know, this panel's focused on
9 distribution, and that's largely fallen to the
10 state regulation and transmission to federal
11 regulation, the previous panel. But I agree with
12 Commissioner Savage that that line is going to be
13 blurred.

14 You do have to get to fairly high
15 levels, at least based on our studies, where
16 distributed resource penetration on the
17 distribution grid starts to be sufficient enough
18 to impact flows on the bulk power system. I'm not
19 -- I point that out only to say that I think we
20 have time to work out that cooperation between the
21 federal and state agencies because it likely will
22 happen, but we do have some time. And I would

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1 encourage all regulators to anticipate it rather
2 than react at the time when it occurs.

3 MODERATOR KELLEY: Yes, Pat?

4 MS. VINCENT-COLLAWN: Yeah, I would
5 encourage the Federal Government as they go
6 forward to respect local circumstances and local
7 regulators. You know, different states have
8 different renewable potential, even different
9 kinds of renewables.

10 For example, we're in Texas where
11 there's a great wind potential. New Mexico,
12 there's solar potential. There's different income
13 levels of our customers. There's different needs.
14 There's rural locations. There's urban locations.
15 So I think it's understanding that naturally we
16 want to get somewhere, but the local -- the states
17 and the local municipalities are going to get
18 there very, very differently, so make sure there's
19 that kind of flexibility.

20 MODERATOR KELLEY: Jim?

21 MR. PIRO: Prices are set at the local
22 level, at the state level. So I still continue to

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1 urge the, kind of, collaborative approach at the
2 state level, working closely with your regulators.
3 Federal Government can set some policy and ideas,
4 but I think as Pat mentioned, every jurisdiction
5 is different in how it's going to work.

6 And I really think it's the best way to
7 get these things implemented is to bring people to
8 the table and have that collaborative discussion.
9 Think about both costs and benefits because there
10 are those two sides of it and really make sure
11 that we balance that as we set our customers'
12 prices and make decisions on technologies that are
13 sometimes 10- or 20- year kinds of investments.

14 MODERATOR KELLEY: Dave?

15 MR. MARKHAM: I'm going to back first on
16 the local control and local decision making for
17 cooperatives, and that's what's helped us operate
18 so efficiently for over 75 years. I'm going to
19 jump back in real briefly on something during my
20 presentation, what I testified at in Washington
21 D.C. John understands that we have requirements
22 for maintenance of our facilities. That may be

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1 replacement of poles, upgrades, that sort of
2 thing, inspection.

3 When we have to wait for years to get
4 approval for permits from our federal land
5 agencies for us to be able to do maintenance on
6 our systems, that creates some real issues for us,
7 and we've got to get by that, and we've got to be
8 able to get some streamline measures in place so
9 that we can meet not only the best business
10 practices that we have, the mandates by our state
11 and not be held up by our federal land agencies.

12 MODERATOR KELLEY: Any other comments?

13 Okay. So in the last panel we talked a
14 bit about technology and, in the case of
15 transmission, the deployment of PMU's on the
16 system, perhaps the analog here in the
17 distribution world is advanced metering
18 infrastructure or distribution automation. So I'd
19 like to talk a little bit about just the
20 technology you see in the future and, again, back
21 to that federal role in helping in terms of
22 investment, education.

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1 We heard, I think from Dave, about your
2 smart grid project that was funded through federal
3 dollars. Is there -- are there other technologies
4 that should be explored? And just to -- before I
5 wrap up my question here just -- the initial
6 comment I heard on the PMU's was that it wasn't
7 necessarily a response to the technology, or not
8 necessarily an investment in technology, but it's,
9 how do you take the technology to the next level?
10 So I just ask, is that where you see the next
11 steps?

12 So who would like to take that?

13 MR. MARKHAM: I'll jump in because, you
14 know, I'll take off here from where I left off.
15 We had a partnership with DOE on smart grid, very
16 successful, very good. As I mentioned, we're
17 rolling out our community solar program. I would
18 really like to be able to implement storage
19 technology in with that at some point because we
20 want -- I want to be able to pilot load shifting,
21 see the benefits of that and that's a role that I
22 think the DOE can really help with co-ops like

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1 mine is in storage. I'm going to go back to that
2 and implementing these renewable energy projects.

3 MODERATOR KELLEY: Thanks.

4 Jorge?

5 MR. CARRASCO: So I alluded earlier to
6 the fact that we are spending a great deal of
7 money trying to address aging issues,
8 infrastructure issues in the distribution system.
9 And as we're doing that, it's a great opportunity
10 to make sure that we take advantage of any new
11 technologies that make the grid smarter. And while
12 there's been a lot of talk and fluff about smart
13 grid, I'm not sure anyone has actually
14 operationalized that in any comprehensive way.

15 And I think this is an area where the
16 Government, through perhaps investments and basic
17 and applied research, demonstration projects
18 perhaps, could help utilities take full advantage
19 of whatever opportunities exist as they're
20 updating or addressing the aging issue with new
21 technologies that can be made a part of that
22 investment.

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1 I think we're all going to be better off
2 long-term if that happens, and I think that would
3 be an appropriate role for the Federal Government
4 to play.

5 MODERATOR KELLEY: Thank you.

6 MR. LITZINGER: Yes. As we are
7 preparing our distribution resource plan that I
8 alluded to in my formal remarks, we are focused on
9 a lot of policy issues, but we are focused on
10 technology issues. And it's really a repeat, a
11 lot of the technology issues that we've looked at
12 since smart meter installations began and the
13 focus on a smart grid began to take off.

14 It really comes down to inner
15 operability standards for sensors and devices.
16 And the key for that is that we can communicate
17 with the customers' devices and that the
18 communications technology is fast enough to move
19 large amounts of information. I think the
20 computing technology is there to deal with the
21 large amounts of information.

22 We have to move it quickly, use it, and

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1 communicate it back to end-use devices very
2 quickly and that's going to continue to require
3 advancement. So the communications technology
4 itself. We're fortunate to have a lot of fiber on
5 our system. But the inner operability and
6 communication protocols with the devices of
7 customers will also be critical for this to
8 succeed in the end.

9 MODERATOR KELLEY: Thanks, Ron.

10 Pat?

11 MS. VINCENT-COLLAWN: I'm probably one
12 of the few investor-owned utilities that don't
13 have smart meters. And in our New Mexico
14 territory, our average -- customers' average
15 monthly bill is \$75. I can't make a business case
16 for smart meters. When I go over to Texas, the
17 average customer bill is about twice that. So I
18 can make a business case for them and the
19 regulators encouraged it. So those technologies
20 are there and they'll get deployed when you can
21 make a business case for it.

22 As I mentioned earlier, for example, New

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1 Mexico is unfortunately a very poor state, so
2 having the latest and greatest technology is not
3 necessarily a great thing. We actually say in our
4 strategic guidance that we're a "technology
5 follower" because of that. But I think it's those
6 places where the DOE can help doing demonstration
7 projects so that things can ultimately make --
8 become commercially available. And then
9 individual utilities can make business cases for
10 them because customers want stuff, but we have to
11 be careful about how much they're willing to pay.

12 Thanks.

13 MODERATOR KELLEY: Thank you.

14 MR. PIRO: Yeah, just a comment about
15 electric vehicles and electrification of the
16 transportation system. That second-life use of
17 batteries is really critical for the auto makers
18 because they need to find a secondary use to drive
19 down the cost of batteries, so that research is
20 pretty important.

21 And then, vehicle to grid, even though
22 it sounds really great, I will tell you in talking

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1 with the vehicle manufacturers, they haven't done
2 the work on that. And if that's going to make
3 sense, there's going to have to be some
4 significant R&D dollars. And that's based -- it
5 has a whole lot of implications to their
6 operations in terms of the car, in terms of how
7 much can you cycle that battery? So battery
8 cycling is a big deal, and some research in that
9 area would be helpful. And I think the auto
10 manufacturers would welcome that because they just
11 don't have all the resources to throw at that
12 technology.

13 MODERATOR KELLEY: Any other comments?

14 Okay. So with the time that we have
15 left, again, I will ask you to think about your
16 one comment or one suggestion that you have here.

17 And I know we've heard a lot of your comments
18 already to the DOE for the role of this QER task
19 force and the role of the Federal Government here.

20 So I will go ahead and start at this end
21 here with Jim.

22 MR. PIRO: Well, I sure like John's

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1 before me because my -- he's our regulator, but --
2 I would add to what John said in terms of driving
3 innovation. Really need to focus on economic value
4 and market transformation. I think we can't lose
5 sight that these things have to be economic for
6 our consumers can really drive market
7 transformation through codes and standards where
8 it makes sense rather than trying to do it one
9 size, you know, individually. Let's do it broadly
10 across the industry.

11 MODERATOR KELLEY: Thank you.

12 Pat?

13 MS. VINCENT-COLLAWN: I would think that
14 I would say is whether, you know, we're an
15 investor- owned utility, whether we're a
16 municipality, a cooperative, or a power market
17 agency, you know, we're all in the business of
18 delivering a public good and that safe, reliable,
19 affordable, environmentally sensitive power. And
20 we have to deliver it to everybody, not just the
21 affluent, not just the urban. And that's, I think,
22 a unique obligation and role that we've all

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1 happily taken on. And as, I think as we go
2 through this process of looking at our electric
3 grid, we need to keep that obligation in the
4 forefront of our minds.

5 MODERATOR KELLEY: Ron?

6 MR. LITZINGER: As we look at a
7 distribution grid of the future, we're really
8 focused on two things: A) you know, the
9 distribution grid remains vital. And it is going
10 to take technology development going forward.
11 And, secondly, rate design is critical. But since
12 this is focused at the federal level, I would
13 emphasize the technology aspect because the rate
14 design issues to ensure that the costs are
15 allocated fairly across all customers is more of a
16 local issue.

17 MODERATOR KELLEY: Jorge?

18 MR. CARRASCO: So I guess I'd come back
19 to this notion of the integrated grid and -- which
20 I think encompasses all the technologies that
21 we're all trying to contend with. And I think
22 there is a great opportunity to work in tandem,

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1 perhaps with EPRI and other organizations that are
2 trying to figure out the answers to how you can
3 get utilities and customers to work side-by-side
4 on solutions to this new energy future that we're
5 all faced with.

6 So that would be the one thing I would
7 say. And, of course, I mentioned earlier the
8 electrification of the transportation sector I
9 think is an area that -- it's kind of subset of
10 this integrated grid concept, but a critical one
11 for both environmental reasons and energy reasons
12 as well.

13 MODERATOR KELLEY: Thank you, Jorge.

14 Dave?

15 MR. MARKHAM: Yeah, go back to our
16 communication co-ops. We have a very unique
17 relationship with our consumer owners. We're
18 constantly finding out what they want and the
19 local co-ops, we're responsive. We set policies
20 responsive to their needs. We're walking the walk
21 as far as renewable energy.

22 And, as you know, in the Northwest, just

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1 about all the new resources coming on are non-
2 carbon emitting. And so, again, I believe the DOE
3 can help us streamline regulations as we try and
4 push forward with implementing technology and
5 giving our consumers what they really want.

