NATIONAL PETROLEUM COUNCIL MEETING

TUESDAY, APRIL 23, 2024

9:00 A.M.

Reported by: George Quade, CERT

I N D E X

I N D E X (Continued)

P R O C E E D I N G S

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(Meeting called to order, 9:03 a.m.)

MR. ARMSTRONG: Good morning, ladies and gentlemen. Will the 134th meeting of the National Petroleum Council please come to order.

First of all, I want to welcome to all of you members of the Council, honored guests, and members of the press and public. We have what I think will be a productive and particularly informative meeting this morning. We have a very full agenda, a copy of which is among the papers before you. And we also have the honor of the Department of Energy's leadership participating throughout the session today.

First, I will make the customary safety announcement. There are no scheduled fire alarms today. So if the alarm sounds, we will evacuate through the doors back here, up the stairs, and through the lobby to the street. The muster point will be immediately in front of the hotel on Pennsylvania Avenue.

Now, if there is no objection, I will dispense with the calling of the roll, and for the members of the Council, the check-in in the Buchanan Room back behind us will serve as our official

attendance record. Any member or observer through a member who is not checked in, please do so before you leave to ensure we have an accurate record for today's attendance.

In addition to the audience in the room, we have an online audience that will be able to watch the livestream of our proceedings. This audience includes council members unavailable to attend today, as well as many of the individuals who have contributed to the study efforts we will be voting on this morning. And to those of you all listening in that did help out on the studies, I want to give you a personal thanks on behalf of the NPC for the great efforts that have gone on to get us where we are today.

I would now like to introduce to you, and for the record, the participants joining me at our head table.

To my immediate right, we are pleased to have Mike Wirth, Chair for the NPC Committee on the Hydrogen Energy.

And next to Mike is the Honorable David Turk, Deputy Secretary of Energy.

To my far right is the Honorable Brad Crabtree, who's the Assistant Secretary for Fossil Energy and Carbon Management.

And next to Brad is Ryan Lance, Chair for the NPC Committee on Greenhouse Gas Emissions and the NPC Vice Chair.

Next to Ryan is the Honorable Jennifer Granholm, Secretary of Energy, whose remarks are next on our agenda.

Madam Secretary, we look forward to hearing from you this morning, and presenting to you the results of both the greenhouse gas emissions study, as well as the hydrogen energy studies that you have requested.

I just want to -- before I turn this over to Secretary Granholm, I just want to recognize all the tremendous amount of energy and work that goes into these studies and all the volunteers that take time to do that. I know as we get toward the end of this study people are always asking how did I get drug into this, and I just want to tell you how appreciative I am of the efforts that you all put in and the time that it takes to get that. These are remarkable studies, and they will -- they will live on and provide great reference and pathways for the future. So thank you for your work on that.

So, again, Madam Secretary, thank you very much. We're honored to have you with us today. And so

please join me in welcoming Secretary of Energy Jennifer Granholm.

(Applause.)

SECRETARY GRANHOLM: Great. Thank you, Alan, and welcome everybody to the National Petroleum Council. Those of you who are veterans, those of you who are newer, really appreciate your participation here this morning.

I do want to acknowledge our DOE team who has been working on these studies and working in partnership with a number of you: Jenn Wilcox, who's over here; Sunita Satyapal, who's also here; Ryan Peay, who's here; I think Nancy Johnson maybe is here, not sure; Christopher Freitas is here. You know, Brad, you're going to hear from -- Dave Turk you're going to hear more fulsome remarks than I have from; Bridget Bartol, who's over here, who a number of you have been working with, as well. We are grateful for the ability to have a conversation with you about how jointly we can move to collective outcomes.

And I want to -- I want to double down, I'm going to foot stomp the thanks on the report committees. Mike, thanks for your lead on this hydrogen report, and, Austin, thank you for your work on making this happen. I know we're going to hear from

you in a minute.

And, Ryan, again, similarly on the hydrogen -- or excuse me, the GHG report, and John, thank you so much for your work on it. And I know, again, a lot of this -- a lot of time and resources go into these, and I know our policy teams are eager to dive in.

And I just want to say as an important matter, I really appreciate the weight that you gave to environmental justice and community engagement issues, giving them, I know, standalone chapters in the reports for the first time. Your leadership on this has outsize impact, and look forward to hearing more about the findings.

Okay. I'll just say one more thing about this. These two studies are really quite comprehensive. I invite the NPC to think about future topics, as well. And I know Dave Turk has some ideas, and I know he's going to share some of that a little bit later.

I thought I'd spend just a minute reflecting on how far this group, all of us, have come in the last three years. At one of our first meetings back in 2021, one of you asked me whether the Biden Administration was looking for progress or for a fight. And I swear, my answer was progress, and that means

progress on climate change, progress on deploying clean energy, progress on decarbonizing.

And my goal, the Administration's goal, was really to lay the groundwork for a productive relationship, to understand that the climate crisis is a massive threat obviously to the country and to your industry's long-term health, and understand what tools -- what tools would be enticing you, perhaps, to use your substantial resources and influence to jump into producing clean energy, decarbonizing traditional energy.

I know, I know many of you are already decarbonizing -- that's clear -- and showing us how we need to do that. These reports are an example of that. A few are actively exploring clean hydrogen and geothermal, my favorite. That's great. More of this, please! But in these three years, we all acknowledge that there have been difficult conversations. We want prices low at the pump for everyday people. Your investors want prices high to make a greater profit. Despite this structural tension that's embedded in capitalism, progress is undeniable, particularly in other ways.

So I threw out some stats at CERAWeek, but they bear repeating. Global clean energy investment

has broken records every year -- $1.8 trillion in 2023. And here in the U.S., companies -- this is that we know of, have announced over $400 billion in clean energy and manufacturing investments in just the past three years. EV sales have quadrupled. The tools that you all have now are unprecedented.

Back then, I think some of you might have been skeptical if I told you we would roughly double the tax credit for CCUS, or that we'd offer up to $3 per kilogram for clean hydrogen production. You might have been skeptical that we'd have muscled $8 billion out the door for hydrogen hubs, or that your businesses would be able to get geothermal leases in a snap of a finger, more