6 MODERATOR KELLEY: John?

7 MR. SAVAGE: Finish your grid tech team
8 plan that I mentioned before. Second of all, work
9 with the industry to create a shared technology,
10 RD&D&D agenda that would be aiming, you know, that
11 you'd be really zeroing in on stuff for the
12 utilities. I think it would make a lot of sense.
13 It would drive down costs, make it operational,
14 and also bring comfort for the use of the
15 technology.

16 MODERATOR KELLEY: Great, thank you.

17 MR. CARRASCO: Just had a thought that
18 I've been contending with of late back home, but
19 our industry is one of the least understood and
20 underappreciated industries in my opinion.
21 There's a lot that goes in to keeping the lights
22 on that many of our customers don't understand

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1 and, in some cases, don't care so long as the
2 lights are on. And creative, different,
3 innovative ways of educating people on what's
4 behind keeping the lights on oftentimes become
5 controversial and misunderstood.

6 And I think to the extent the Federal
7 Government has opportunities to broadly educate
8 the public on the vitality of the electric service
9 they get and the critical nature of it and the
10 challenges that our industry faces, I think it
11 would be money and time well spent.

12 MODERATOR KELLEY: Great closing
13 comment.

14 So, once again, thank you to this panel
15 for joining us here today. I learned a lot.
16 Thank you.

17 (Applause.)

18 MODERATOR KELLEY: Okay. So, at this
19 point, we're actually going to be taking a lunch
20 break. And before you head out the door and leave
21 for good, I just want to encourage you to return
22 because as you heard from our panelists here, a

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1 lot of interest in energy storage on their part,
2 and that's exactly what our next panel is all
3 about.

4 So, we will be taking a break until 1:00
5 p.m. The lunch location, there is a cafeteria
6 down the hall, but I'm told that that -- you may
7 have better options if you go down the stairs.
8 And there's some students to guide you to get to
9 the downstairs option, which is supposed to be
10 better.

11 So we are going to start sharply at
12 1:00. For those of you who are joining us via the
13 live stream, please bear with us for the next hour
14 and a bit. We'll get started at 1:00. So thanks,
15 everybody.

16 (Whereupon, the lunch break was
17 taken at 11:53 a.m.)

18 (Meeting resumes at 1:04 p.m.)

19 MODERATOR KELLEY: Okay. Well welcome
20 back, everybody. I hope everyone enjoyed their
21 lunch. It seems like we lost a few, but not too
22 many folks.

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1 So we are going to get into our third
2 panel here in a moment. Third panel is focused on
3 storage. They're finally coming.

4 I'm joined up here again by a
5 distinguished set of folks who will be providing
6 us with their comments. Of course, we have Haresh
7 Kamath, Program Manager, Energy Storage, Electric
8 Power Research Institute; Carla Peterman,
9 Commissioner, from the California Public Utility
10 Commission; Geisha Williams, Executive Vice
11 President for Electric Operations, Pacific Gas &
12 Electric; Arlen Orchard, the General Manager and
13 CEO, and Chief Executive Officer of Sacramento
14 Municipal Utility District; and Steve Klein, CEO
15 of Snohomish County Public Utility District.

16 So, again, we'll follow a similar format
17 where we're going to hear some comments from these
18 -- these distinguished folks. And, again, I
19 remind everyone that if you haven't yet signed up
20 to provide comments at the end, I encourage you to
21 do so. You can still do that at the front table.

22 Immediately following this session, we

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1 will be turning to the public comments. And then,
2 again, for those who are joining us via live
3 meeting, please submit your comments via email.
4 And, once again, I remind you that the panelists'
5 views are their own and not the views of the U.S.
6 Department of Energy.

7 So, with that, let's turn to Haresh.

8 MR. KAMATH: Thanks very much, Chris.

9 I'm Haresh Kamath with the Electric
10 Power Research Institute. We are studying many of
11 these issues and storage is a program that I work
12 in.

13 In -- to preface a lot of the remarks
14 today, I want to remind everyone that when you
15 look at the grid as it operates today, it was
16 really designed to operate without a significant
17 amount of storage. And it does, and it has
18 operated for over 100 years without a great deal
19 of storage on it.

20 There are a few storage plants out
21 there, about 2.5 percent of the grid in the U.S.
22 And it's comprised entirely, almost entirely, of

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1 pumped hydro units at the transmission level. So,
2 the question is legitimate, do we really need
3 storage on the grid?

4 What we do know is -- I talked to the
5 system operators, that the amount of storage --
6 the storage that is out there is extremely
7 valuable. And when you talk to them about its
8 value in the regulated grid, they will tell you
9 that it is very handy to have, and they would not
10 give it up for the world.

11 Furthermore, we think that the need for
12 our energy storage is going to increase as we see
13 the challenges and the opportunities of increased
14 penetration of variable generation as well as
15 distributed energy resources on the grid. So the
16 real challenge is if we can make better, or if we
17 can make good use of the energy storage that's out
18 there, how can it be deployed? And where are we
19 going to get it from?

20 So there are a couple of things that we
21 have to think about for the technology. And the
22 first thing is that energy storage continues to be

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1 an extremely expensive technology and relatively
2 difficult to implement. There are new
3 technologies that are being developed right now.
4 There's a great deal of research that's being
5 done, not only that's funded by agencies like the
6 Department of Energy, but also by the private
7 sector.

8 The private sector has really taken up
9 this challenge, not just because of the grid need
10 for energy storage but also because energy storage
11 is starting to become a very important technology
12 for everything else. For example, the cell phones
13 that you carry, the laptops that you use, all have
14 batteries in them, and that would not be possible
15 without a lot of the research that's happened in
16 the last 30 years.

17 That research is going to ripple across
18 into all the other industries out there. You've
19 already started to see it make inroads into, for
20 example, transportation, electric transportation.
21 And now, you're going to see it really enter the
22 grid.

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1 That said, even for those technologies
2 that exist today, we don't have on the grid side
3 any really established products or product
4 solutions from vendors that have been in operation
5 for many, many years.

6 There are a few vendors out there who've
7 developed and delivered good products. And we've
8 seen a few in the last few years, people really
9 making a go at it. But we still don't have an
10 established industry. And one of the challenges
11 over the next few years is going to be, really, to
12 bring all the players together to make sure that
13 industry can deliver safe, reliable, affordable
14 energy storage products that the utility can
15 really use.

16 One of the things that we've been
17 working on at the Electric Power Research
18 Institute in collaboration with our member
19 utilities, as well as the Department of Energy and
20 other stakeholders out there, is to create an
21 Energy Storage Integration Council, which is an
22 activity by which people can come together as a

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1 forum and discuss some of the basic technical
2 issues in actually integrating energy storage to
3 the grid, both from the standpoint of making very
4 effective product solutions and from the
5 standpoint of the utility side, knowing what to
6 expect in terms of permitting, siting, the issues
7 that are related to storing any products on the
8 grid.

9 We just have not done that for energy
10 storage to the degree that we've done it, for
11 example, for transformers or for transmission and
12 distribution.

13 Finally, as with any other distributive
14 energy resource, we do believe that installation
15 of energy storage needs to be done according to
16 the planning and operation schedules that we've
17 already established for the electric power
18 industry.

19 So, one of the parts that you've heard,
20 or one of the research areas that we've heard
21 about this morning was the integrated grid. This
22 is our concept of EPRI, of bringing together

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1 distributive energy resources into the planning
2 and scheduling processes for conventional
3 resources on the grid to make sure that you get
4 the maximum value out of those distributive energy
5 resources.

6 We feel that this is a really critical
7 area for future research. And we're really
8 looking forward to working with utilities and
9 other stakeholders to make this possible over the
10 next few years.

11 Thanks very much.

12 MODERATOR KELLEY: Thank you, Haresh.
13 Carla?

14 MS. PETERMAN: Yes, hi. Good afternoon,
15 everyone. Nice to see you, and thank you for
16 staying for our panel. You've heard a lot about
17 storage already today, and so it's good to do a
18 deeper dive.

19 I'm with the California Public Utilities
20 Commission. And last fall, we adopted targets for
21 energy storage for our investor-owned utilities.
22 So we set a target of 1.325 gigawatts of energy

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1 storage for our IOU's to be procured in
2 solicitations through
3 2020.

4 And my first takeaway I'm going to leave
5 you with is that energy storage is just one of the
6 tools that California is pursuing for energy
7 management. In terms of what we want to get from
8 energy storage, some of those benefits, we will
9 also get some of those benefits from demand
10 response, from better forecasting of renewables,
11 from faster ramping natural gas plans.

12 But energy storage is a class of assets
13 that we haven't invested in as much as a state,
14 and that's why we're having this focus. But it is
15 important to have it as one of your tools and not
16 your only tools.

17 And so we decided to set targets, we
18 were rejected by legislation in 2010, AB-2514.
19 And that legislation asked the Public Utilities
20 Commission, and then our publically-owned
21 utilities, to consider setting targets for viable
22 and cost-effective storage.

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1 We had to determine whether we were
2 setting targets by last year, and our publically-
3 owned utilities had to decide this year. Our
4 investor-owned utilities represent over 70 percent
5 of the state load. And so, indeed -- and a really
6 diverse geographical base. And so we wanted to be
7 mindful of the differences in our utilities and in
8 resources as we move forward.

9 So just a little bit about our targets.
10 1.325 gigawatts, which are spread across the three
11 investor-owned utilities, and it's also spread
12 around three different interconnection points, so
13 customer side-storage, distribution storage, and
14 transmission storage -- connective storage.

15 The legislation said that this storage
16 needed to do one of three things: it had to help
17 with greater reliability, had to help with
18 integrating renewables, or reducing greenhouse
19 gases. And also, as I noted, it had to be viable
20 and cost-effective. So we spent the first two
21 years after the legislation was passed trying to
22 figure out what does cost- effectiveness mean?

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1 What is energy storage?

2 So we contracted with EPRI and KEMA DNV
3 to do analysis about different use cases for
4 storage. And one of the takeaways is, there are
5 many different types of use cases for storage and
6 different technologies that can meet that. And
7 these different assets have a different level of
8 cost-effectiveness. And so it's important as
9 you're looking at what you're trying to do in the
10 state or nationally to really focus on what's the
11 problem you're trying to address because a
12 different storage technology may be able to do
13 that.

14 And it was important for us to leave as
15 much flexibility as possible with directing these
16 targets. And so, for example, we allowed there'd
17 be movement of target between transmission and
18 distribution categories. We allow for multiple
19 business models.

20 So the utilities are allowed to own
21 storage at each of those interconnection levels:
22 transmission, distribution, and customer side.

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1 We also want to encourage competition,
2 however. And so, we capped the overall amount of
3 utility ownership at 50 percent. The utilities
4 are allowed to defer up to 80 percent of the
5 target in a given period to the next solicitation
6 if viable projects don't emerge.

7 And there's also plenty for us to learn,
8 so after three years, we're going to do a
9 comprehensive review of the program and see what
10 needs to be adjusted. You know, we've heard a lot
11 of discussion today around pilots. And to put it
12 in perspective, we just didn't start thinking
13 about energy storage in 2010. California has been
14 investing in pilots and R&D for energy storage for
15 a number of years.

16 But you get to the point where there's
17 only so much you're going to learn from pilots.
18 You really have to start integrating these
19 technologies into the system and seeing how they
20 perform in the real world. And even with our cost-
21 effectiveness analysis, we could have spent years
22 doing it because, ultimately, it's really hard to

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1 pinpoint is that cost- effectiveness when you
2 don't have operational experience.

3 So California is at the point where we
4 have our demonstration projects, but we really
5 need to get more operational data. It's
6 important, though, to connect those pilot projects
7 to your future targets. So we do allow the
8 utilities to grandfather in some of the
9 demonstration projects that will continue to
10 operate.

11 The other takeaway I want to leave you
12 with is that how effective your storage will be
13 depends on what your rate structure is and what
14 you're doing in other technology fields. And so
15 electrification of transportation has come up a
16 few times today, and we're doing a lot of the work
17 on transportation and electrification.

18 We have a proceeding where we're looking
19 at vehicle integration activities with a focus on
20 first b1g, things like controlled charging. You
21 know, that might be considered a demand response
22 resource. And then eventually looking at b2g,

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1 where you're having bi-directional power flow,
2 which could potentially be a storage asset.

3 There's some real questions around that
4 about what is the asset? How do you aggregate it?
5 And so it's important to be working on all of
6 these things in parallel, but be having
7 conversations across these different proceedings
8 and among these different groups.

9 So I want to wrap up with about where
10 are we now? What's been the reaction, right? We
11 put out these targets, and we said, Okay,
12 industry, here's your chance to show us that you
13 actually may have something to bring. And they're
14 coming.

15 So before we even set our targets,
16 Southern California Edison was required to do a
17 solicitation for energy storage, 50 megawatts.
18 And they had over 500 bids with energy storage.
19 Now, all these bids are not going to be viable.
20 But in terms of, you know, who's interested, there
21 was a real response.

22 The California ISO, which keeps the

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1 queue for transmission projects, transmission and
2 connected projects, has seen over 2,300 megawatts
3 of energy storage projects come forward to get
4 into the queue. Now, again, all of those projects
5 won't be viable.

6 But there was enough projects out there
7 that are positioning themselves to compete in our
8 targets. Thirteen hundred of those, approximately,
9 are stand- alone storage, and the rest are hybrid
10 projects. And so, there's been a tremendous
11 amount of interest.

12 So we're looking forward to seeing what
13 this bid into utility solicitations. We have
14 their applications before us. It's a very
15 interactive group of stakeholders, a lot of new
16 stakeholders. So if you're thinking about setting
17 targets, you have to be mindful of, you're going
18 to have developers who have never participated in
19 the utility procurement process. And so it
20 requires an extensive amount of handholding
21 between a utility and these new providers.

22 And then, finally, a lot of questions

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1 are coming up. We already want to figure
2 everything out up front. And so we're working
3 together as agencies to address some of these
4 questions. One of the initiatives that's just
5 started is the development of energy storage road
6 map, which we're doing in conjunction with the
7 California ISO as the lead. And they're working
8 with our Public Utilities Commission and the CEC
9 because there is some real questions about the
10 interaction between the distribution system and
11 the transmission system.

12 So there are storage projects who want
13 to be able to bid into the wholesale market at
14 some times and also serve as a distribution asset.
15 How do you manage that? What's the right retail -
16 - what's the right rate charge? Is it a wholesale
17 rate? Is it a retail rate? So I think we all
18 need to look at our own processes to be able to
19 facilitate these resources to be more flexible,
20 but our system isn't currently designed for that.

21 MODERATOR KELLEY: Thank you, Carla.

22 Geisha?

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1 MS. WILLIAMS: Good afternoon, everyone.
2 I'm Geisha Williams, and I'm Executive Vice
3 President of Electric Operations of Pacific Gas
4 and Electric Company. We're proud at PG&E in
5 providing service to our customers that's safe,
6 reliable, and affordable. We provide service to
7 nearly 16 million people in the State of
8 California across Northern and Central California.

9 Over the next three years, we'll be
10 making about an \$8 billion investment to modernize
11 our electric infrastructure to really enable our
12 communities in the State of California achieve as
13 a vision of being able to provide low-carbon and
14 have a clean energy future. Eight billion dollars
15 is a lot of money, but not when you compare it to
16 what the rest of the industry is doing over a
17 decade, and that number is \$1 trillion.

18 And I think we all are in it at the same
19 time trying to figure out what we need to do to
20 modernize our infrastructure to enable us to
21 operate it in a way that we never have before.
22 This work is truly essential. We don't often talk

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1 about how times have changed, but, you know, so
2 must the grid change.

3 When it was originally designed and
4 thought through in terms of what the grid would
5 do, it was very much viewed, and you've heard
6 several times today, as a one-way power flow from
7 central power plants, leading to delivering
8 electricity to the end- use customers at the end
9 of power lines. But, today that's no longer the
10 case.

11 And it's imperative, I think, for all of
12 us to put together grids that are flexible so that
13 it can accommodate intermittent renewable
14 resources such as wind and solar while at the same
15 time allow for two- way power flows as we see more
16 and more solar roof topping that is coming online.
17 PG&E has a 120,000 solar rooftops, and we're
18 adding about 3,000 every single month. It's here;
19 it's happening, and so we've got to accommodate.
20 We've got to figure out how to make the grid work
21 for all of us.

22 So, as a result, today, our grid

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1 operators must rapidly increase or decrease the
2 amount of energy that's actually on the system,
3 depending on the demand and the supply. You know,
4 it has to happen on a real-time basis. This is
5 the stuff of science fiction, right, a few years
6 ago or a hundred years ago, and yet, it's exactly
7 what our operators are having to deal with today.

8 And so, although the way that we operate
9 our grid has changed and will need to continue to
10 evolve, the grid still has to work in real-time.
11 As you all know, the total demand and the
12 consumption has -- the consumption and supply has
13 to equal -- be exactly the same, simultaneously at
14 any point in time. Makes it a little bit of a
15 challenge as we have more and more intermittent
16 renewable generation entering the grid.

17 Storage technology, we believe, holds
18 great promise in helping provide that flexibility,
19 helping to provide that balance of both supply and
20 demand. We also believe that the utility industry
21 will play a really important role in storage.
22 PG&E and California, specifically, are at the

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1 forefront through a combination of using tested
2 technologies that we have in place today like pump
3 storage and, at the same time, exploring new
4 technologies like compressed air, batteries, and
5 even mobile storage, the vehicles.

6 There are, as Commissioner Peterman
7 said, a wide variety of storage technologies and
8 options that are available. And I think that
9 there are different solutions for different issues
10 and for different needs. And I think we need to,
11 kind of, not think of storage as a "one size fits
12 all" option, but something that needs to be
13 tailored to the specific needs and the specific
14 issues that you're trying to address.

15 In some cases, we're looking for high
16 energy, long durations provided by technologies
17 such as pumped hydro, pumped storage systems. In
18 fact, today, we have about 22,000 megawatts of
19 pumped hydro, pumped storage, throughout the
20 United States. Within PG&E, we've got the Helms
21 storage. Helms is a power plant which is a pumped
22 storage facility that allows us to have 1,200

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1 megawatts available in storage. It's fantastic.

2 It can go from nothing, sitting still,
3 you know, absolutely not generating at all to
4 full-blown 1,200 megawatts being online in about
5 eight minutes. That's fantastic, and it provides
6 us a great resource to be able to deal with all
7 the intermittency that we're seeing in our system.

8 Another promising, high-energy, long-
9 disc charge technology is compressed air energy
10 storage. And this -- we're currently conducting a
11 feasibility study for a 300-megawatt facility.
12 We're working with -- had great support from the
13 Department of Energy. It's located near Lodi,
14 California. And we're, right now, looking at
15 permitting and what it will take to actually
16 inject air into these -- actually, it's a former
17 natural gas storage facility.

18 In some cases, however, as I said,
19 you're not looking for long duration, high power.
20 You're looking for, maybe, a short discharge
21 duration, high- powered, short discharge. And
22 it's in this category that we believe that

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1 batteries hold a great deal of promise.

2 Today, we're testing two such projects.

3 We have a four-megawatt battery project near an
4 office complex in Silicon Valley. And we have a
5 two-megawatt battery facility near an electric
6 substation that is right next door to a solar
7 facility.

8 We're also working with VIA Motors to
9 develop and deploy mobile storage solutions on
10 electric pickup trucks.

11 So you got to look at this from lots of
12 different perspectives and look at a lot of
13 different options and not make a bet, but look at
14 -- just making lots of -- taking lots of different
15 bets and seeing what will evolve and what will
16 work for your customers.

17 So, while all these technologies are
18 exciting, and they hold promise, and we are
19 extremely supportive of them in their development,
20 you know, they are in their nascent stage. And I
21 also think that there's some significant
22 challenges to truly making them commercially

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1 viable. So I'd like to spend just a couple of
2 moments on some of what those challenges are.

3 First and foremost, the biggest
4 challenge I think to storage is economics. We
5 have an obligation, all of us in the utility
6 industry, to do everything we can to keep our
7 rates and the service that we provide to be as
8 affordable as possible. So we've got an
9 obligation to really look at economics and make
10 choices based on the alternatives that are out
11 there.

12 The second thing that I think is a --
13 and I think an area in this would be the great
14 work that I think the State of California is
15 doing. I think Government in general can play a
16 pretty significant role in trying to make it more
17 affordable. So you heard from Commissioner
18 Peterman about the mandates that we have in
19 California.

20 We think this is going to cause a lot of
21 investment, a lot of research, and a lot of
22 activity in the State of California, and we're

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1 hopeful that with that activity will come a
2 reduction in prices over time, not unlike what we
3 saw with photovoltaics. That's the hope. And
4 we're very -- obviously, very much hoping that
5 that, in fact, will occur.

6 Another challenge that we have to deal
7 with, though, is permitting. It takes a really
8 long time to site or permit anything in the State
9 of California and, I'm sure, in the rest of the
10 country as well. I think the Government can help
11 in several ways in this regard by including
12 everything from aligning agency requirements and
13 schedules to also allowing permitting activities
14 to occur on a simultaneous basis instead of
15 sequential.

16 We really do have to deal with a -- we
17 heard about siting issues and permitting issues on
18 the transmission line side, but I think we could
19 also have some significant issues on the storage,
20 and we've got to anticipate that and deal with it
21 upfront.

22 I think another challenge that we've got

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1 to recognize, particularly for batteries, is the
2 environmental challenges as we start thinking
3 about long-term, the disposal and the management
4 of potentially hazardous materials that are in the
5 chemistry of these batteries. And I think knowing
6 upfront what the rules are will help all of us
7 make informed decisions to help us inform both our
8 risks and our costs.

9 And, finally, I think we also need
10 increased funding for research and understanding
11 in terms of how to better integrate all of these
12 different resources that we can operate them on a
13 real-time, day-in, day- out basis. And a lot more
14 work needs to be done, and we heard a little bit
15 about them in previous panels that we heard this
16 morning.

17 So, in short, or I guess in conclusion,
18 I would say there are challenges ahead, no
19 question, in terms of making energy storage
20 viable. However, we believe that the potential
21 benefits for our customers are tremendous. And
22 this is an area really worth spending time and

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1 effort and money in exploring. I think that if we
2 work together, Government and industry, to
3 encourage both the growth and the integration of
4 storage technologies into our integrated portfolio
5 products that we provide to our customers, it
6 could only be good. And we're very strong
7 advocates of this.

8 So, I would just close by saying thank
9 you for the opportunity to giving us, PG&E in
10 particular, an opportunity to tell our story, and
11 I look forward to your questions.

12 MODERATOR KELLEY: Thank you, Geisha.
13 Arlen?

14 MR. ORCHARD: Great, thank you.

15 Good afternoon, everyone. I want to
16 thank the Department of Energy for the invitation
17 to speak on this panel today.

18 SMUD is a recognized leader in energy
19 innovation, and we're actively exploring
20 technologies to make wide-scale storage a reality
21 for the transmission and distribution grid. I
22 also appreciate the Department of Energy including

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1 the perspectives of community-owned utilities like
2 SMUD and Snohomish and our place to contribute to
3 the development of the Administration's energy
4 policy.

5 I also want to personally thank the DOE
6 for helping fund our energy storage initiatives,
7 including a -- no, I'm not going to use that; it's
8 too long, okay, couldn't get through it in five
9 minutes -- for helping us fund our energy storage
10 initiatives, including \$5 million for preliminary
11 studies for a composed 400-megawatt pump storage
12 project and nearly \$5 million for our residential
13 distributed storage projects.

14 SMUD has developed an integrated
15 generation portfolio that includes renewable
16 energy resources such as hydro, photovoltaic and
17 wind, which meets about 50 percent of our power
18 demand with carbon- neutral resources at this
19 point. The remaining demand is met with utility-
20 owned natural gas-fired generation and power
21 contracts.

22 As we look to the future and the

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1 additional de-carbonization of our supply,
2 advances in energy storage will play an
3 increasingly important role in reliably serving
4 our customers.

5 Central to our integrated resource plan
6 is our 688 megawatt Upper American River Hydro
7 Project, which plays an integral role in providing
8 some of the operational flexibility, including the
9 integration renewables; overall system
10 reliability; meeting emissions reduction goals set
11 by our board and the State of California; and
12 providing value to our consumers and our
13 community.

14 In California, the majority of our
15 future renewing energy resources will be solar and
16 wind, which are both, as you know, intermittent
17 and not dispatchable. As more intermittent
18 resources are added to the grid, additional
19 flexible generation will be needed to smoothly
20 integrate these resources. Currently, the majority
21 of that integration is done with gas-powered
22 generation.

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1 Again, in the trajectory to reduce
2 greenhouse gas emissions, other strategies clearly
3 must evolve. Pumped hydro generation, as you
4 heard, is a proven storage technology that can
5 help bridge this divide. As part of the expansion
6 of our hydro system, we've proposed to construct a
7 400-megawatt pumped storage project. The Iowa
8 Hill Project will involve the construction of a
9 new, 6,400 acre-foot reservoir and will include
10 three variable-speed turbines.

11 Value-stream modeling, funded by DOE,
12 other proposed project, has demonstrated that it
13 will provide significant value in terms of
14 ancillary services, resource adequacy, and
15 efficiently regulating and dispatching
16 intermittent resources such as solar and wind.

17 With the continued expansion of wind and
18 solar resources, we believe that hydro pumped
19 storage can and should play an important role in
20 bridging the gap from intermittent, renewable
21 energy to truly dispatchable energy capacity. I
22 would encourage the DOE to continue to look for

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1 opportunities to support the expansion of this
2 valuable storage technology in the future.

3 To put into context the important role
4 storage may play in the future, California has
5 adopted a 33 percent Renewable Portfolio Standard
6 by 2020 and has targeted an 80 percent carbon
7 reduction below 1990 levels in 2050. Under any
8 conceivable scenario, these goals will require
9 significant expansion of a renewable generation,
10 the bulk of which, as I noted earlier, is expected
11 to be wind and solar.

12 To better understand the impacts of the
13 expansion of the five largest community-owned and
14 investor of utilities -- PG&E joined us in that --
15 in California, commissioned to study by E3. The
16 report focused on scenarios with significant
17 increases in solar generation. And it also
18 examined both the 33 percent RPS and impacts of 50
19 percent RPS. Under the 33 percent RPS, over-
20 generation is increasingly likely. And at 50
21 percent RPS, over-generation may occur in as many
22 as 23 hours of the -- 23 percent of the hours in

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1 the year.

2 The report found that energy storage,
3 flexible generation, and a locally-controlled
4 demand response are key to mitigating the impacts
5 of over- generation. Smart invertors to curtail
6 and manage over-generation of localized impacts
7 will also be an important tool. And so you're
8 going to hear some common themes about one size
9 doesn't fit all, and there has to be multiple
10 strategies when you're dealing with the
11 intermittency of renewables.

12 SMUD has also engaged in distributed
13 storage projects to support the expansion of
14 distributed generation, expected increase
15 distributed system loading from EV charging.
16 These projects have demonstrated that there
17 continues to be challenges with the tested
18 technologies in terms of communication and control
19 of the storage systems and higher than expected
20 O&M costs.

21 From a cost-competitive standpoint,
22 again another common theme, our preliminary

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1 analysis of the distributed storage application
2 indicates that installed costs for distributed
3 storage generally need to drop below \$400 per kWh
4 before they'll be cost-effective. Commercially
5 available systems are higher than that today. But
6 there are independent forecasts that suggest these
7 storage technologies will reach this threshold
8 within the next five years.

9 We think that DOE supported distributed
10 storage projects will play an important role in
11 proving the reliability and cost-effectiveness of
12 these emerging technologies. I want to encourage
13 them to continue to support these efforts
14 financially.

15 Again, I appreciate the opportunity to
16 be on the panel today and look forward to any
17 questions the folks may have.

18 MODERATOR KELLEY: Thank you.

19 Steve?

20 MR. KLEIN: I suspect I'm the last
21 speaker of this long day because it's known that
22 Snohomish PUD is a revolutionary utility, and this

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1 way I shock the least amount of people and about -
2 - (laughter) -- about now, your lunch is starting
3 to settle in, but I'm still going to try to keep
4 you on your toes.

5 Snohomish PUD, the land of the Boeing
6 Company, the largest contiguous building in the
7 world, very thriving manufacturing and technology
8 community. We're in the neighborhood of the 10th
9 to 12th largest consumer-owned utility in the
10 country, a beautiful service territory, north of
11 Seattle towards the Canadian border, Salish Sea to
12 the Cascade Mountain Range.

13 And, I have a local commission that
14 said, in the value of the typical Northwestern
15 citizen, "We want you to go forward and fill that
16 deficit that we have as a growing utility with
17 conservation and renewables." We have no fossil
18 fuel in our portfolio, and that includes no
19 natural gas. They said, "Go forth and develop
20 renewables, but do not, whatsoever, add any fossil
21 fuel."

22 So, with that, in less than two years,

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1 we went from zero wind in our portfolio to eight
2 percent of our portfolio is wind. And, at certain
3 times of the year and the day and the month, it
4 can actually be almost up to one-third of our
5 operating resources at that particular time.

6 But, we're also having -- I say this at
7 ACORE conferences, and so far, nobody has been
8 able to challenge me on this -- we have the most
9 aggressive, local-distributed solar program in the
10 country. So, you start putting all of these
11 things together with programs looking at
12 geothermal, tidal, low-impact hydro, biogas and
13 biomass, we start putting this all together, and
14 of course, with the variability of the resources
15 that we've added, we immediately have an impact.

16 Other utilities talk about it. Other
17 utilities say it's the holy grail; it's coming; we
18 need it. We're the living use-case today. You
19 sit in our control room and you watch what happens
20 when that wind comes on and within the hour that
21 wind goes away.

22 So, again, without the ability, as with

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1 most utilities today, they talk about storage, but
2 they go out and add gas peakers in the interim.
3 We didn't have that option. My commission did not
4 give me that option. So going out there, we went
5 to every utility in the country that had any
6 experience with it. We went to all of the
7 National Labs. We went to all of the
8 organizations. We came to the conclusion that we
9 -- as Commissioner Peterman -- we don't need any
10 more pilots.

11 And the other thing is, is it's clearly
12 expensive, and there are operational problems
13 associated with it that we felt weren't being
14 addressed. You need to drive down the cost, and
15 you need to make them more operable. And how do
16 you do that?

17 Look at any other type of industry, and
18 I use the personal computer industry. If there
19 was not a non-proprietary operating system, when
20 you went to buy a home budget piece of software,
21 you'd be buying the computer and the printer all
22 based on that person that put that package

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1 together.

2 That's the battery of the storage
3 industry today. They're empties that go buy the
4 batteries, put them in black boxes, put a minimal
5 amount of control logic with them. They don't
6 talk to your Alstom energy management system or
7 your Brown Vary (ph) or whoever else you have
8 that's flying the electric plane, either at the
9 distribution, transmission or structured grid
10 level.

11 And so that's what we saw. So as we
12 went around in this, people would nod the head and
13 say, "This make a lot of sense. But we're not in
14 the same shoes that you are. We're not burning
15 down yet." So, so far, what we've been trying to
16 pull together is an effort that's called MESA, and
17 you can find it. It has a website, the MESA
18 Alliance.

19 And what we're trying to do is pull
20 together major players in the industry. We have a
21 number of major battery manufacturers, both U.S.
22 and offshore. We have entities like Parker

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1 Hannifin and major equipment suppliers in the
2 United States. And what we're seeking to do is
3 establish standards around energy storage because
4 if you look at any other product out there today,
5 if it's not gone through the step of
6 standardization and commoditization, the price
7 does not come down.

8 As long as you're having people throwing
9 batteries each time, a one-off black box, minimal
10 control logic, doesn't talk to anything, how can
11 the utility industry start to purchase these
12 things in mass amounts when from one minute to the
13 next, the next time you need to add some
14 additional to your system, it doesn't mesh with
15 what you've already bought or you have to go
16 through difficulties trying to integrate all this?

17 There needs to be a non-proprietary,
18 kind of, software operating system that links all
19 of this. There needs to be standards that pull all
20 of this together.

21 To give you just a few examples because
22 I'm still on the yellow light, today you can go

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1 out and buy a community storage box that a well-
2 known industry supplier will do, and you pay
3 \$100,000 for it. It's a 25 kilowatt-hour battery,
4 100-plus thousand dollars. You can buy a Nissan
5 LEAF for 30-some thousand, and you get the car
6 with it.

7 (Laughter.)

8 MR. KLEIN: And so, just in closing,
9 again, there's lots we can do in investment and
10 improving the battery chemistries. There's a lot
11 more we can learn in terms of optimizing the
12 placement, the algorithms and all these things
13 associated with getting greater efficiencies and
14 values out of energy storage. But all of these
15 efforts, at all levels that we're talking about
16 here, we need to as an industry and as a nation,
17 drive towards that standardization so it can bring
18 about the commoditization and ultimately lowering
19 the cost of energy storage.

20 And thank you for the opportunity.

21 MODERATOR KELLEY: Thank you, Steve.

22 So, now let's turn to our discussion.

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1 First question to the panel is related to -- is
2 feeding off of some of the comments that I heard
3 about the benefits of storage relative to
4 reliability. I think the first few speakers spoke
5 on that. But, as Arlen and Steve mentioned,
6 there's also a low-carbon impact here. So, in a
7 low-carbon economy, what do you see as the unique
8 role of storage?

9 And I wonder if we could start here with
10 you, Haresh, specifically.

11 MR. KAMATH: Right. So this is a really
12 good question.

13 So I have to remind people, I guess, a
14 lot of times that storage itself is not a low-
15 carbon -- necessarily a low-carbon technology. It
16 does not -- I mean, it's neutral, right? You can
17 use storage, and it can be cycling fossil
18 generation too. So, it's not inherently a
19 renewable technology.

20 However, it can be used to integrate
21 renewable technologies, and that's in fact one of
22 the reasons why it's come to prominence these

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1 days. Historically, if you take a look at the
2 storage systems that have been built, they have
3 been very successful at turning base load power
4 plants into more operative power plants.

5 For example, as Geisha had mentioned
6 earlier, hydroelectric, a pumped hydro system, can
7 respond very quickly, much more quickly than a
8 conventional power plant. And so it can provide
9 operating benefits to the grid that the
10 conventional power plant can't do.

11 This is even more the case with
12 renewable systems, of course, because renewable
13 systems are not typically dispatchable. And so
14 you can't really get more energy out of a wind
15 turbine if the wind is not blowing harder. You
16 can't get more solar energy out of the solar
17 panels, if the sun's not shining more, have
18 issues.

19 So storage is there to smooth that, to
20 firm that energy, firm renewables. And in doing
21 so, it really enhances the reliability and the
22 flexibility of the grid.

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1 So storage is an opportunity. It's a
2 tool by which we can achieve more renewable
3 penetration. It's not renewable in and of itself.
4 But, we, I think we have to consider it as part of
5 the whole package just as we do other assets, as
6 Carla mentioned earlier, things like demand
7 response, things like forecasting and other tools
8 that can help increase the penetration of
9 renewable energy.

10 MODERATOR KELLEY: Thank you.

11 Carla, any comments?

12 MS. PETERMAN: Yes.

13 And so, in addition to the firming
14 potential of energy storage with renewables, it
15 also helps you not waste renewables. So
16 California is in a position and other states are
17 even further ahead in this, such as Hawaii. We
18 are seeing excess generation, you know, more re-
19 over-generation on the system than we actually
20 need.

21 And so if we're trying to reach higher
22 levels of renewables, again, where are you going

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1 to store that excess energy. And so, the
2 potential to use energy storage to store solar PV
3 power during the day and wind energy at night.

4 And then, in terms again towards the
5 greenhouse gases, in terms of firming renewables,
6 historically we use natural gas. Well, we're not
7 going to be able to use as much natural gas going
8 forward. So, again, if you can use low-carbon
9 energy as that alternative, there is some benefit.

10 And I'll just make one additional
11 comment on customer-side storage because there was
12 some comments about that. We've seen a tremendous
13 amount of interest in customer-side storage,
14 particularly paired to solar PV. So within our
15 state, SolarCity and Tesla in particular have
16 partnered up to start selling systems to
17 customers.

18 And we have a program of self-generation
19 incentive program that provides incentives for
20 customer-side technologies that reduce greenhouse
21 gases. And, over half the projects are either
22 stand- alone storage or storage paired with PV.

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1 So I think we're going to see a lot more
2 adoption of customer-side storage than we might
3 have anticipated when we set our targets.

4 MODERATOR KELLEY: Thank you.

5 Geisha?

6 MS. WILLIAMS: So I would just say,
7 without storage, having to integrate all the
8 renewable resources that we're having to do is
9 going to require increased levels of flexible,
10 ramping type of fossil generation, probably
11 natural gas. And where storage can come in is it
12 could displace some of that, some of it, maybe all
13 of it. But in the short term, we think that
14 there's a possibility for it to displace, at a
15 minimum, some of it. And, of course, that goes to
16 the issue of you're dealing then with less
17 greenhouse gas emitting generation, which is a
18 good thing.

19 MODERATOR KELLEY: Thank you.

20 Arlen?

21 MR. ORCHARD: So, just briefly, I would
22 echo the comments of my colleagues up here.

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1 But, you know, if you think about
2 storage, it's really -- is about shifting the
3 timing of the delivery of energy. And if you look
4 at the over- generation that California is going
5 to be facing, it doesn't necessarily coincide with
6 our peak.

7 So it allows us to shift that generation
8 which is the renewable clean generation, which is
9 generated off-peak to reduce our on-peak which
10 should assist in reducing greenhouse gas emissions
11 since that tends to be the units that are on the
12 margin and are the dirtiest of the units that
13 we'll use to meet that peak.

14 So I think from that point, joining
15 those two and time shifting of it will be where we
16 see a big benefit.

17 MODERATOR KELLEY: Thank you.

18 Steve?

19 MR. KLEIN: I think Commissioner
20 Peterman would fit in well in Snohomish County.
21 I'd agreed with everything she said.

22 MS. PETERMAN: I'll come up.

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1 (Laughter.)

2 MR. KLEIN: What I was going to say, and
3 I think we are the walking, talking case of
4 avoiding and trying to avoid adding any carbon
5 with storage.

6 But one other aspect -- it doesn't
7 necessarily speak directly to the low-carbon
8 aspect that other folks have -- but there's also
9 the opportunity when you have particular areas of
10 the distribution or transmission system where you
11 have transmission capacity, very limited period of
12 times is not sufficient.

13 In order to avoid those additional
14 environmental impacts and all of the costs
15 associated with that storage could also fill that
16 niche too in terms of avoiding adding additional
17 transmission that cause some impacts to the
18 environment, so it has that additional benefit.

19 MODERATOR KELLEY: Thank you.

20 So my next question then is back to you,
21 Steve. You mentioned the need for standards
22 around energy storage and your MESA effort. I'm

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1 curious, it strikes me as something that possibly
2 the Federal Government could provide some guidance
3 for or at least be involved in some way.

4 And so my question really broadly for
5 the rest of the group is, are there other aspects
6 like that that might be a good role for the
7 Federal Government relative to energy storage?

8 And I guess, Steve, I'll turn to you
9 just -- you gave a good example there, but I'll
10 give you a chance to expand on that if you feel
11 the need.

12 MR. KLEIN: Well, as I said earlier, the
13 MESA Alliance will not be successful if it's just
14 Snohomish and two or three other people. We
15 welcome everybody. We're not even asking for
16 money. We're just asking for people to bring
17 their thoughts and ideas in terms of how we
18 develop this so that ultimately as an industry we
19 can move in a direction so that the utilities can
20 have the confidence that what they're buying is as
21 comforting as when we go to a catalog and we order
22 a transformer or any other part of the system and

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1 knowing that it's going to meet the requirements
2 that we need.

3 The general part of your question is
4 also, what can the Government do? I think the
5 kind of things they're doing with ARPA-E and the
6 sort of things that ARPA-E is doing with -- it's
7 not just use cases, it's actually looking at more
8 because, you know, use cases, does it work well to
9 integrate resources? Does it work well to deal
10 with oversupply?

11 But what I like that ARPA-E is doing,
12 it's actually looking in to the optimization of
13 energy storage, so it's eking out the most
14 efficient use of it, not just the use -- the broad
15 issue of use cases, but actually the optimization
16 of -- placement of energy storage.

17 I also think, as in any of these
18 industries whether it's photovoltaic or not,
19 continue to support the enhancement, improvement
20 of the battery chemistry is definitely an area
21 that needs continued support.

22 So, in summary, please join us in

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1 support of the MESA, and we're open to as many
2 folks as are interested.

3 MODERATOR KELLEY: Thank you.

4 Arlen, did you have --

5 MR. ORCHARD: Sure. I would just say
6 that DOE has a powerful role as a convener, and
7 they've demonstrated success in any number of
8 areas serving as a convener. Along those
9 standards, I think could play an important role in
10 developing that.

11 I also have to say that DOE funding of
12 projects is very important from my standpoint. We
13 have planned and have committed to do storage
14 projects, but the benefit of the DOE's funding is
15 it allowed us to shorten that timeframe and do
16 more than we anticipated. So I think DOE funding
17 plays an important role in really kickstarting the
18 development of different storage strategies.

19 And then the other thing I would say is
20 I would encourage DOE to continue to support, in
21 any number of ways, storage along the entire the
22 value chain from utility scale generation all the

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1 way through the end-user technologies because I
2 think, as we've discussed, there's not a one size
3 fits all. It's going to take everything in the
4 value chain to make storage successful and be able
5 to maximize the integration of the intermittent
6 resources.

7 MODERATOR KELLEY: Thank you.

8 Geisha, did you have any additional --

9 MS. WILLIAMS: Well, I would just say
10 storage is -- I think standards is a good idea,
11 obviously. But I think storage is just one
12 component of an integrated, sort of, solutions
13 that are going to be necessary, including smart
14 grid standards as well.

15 So I think that the issue of standards,
16 not just on storage, but from other parts of the
17 smart grid are -- it's the right thing to do and
18 we've got to figure out, and I think the DOE have
19 an important role in convening. But at the end of
20 the day, I think industry does have to own the
21 standards themselves. So I think that convening by
22 DOE but ownership by the industries are.

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1 MS. PETERMAN: So, I also strongly
2 support standardization work that can be done.
3 And, you know, if we look at the supply chain of
4 energy storage, we see a lot of developers, but
5 there's very few integrators. And so if you're
6 really thinking about also to what extent is the
7 private sector doing at this point, it's not as
8 much as you would expect.

9 Also, specifically, I want to call out
10 standards around safety because I think this is an
11 area that DOE is already working in, and we
12 continue to benefit from that federal leadership.
13 This is the technology we're trying to deploy in
14 different parts of the system. And if there are
15 safety concerns, that can set back this industry,
16 and so I would make a call for that.

17 And then the third one I would suggest
18 is particularly focused on pumped hydro storage.
19 And I call that out because our target, for
20 example, does not allow pumped hydro above 50
21 megawatts. And it's not because we don't see the
22 tremendous value in pumped hydro, it was just that

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1 when looking at all these other technologies for
2 storage, we thought that they needed a different
3 type of market transformation, where these other
4 technologies such as batteries and compressed air
5 storage don't have the same level of
6 commercialization.

7 And when we looked at what are the
8 barriers to pumped hydro storage, they were a
9 little different. You know, cost barrier in the
10 sense that these are big cost projects. There are
11 also projects that may make sense to serve
12 multiple utilities. These were also projects that
13 can face serious siting challenges. And so we
14 thought that our program in itself wasn't going to
15 tackle all those issues.

16 But there have been some real
17 developments in the technologies with pumped hydro
18 storage. And so that has been an area where DOE
19 has provided funding before. And you may want to
20 look at, where do we need pumped hydro projects in
21 this nation, and then what type of support can you
22 give then into some bigger project buildup?

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1 MODERATOR KELLEY: Thank you, Carla.

2 MR. KAMATH: Great, thanks.

3 This is a really important area as far
4 as this. And DOE has actually taken a great
5 leading role in terms of standardization of energy
6 storage.

7 There's several different areas where
8 we've worked together with DOE. As I mentioned
9 earlier, our Energy Storage Integration Council is
10 something that's gotten a lot of -- brought a lot
11 of stakeholders together, including many of the
12 folks involved in the MESA Alliance.

13 And one of the things that we've done is
14 worked in several of DOE's National Labs to
15 actually pull together folks from those National
16 Labs and bring their efforts into that
17 organization.

18 So one of things we wanted to do was
19 things that arise as a part of the Council, any
20 decisions that are made, any products that have
21 come out, we want them actually to be published by
22 DOE. And so we're going to try to incorporate

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1 them into the DOE EPRI "Energy Storage Handbook,"
2 which is one of the publications that we've worked
3 with DOE on very successfully.

4 Another area, as Carla mentioned, is the
5 safety aspect. DOE has really stepped up in the
6 last few months and said, We really feel that
7 safety is a very important issue here. And Sandia
8 National Labs, PNNL, several of the other National
9 Labs, have started major efforts in really
10 addressing the safety issue with not just energy
11 storage technologies, but actual energy storage
12 products, which is a big, big step forward.

13 We've been working very closely with
14 several different agencies, including the Office
15 of Electricity, the energy storage program there,
16 led by Dr. Imre Gyuk has really done some
17 fantastic work in deployment of energy storage
18 under the Recovery Act.

19 And a lot of the data and information
20 that coming back from those projects is directly
21 feeding the efforts that we're doing to create
22 standardized approaches; I won't say standardized

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1 products. We're just trying to define the
2 approaches to specification and to test plans and
3 to functional requirements definition and so on
4 that can be used across the industry.

5 So without that foundational work that
6 the DOE is performing, all of these aspects of
7 building the industry would be much, much more
8 difficult. So there's no question that DOE is
9 already playing a role in that and, quite frankly,
10 an underappreciated role in the energy storage
11 industry that's developing, and we hope that
12 that's going to continue in the future.

13 MODERATOR KELLEY: Thank you.

14 So, once again, we'll wrap it up with
15 just a -- a lot of good suggestions from you all
16 for the role of the Federal Government relative to
17 storage. I'd like you to hone that down to maybe
18 your one topic, one point that you'd like to leave
19 this QER Task Force with.

20 So, again, we'll start all the way down
21 at the end with Steve.

22 MR. KLEIN: I guess trying to

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1 incorporate all the good thoughts of others on top
2 of my own.

3 Continue to be what you've been in the
4 past and that's been attentive and interested in
5 pushing us and challenging us, but also providing
6 the support.

7 That probably sounds overly general, but
8 I also like the earlier comment that -- from the
9 representative from Pacific Gas, Geisha -- that
10 you need to really involve the utilities because
11 oftentimes what happens is mandates come out. And
12 while certainly utility industry is very talented
13 and we can try to find a way to make whatever
14 we're told to do work, it sure works a lot better
15 if you engage the utility industry in that, in the
16 development of the solutions and the things that
17 really work.

18 Like I said earlier, oftentimes in our
19 scope of trying to actually move energy storage
20 forward, we ran into problems where a lot of
21 dollars and effort are purely around just pumping
22 out pilot projects and use cases when you have

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1 utilities out there that are actually willing to
2 begin to implement it operationally. To me,
3 that's where the microscope and the attention
4 should go. You know, while pilots and use cases
5 can be valuable, to just keep doing the same thing
6 over and over again and producing the same result
7 doesn't help.

8 You actually have utilities out there
9 that are willing to take that step and actually
10 fully engage in it, integrate it completely into
11 their energy management system and into their
12 transmission distribution system. DOE really
13 needs to take advantage of that opportunity and
14 support it.

15 MODERATOR KELLEY: Thank you.

16 Arlen?

17 MR. ORCHARD: So I guess my suggestion
18 may go a little more tactical. I think it is
19 around the role of DOE as a convener. And I think
20 I can't emphasize the importance of standards.
21 It's not only standards around control
22 technologies and performance standards, but the

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1 utility industry is facing a big challenge because
2 of the numerous new technologies we're introducing
3 into our system, whether it's smart technologies
4 or storage.

5 And part of the challenge is we
6 ultimately remain responsible for the reliability
7 of the grid. And so one of the areas that I think
8 hasn't been mentioned that bears mentioning is the
9 issue of cyber security. There are no standards
10 associated with many of these plug-and-play
11 technologies. And those present specific
12 challenges for utilities as we attempt to make the
13 grid not only robust but also secure.

14 So I think that's another area where
15 DOE, along with standards, looking at performance
16 and control technologies, should also be thinking
17 strongly about the issue of cyber standards that
18 apply to these plug-and-play technologies.

19 MODERATOR KELLEY: Thank you, Arlen.

20 Geisha?

21 MS. WILLIAMS: It's three words:

22 convene, engage, and invest. The first two, you

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1 know what I mean by that. The third, I think we
2 can't overemphasize the incredible role that the
3 Government can play in the research and
4 development, particularly on chemistry and
5 integration. And so that's what I would say are
6 the key things.

7 MODERATOR KELLEY: Thank you.

8 Carla?

9 MS. PETERMAN: I think all of those are
10 the key takeaways. And so I will just add, spend
11 some time out West. Continue to do that. I
12 remember when we put out our targets, I got a call
13 from DOE, someone in the DOE, saying, We want to
14 talk about these targets. And we were like, What?
15 They're watching us in Washington D.C.? You know,
16 you feel like, especially when you're in
17 California, that you're really far away. And it
18 is sometimes hard for us to engage as much as we
19 want, especially as regulators in the national
20 conversation, including limits on travel, right?
21 So the fact that you had this meeting
22 out West meant that I could participate. When you

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1 hold these in D.C., it's very hard for me to get
2 authorization and funding and time to go do that.
3 So please continue to engage with us.

4 And then also, there's that convening
5 function internationality. So I've spent some
6 time in Germany and Spain this year because those
7 are countries that are facing some of the
8 challenges of renewables integration.

9 And they're all looking at energy
10 storage in various different ways. I mean, a lot
11 going on with powered gas and hydrogen, for
12 example, in Germany. And so these conversations
13 are starting to happen in other countries. So the
14 extent that DOE can use its existing relationships
15 to get best practices from elsewhere and not only
16 think about standardization nationally but
17 internationally, I think it would yield benefits.

18 MODERATOR KELLEY: Thank you.

19 Haresh, other comments?

20 MR. KAMATH: So, this morning, John
21 Savage had summarized his statement in three
22 words, which was innovate and follow through. And

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1 I think that's really important.

2 But just to build on that, the follow
3 through part is something that people don't talk
4 about enough.

5 Innovate, everybody has heard innovate
6 over and over again, and we build our society on
7 that word. But really, everything about that is in
8 the follow through. There's so many activities
9 out there, including storage, that we get about
10 halfway and then somewhere along the way, the
11 funding stops or the effort stops or gets diluted
12 down into something else, and then we don't know
13 really where to go and just for lack of somebody
14 pulling all this stuff together, it doesn't go any
15 further.

16 We really need somebody out there to be
17 able to pull together everybody on these things,
18 really create something that can bring together a
19 large number of entities, utilities, vendors, as
20 well as other entities like universities and
21 national labs and other folks in the research
22 community to really try to address these problems.

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1 Without that, it's very hard to see how
2 we can succeed with the significant challenges
3 that we have. At the same time, there are huge
4 opportunities in this. And if we can succeed with
5 it, those opportunities can really lead to some
6 amazing things in the future.

7 MODERATOR KELLEY: Thank you.

8 So with that, once again a fabulous
9 panel. Thank you so much for your time and your
10 comments.

11 (Applause.)

12 MODERATOR KELLEY: Okay. At this point,
13 we're going to turn to the public comments, so
14 we're going to take a moment here to get set up.

15 (Pause in proceedings.)

16 MODERATOR KELLEY: So now is your last
17 chance. If you haven't signed up to provide
18 comments, please do so. I do have the list of
19 everyone who has signed up so far and I'll be
20 calling you up. We have a microphone here set up
21 on the side. You'll be called in the order in
22 which you signed up for comments.

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1 And again, for those of you who are
2 joining us via live meeting, the streaming, you
3 can provide your comments at
4 qercomments@hq.doe.gov.

5 So when I do you call you to join us and
6 provide your comments, you have five minutes. We
7 have this colored light. So you get the benefit
8 of our speakers here as well where you get to see
9 these colorful, flashing lights that tell you when
10 your five minutes is up.

11 (Pause in proceedings.)

12 MODERATOR KELLEY: Okay. So before we
13 get started, I'd like to welcome additional guests
14 here to the stage. So this is our DOE QER
15 contingent here today, who is very interested in
16 hearing what you have to say. Really, this is
17 quite possibly the most interesting part of the
18 day because we get to hear from all the public.

19 So today joining me are Levi Tillemann;
20 we have Matt McGovern; Karen Wayland, who you met
21 before; Sallie Gilbert and Blair Nitsway (ph).

22 So our first public commenter -- and

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1 some of you, I wasn't able to make out whether you
2 were going to comment or not, so if you don't want
3 to comment, just let me know.

4 Kevin P. Owens? Kevin Owens? You have
5 five minutes.

6 MR. OWENS: Thank you.

7 I'd like to thank the Department of
8 Energy and the QER Task Force for the opportunity
9 to address you folks this afternoon.

10 My name is Kevin Owens. I am the
11 General Manager of Columbia River PUD. We're a
12 distribution utility and a full requirements
13 customer of BPA, serving about 19,000 customers,
14 about 30 miles downriver from Portland here today.

15 I'm speaking on behalf of the Northwest
16 Public Power Association. Let me provide a little
17 context of who we are. We are a not-for-profit
18 trade association with nearly 150-member people's
19 utility districts, public utility districts,
20 electric cooperatives, municipals and crown
21 corporations in the seven Western United States
22 and Canada. Nearly 50 percent of our member

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1 utilities serve less than 10,000 customers. We
2 serve 5.5 million retail customers with 22,000
3 employees.

4 The broad regional membership of NWPPA
5 reflects the reality of a single western
6 electricity market that promotes collaborative
7 solutions. Public power is an integral part of
8 the history, culture and economy of the Pacific
9 Northwest. Columbia River PUD and its fellow
10 members at NWPPA believe and live the public power
11 mission to deliver safe, reliable energy at the
12 lowest possible cost to consumers through local
13 control.

14 I am here today to discuss some of the
15 challenges facing NWPPA member utilities with
16 regard to distribution and transmission. I'd like
17 to suggest areas that the Federal Government can
18 help our members meet those challenges.

19 As DOE is aware, distribution utilities
20 are currently being challenged with the
21 integration of variable energy resources at the
22 distribution level. Figuratively, the torch has

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1 certainly been passed from the wind industry to
2 the solar industry. That's been manifested in the
3 form of distributed generation.

4 An example is the recent proliferation
5 of community solar projects and individual rooftop
6 solar installations in our service territories.
7 Today, many of these projects are not paying their
8 fair share of the costs of integration. They're
9 using our electric systems as large firming
10 batteries when they are not producing energy.

11 Those costs are being shifted to
12 customers who are not able, or do not choose, to
13 deploy the rooftop or community solar projects.
14 Firing capacity for a variable resource at the
15 distribution level is a real cost to our
16 distribution utilities and our member utilities at
17 NWPPA. We're concerned about cross- subsidization
18 between different classes of customers.

19 We also see that we need to be proactive
20 in developing new cost of service and cost
21 recovery models that actually facilitate the
22 interconnection of these variable resources while

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1 still recovering the actual costs of that firming
2 capacity. We observed the debate over stranded
3 investment among the IOU's during the move to
4 deregulation during the '90s. We're not interested
5 in going there.

6 DOE is in a key position to provide
7 better information regarding best practices,
8 guidelines, and lessons learned on a timely basis.
9 It's a new cost shift -- cost of service paradigm
10 shift. We need the Administration to recognize
11 the integration of renewables has costs associated
12 with our T&D systems. It's unfair to expect all of
13 our customers to bear the costs of these -- to
14 bear the burden of these costs.

15 NWPPA utilities -- member utilities need
16 a seat at the table. We need a represented voice
17 in the agenda, research, and publications of the
18 Administration and DOE's important work in this
19 area.

20 Distribution issues generally fall under
21 the province of state regulators, in the case of
22 IOU's and local regulators, board of directors, in

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1 the case of public power systems.

2 NWPPA believes the Administration and
3 DOE should include within the QER help for these
4 public power distribution utilities to meet the
5 challenges that the QER envisions, specifically:

6 o Publish research, white papers and
7 "lessons learned" on a more timelier basis related
8 to these variable energy resource integration
9 issues.

10 o Coordinate with other federal
11 agencies regarding tax incentives to ensure that
12 incentives do no harm and actually incent the
13 behavior intended, specifically production tax
14 credits versus investment tax credits.

15 o Streamline the grant processes and
16 partnerships with National Labs.

17 o Continue to hold competitions,
18 such as the recently announced Microgrid
19 Competition, and make those best practices known
20 and publish the self- guides for distribution
21 utilities.

22 o Continue research on, and provide

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1 grants for smart grid demonstration projects, many
2 of which include those emerging technologies.

3 o Ensure that we got regional public
4 power representation in those DOE discussions.

5 Let me close and just say thank you for
6 the opportunity to address you folks today and
7 provide comment. NWPPA member utilities look
8 forward to working with you on these important
9 issues in the future.

10 MODERATOR KELLEY: Thank you very much.

11 MR. OWENS: Thank you.

12 MS. WAYLAND: If you -- if people who
13 are giving statements have written statements, you
14 can give those to the Court Reporter. And it
15 would make it easier to make sure that your
16 statements actually reflect what you wanted to say
17 in the transcript. And she is right over there at
18 the table here.

19 MODERATOR KELLEY: So, next up we have
20 Cameron Yourkowski -- if I'm saying that right?

21 MR. YOURKOWSKI: Yeah.

22 MODERATOR KELLEY: Cameron? Welcome.

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1 MR. YOURKOWSKI: Thank you, good
2 afternoon. Thank you for the opportunity to
3 comment.

4 My name's Cameron Yourkowski. I work
5 for Renewable Northwest, formerly Renewable
6 Northwest Project. We're a non-profit advocacy
7 group focused on the Northwest region renewable
8 energy development in the Northwest.

9 Appreciate you all coming to Portland
10 today to focus in on these issues. I'll be brief.
11 I just wanted to highlight some of the things from
12 my perspective that you've already heard about
13 today, particularly, in thinking about in the
14 Northwest region, again, focusing on climate
15 resiliency, making the grid more prepared for the
16 impacts of climate change, allowing more renewable
17 energy to integrate to that grid.

18 For the Northwest, specifically, which
19 is not in the same place as California or other
20 parts of the country, the first step from our
21 perspective is really focusing on the grid
22 operational reforms, a 15- minute scheduling

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1 energy imbalance, market discussions going on in
2 the region. That's really the low-hanging fruit
3 for improving transmission resiliency to climate
4 change in this region.

5 So I think you've heard quite a bit
6 about the IM efforts in the Northwest, just wanted
7 to highlight that as the low-hanging fruit for
8 getting prepared for climate change, facilitating
9 renewable energy development in the region.

10 Where that stands currently, as you're
11 aware, PacifiCorp and the (inaudible) are moving
12 forward with their effort, and then also the
13 Northwest PowerPool effort, more focused on the
14 Northwest alone, a great coalition of public
15 power, private entities working with BPA to
16 facilitate a discussion around Northwest CIM. I
17 just want to highlight in your notes that that
18 effort deserves your full support and attention.

19 Thank you for the opportunity to
20 comment.

21 MODERATOR KELLEY: Thank you.

22 Next, we have Gerald Deaver.

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1 Mr. Deaver?

2 MR. DEEVER: Thank you. Thank you for
3 the opportunity to speak on behalf of Xcel Energy.

4 Xcel Energy has transmission assets
5 through its three operating companies in both the
6 Western and Eastern Interconnection. We are, of
7 course, a member of WECC. We're also a member of
8 the Southwest Power Pool and the Midcontinent ISO.

9 I believe we're the number one investor-
10 owned utility, if not all utilities, in terms of
11 adding wind capacity. And we're one of the
12 leading solar utilities in the country. We've
13 reduced our carbon emissions by about 14 percent
14 since 2005. I think we're on track for our target
15 of 30 percent reduction by 2020.

16 So transmission, of course, as
17 everyone's discussed today, is a very important
18 issue to all of us. And I just want to touch on a
19 couple of technical issues that the DOE could, we
20 believe, continue to help us on and also a couple
21 planning topics.

22 The DOE has been very generous and very

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1 helpful in the Western Interconnection in terms of
2 funding and R&D support for tools that will help
3 us improve grid reliability and efficiency. A
4 couple of those that are particularly timely we
5 think.

6 Peak Reliability and its members, which
7 include us and other stakeholders, are currently
8 trying to develop a situational awareness tool
9 that is referred to as the Enhanced Curtailment
10 Calculator or ECC. The current tool, in line with
11 our industry's fondness for painful acronyms, is
12 called the WebSAS, Web-S-A-S. The current tool is
13 really kind of an antique.

14 The objective here for the ECC is to try
15 to evaluate how individual contributing flows on
16 any elements of the grid may, in turn, start to
17 contribute to congestion or overload problems.
18 The current tool has many limitations to it. It
19 cannot recognize curtailment priorities. It only
20 changes its database twice annually to reflect the
21 addition or retirement of new or old transmission
22 lines, and it cannot in any way reflect real-time

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1 conditions on the grid.

2 The ECC, as we hope it will achieve, is
3 intended to provide a much more expanded grid
4 topology in real-time. We hope that it will model
5 individual contributions to flow over any grid
6 element that either peak reliability or a
7 transmission owner asks for within about 20
8 minutes.

9 We hope that the ECC will be able to
10 calculate flows and possible curtailment needs
11 over -- in between any point of receipt of energy
12 and any point of delivery within the grid. The
13 current tool now can only model over very large
14 zones.

15 The ECC, finally, in addition to
16 improving situational awareness, we hope will be
17 an important tool as you've heard today, markets -
18 - trading markets and wholesale markets to expand
19 in the West. We hope that the QER, if it
20 identifies or recommends any future funding
21 opportunities, could consider the ECC as a point
22 that it could pay attention to.

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1 A second tool is called now a State
2 Estimating Tool. This tool, as opposed to the
3 ECC, looks at the entire flow, not just
4 contributing parts, and how that impacts various
5 parts of the grid. As the name implies, it's an
6 estimating tool. And we're hoping that in the
7 future, a more actual, real-time tool could be
8 developed that would take advantage of the
9 explosive growth of data that we're all going to
10 have available to us as synchrophasors continue to
11 be installed in the West, again, thanks in large
12 part to the DOE's funding in the past.

13 Synchrophasor information will expand
14 greatly, the real-time information that'll be
15 available on the condition and topology of every
16 point in the grid. And we think the development
17 of an actual State Estimator Tool would be a way
18 to take advantage of this increased information,
19 which is then an idea that was mentioned in two of
20 the panels this morning.

21 Finally, on transmission planning, the
22 DOE has been very helpful to the West in the past

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1 in providing funds to WECC to enhance its ability
2 to do a large interregional planning throughout
3 the West. It's enabled WECC to develop 10- and 20-
4 year plans with improved environmental assessment
5 databases. And we think some additional planning
6 tools that could be useful in the future would be
7 tools that would allow planners to better tie the
8 results of reliability planning with economic
9 planning, again, as markets -- wholesale markets
10 continue to expand in the West.

11 Transmission, as we all say from time to
12 time, accounts for about 10 percent of the
13 customer bill, but allows transmission owners and
14 utilities to take better advantage of things like
15 renewables and other generation. We'd ask the DOE
16 to continue to consider that in the future as the
17 QER is developed.

18 Thank you.

19 MODERATOR KELLEY: Thank you.

20 Next up we have Fred Heutte. I don't
21 know if I'm saying that right.

22 MR. HEUTTE: Thanks. I'm Fred Heutte

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1 from Portland, Oregon. I'm with the Northwest
2 Energy Coalition, a Senior Policy Analyst and
3 device to work here.

4 We were founded in 1981, and we're an
5 alliance of more than 120 organizations around the
6 region of the four Northwest states and British
7 Columbia, includes: environmental,
8 civic, human service organizations, progressive
9 utilities and others, and businesses.

10 And our focus is promoting development
11 of renewable energy and energy efficiency,
12 consumer protection, low-income energy and
13 systems, and fish and wildlife restoration on the
14 Columbia and Snake Rivers.

15 In my role, I focus a lot on
16 transmission and renewable energy and integrated
17 resource planning at the regional level, at the
18 state level with the utility IRP's and so forth,
19 including both Northwest Power and Conservation
20 Council with WECC in the transitional planning
21 process.

22 I was at one of our meetings this

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1 morning. And we thank the DOE for supporting that
2 process as was previously mentioned. And Larry's
3 involvement directly in that has been very
4 helpful.

5 And also, I'm involved with regional
6 transmission planning under Order 1000 or soon to
7 be, in terms of Columbia grid, which hasn't yet
8 got an Order 1000 approval, but will be.

9 And also, I'm a member of WECC's new
10 Member Advisory Committee for Class 4, which is
11 end-users, industrial customers, and groups that
12 represent environmental and other consumer
13 interests in the region. So I have a lot of, you
14 know, involvement in all the topics that are being
15 discussed today.

16 I thought I'd take a very quick look at
17 some of the bigger picture questions that I think
18 we see. One is that there are really two big
19 drivers happening right now that have been there,
20 but they're really rising in importance. One is
21 on the environmental and policy or, kind of,
22 climate-driven policy as we're seeing with 111(d)

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1 and many other things. And the other is
2 technology innovation, especially in the area of
3 clean energy, covers across all the different
4 technology areas discussed today.

5 So to us what the QER is really about is
6 about providing some policy coherence in that
7 context and to provide -- to combine response to
8 those drivers, not treat them as separate, but
9 figure out the best way forward in the context of
10 climate, especially with environmental policy and
11 technology innovation. And to capture and enhance
12 the value of that we see, it's very important to
13 have DOE play a convening and accelerating role in
14 that regard and to provide for a fair distribution
15 of methods and costs.

16 If you break things down a bit and look
17 at it in detail, traditionally, we've had silos
18 that worked pretty well for policy purposes,
19 transmission, distribution, load-side stuff, but
20 those silos need to come down. And also, now we
21 have storage emerging as a factor across all of
22 those sectors, as we've already heard today.

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1 So on a planning basis, we also need to
2 break down the silos between power and
3 transmission planning. We're seeing some progress
4 in that in this region. The Northwest Power
5 Council and the ColumbiaGrid NTTG and the other
6 playing bodies, are really starting to cooperate a
7 lot more.

8 This is very, very important because in
9 order to get the new resources we need, we need to
10 have the transmission in the right place and vice
11 versa. And it's very large investments that are
12 involved, and it's difficult but not impossible to
13 get the right answers. But we're, you know, kind
14 of evolving that. So those traditional silos
15 between power and transmission planning, which are
16 very deep, need to be bridged.

17 We also need to look at -- as we
18 discussed a little bit -- the traditional silo
19 between transportation and stationary use of
20 energy so the vehicle electrification being the
21 primary example of that.

22 And I think what we're really trying to

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1 talk about is co-optimizing the grid, not for a
2 single objective function like minimizing cost or
3 whatever, but rather looking at environmental,
4 social, and operational aspects. So a reliable
5 grid, clean energy, and affordable. All those
6 things have to be in our view going forward and,
7 of course, including things like cyber security as
8 well.

9 In the Northwest, you know, our focus
10 has always been on renewable energy and energy
11 efficiency considered together, as a combination
12 approach to dealing with our energy needs. But I
13 think we're all beginning to learn we've got to
14 start paying attention to other aspects, the
15 reliability aspects of the grid in particular, and
16 some of the new technology aspects, the smart
17 grid, you know, the grid-edge kind of concept.
18 Where the action is moving is not where we've been
19 traditionally. And I think we are also
20 reevaluating our view of those things and hope to
21 think about how --

22 MODERATOR KELLEY: Three minutes, sir.

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1 MR. HEUTTE: Yes -- and hope to think
2 about how our traditional focus can be even
3 further extended in the future. So I think that's
4 probably a good place to wrap up. Thank you.

5 MODERATOR KELLEY: Thank you.

6 The next speaker has a question mark
7 next to her name, so I'll just announce a name:
8 Ann Fisher.

9 Did you want to make a comment? Ann
10 Fisher?

11 MS. FISHER: Well, as I said to one of
12 the folks standing in line when we were eating
13 lunch, you always get people who want to make a
14 comment because they've heard everyone else. And
15 I really don't have a comment to make except, of
16 course, to thank DOE for coming out because this
17 is important.

18 But it occurs to me that what
19 Commissioner Peterman said about coming out here
20 and engaging us with -- in the Northwest or in the
21 West Coast, is truly important. We have a lot of
22 enthusiastic and really heartwarming stories about

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1 supporting renewables and what we can do with
2 storage and all these things that can happen.

3 But it's still kind of a blossoming idea
4 here. There are people who are afraid of it,
5 people who think it's unknown. And honest to God,
6 I don't care who tells you otherwise, we do things
7 differently out here.

8 Don't take a FERC term and think that's
9 how we use it here. We're our own vernacular.
10 And so if you were to come out more often and
11 engage more often, I think you would have greater
12 support, a better understanding of where we need
13 help in the West Coast and a much more successful
14 endeavor. That's all.

15 MODERATOR KELLEY: Thank you.

16 Next is Kelly Tilford.

17 MR. TILFORD: Good afternoon. My name
18 is Kelly Tilford. I'm actually the Vice Chair for
19 the National Hydropower Association's Pumped
20 Storage Development Council. I've heard of
21 nirvana in Portland, but this is my first
22 experience. After seeing the storage panel and

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1 some of the issues that were brought to light and
2 some of the solutions and challenges, I all of a
3 sudden felt like I fit right in.

4 I want to thank the Department of Energy
5 for a number of initiatives, including the Hydro
6 Vision Initiative that is currently being
7 implemented as well as the Hydrovision and Pumped
8 Storage Development Task Force, the Modular Pumped
9 Storage Task Force. I'm actually thinking of
10 volunteering on both of those. I really enjoy the
11 data and analysis that comes out of the National
12 Labs supported by DOE.

13 The challenges to pumped storage
14 development and grid-scale storage since pumped
15 storage is really the only grid-scale proven
16 storage technology, the DOE studies provide a lot
17 of credibility to our industry. And the issues for
18 our industry are, the credibility is the first
19 thing, then the regulatory side, the support
20 legislation that values the resource that pumped
21 storage can bring to the grid. And then that
22 leads right into the financial side.

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1 And so everybody who is either an
2 investor- owned utility, a muni, or an IPP,
3 Independent Power Producer, understands that
4 cycle. So the DOE's efforts to better analyze and
5 present unbiased data on the benefits and
6 drawbacks of pumped storage are much appreciated.

7 I didn't plan to give a talk. I was
8 just going to listen, but I got so excited, I had
9 to come up to the microphone.

10 AB 2514, the storage -- CPC's
11 implementation of AB 2514 is a good start. When
12 we talk about storage, we're really talking about
13 two different types of storage, and I think some
14 of the speakers mentioned the differences. One is
15 short-term, instantaneous response type storage.
16 And then, the other one is long-duration, high
17 megawatt-hour type storage.

18 And so there's almost two different
19 conversations here. There are megawatts of
20 storage, and then there are megawatt hours of
21 storage. And I just wanted to make that
22 distinction.

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1 You know, I don't want to beat the
2 issues to death because the speaker panels did a
3 great job of identifying what the real challenges
4 and the values to pumped storage. I guess I want
5 to encourage DOE to continue to fund research in
6 grid-scale energy storage. I'd like to see
7 Argonne's modeling evaluation of the pumped
8 storage to the grid. I'd like to see that
9 continued, taken to the next step.

10 I like the idea of grid-scale models
11 that are available to vendors and to utilities to
12 use to do some simulation on their own. And I
13 guess I'll just wrap up with thank you very much.

14 MODERATOR KELLEY: Thank you.

15 Next, we have Roger Wood (sic).

16 MR. WEED: Weed.

17 MODERATOR KELLEY: I'm sorry?

18 MR. WEED: Thank you very much. My name
19 is Rogers Weed, W-e-e-d, and I'm with a company
20 called 1Energy Systems. We are a Seattle-based
21 startup that provides utilities with software that
22 helps them control and optimize energy storage

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1 assets.

2 So the main thing I wanted to do is kind
3 of reinforce Steve Klein's comments about the
4 importance of standardization to reducing costs,
5 increasing choices for utilities as they wade into
6 this area and simplifying the inner-operability of
7 energy storage with other grid assets and systems.

8 A number of us at 1Energy are veterans
9 of the PC industry. And I think we got that right
10 away when we talked to Steve because we saw how
11 USB, Bluetooth, WiFi, web standards, all allowed
12 this kind of maturity and scaling of new
13 technologies and allowed the industry to move
14 forward. So I think we see very much how this is
15 so important for energy storage.

16 MESA, again, is the name of the sort of
17 effort that we have going on now to define
18 standards for information models and communication
19 protocols that can allow energy storage assets to
20 talk to other parts of the grid. And you can find
21 out more information about that at MESA, M-E-S-A,
22 standards.org. So that's the website where you

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1 can go to get more information.

2 And I do think there is role for DOE and
3 other government entities in both encouraging, but
4 I'll counter Steve a little and say and
5 financially supporting, you know, in a seed sort
6 of fashion these standardization efforts because
7 there's often a "chicken and the egg" thing where,
8 you know, the -- especially the larger companies
9 don't really want to engage right away because
10 they're happy to sell their proprietary things
11 until they are more or less forced by customers to
12 adopt standards.

13 And so, you know, we've seen this in
14 California with something called OpenADR, which
15 was standards for demand response. And the early
16 support from the Government in California really
17 allowed that standards and effort to gain traction
18 and become very important to how demand response
19 is evolving.

20 So we're talking in California now about
21 whether the EPIC Program could also identify
22 storage standards as an important thing to

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1 support. And I think that makes a lot of sense
2 for all Government entities to think about.

3 So I guess I would encourage DOE and
4 other Government entities, as well as utilities,
5 by the way, to get involved and encourage the
6 efforts on behalf of the industry.

7 I think the industry has to drive the
8 standardization efforts. It's their products and
9 services that are going to need to comply with
10 these standards, but encouragement and strategic
11 financial support from the Government can really
12 make a difference.

13 So I just want to make that point.

14 Thanks.

15 MODERATOR KELLEY: Thank you.

16 So did we get any additional?

17 Did anyone else have any comments that
18 didn't get on the list? No?

19 Okay. This concludes the public
20 commentary portion of our meeting today. So with
21 that, I'll turn to Karen.

22 MS. WAYLAND: Thank you.

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1 And thank you to everybody for your
2 comments and your participation. I want to let
3 you know that the -- all of these stakeholder
4 meetings that we're holding around the country
5 will be documented and become part of the public
6 record. Every meeting that that we've had so far,
7 you can find a transcript, a briefing memo that
8 asks key questions, video if we were able to
9 arrange for the video, meeting summaries, as well
10 as all of the statements and presentations given
11 by the panelists.

12 And your statements, if you were part of
13 the public comment, the open mic period, will
14 become part of the transcript that will also be
15 posted on the web for all of these meetings.
16 These meetings and the input that we're getting
17 will be essential to our analyses and
18 recommendations.

19 We expect that the first installment of
20 the QER dealing with transmission, storage, and
21 distribution will be finalized by the end of
22 January 2015, and we will begin at some point

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1 around there working on the second installment
2 which will focus on generation, end-use, and
3 production.

4 And the third installment, which will be
5 around 2016, will look at probably supply chain
6 issues. And we'll likely do an integrative report
7 at the end of that sort of three-and-a-half to
8 four years.

9 I want to thank very much Lewis & Clark
10 for this wonderful facility and for the sun that
11 we got today, which I know isn't normal. So I'm
12 going to take it as a sign that the sun is shining
13 on us.

14 I want to thank the DOE staff, in
15 particular Larry Mansueti, as many of you know, is
16 a force of nature in the electricity world; and
17 the rising stars around me, Levi Tillemann, Matt
18 McGovern, and Sallie Gilbert; as well as our home
19 staff back in Washington D.C.; and the Energetics
20 Team, who's been fabulous. Thank you very much for
21 Chris and the team.

22 And with that, I'd like to again thank

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1 you very much. I know that many of you traveled
2 long distances. And we, by federal law, are not
3 allowed to provide coffee and tea, unfortunately.
4 I know the Deputy Secretary was asking me for
5 coffee. But we want to thank you because we know
6 that this -- that you took a lot of time to share
7 your views and input, and we appreciate it. Thank
8 you very much.

9 MODERATOR KELLEY: Thank you.

10 The meeting is adjourned.

11 (Whereupon, the meeting was
12 concluded at 2:33 p.m.)

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1 CERTIFICATE OF TRANSCRIPTION

2

3

4 I, VALORI WEBER, hereby certify that I am the

5 Court Reporter who reported the following

6 proceeding and that I have typed the transcript of

7 this proceeding using the Court Reporter's notes

8 and recordings. The foregoing/attached transcript

9 is a true, correct, and complete transcription of

10 said proceeding.

11

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July 28, 2014

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VALORI WEBER

Transcriptionist

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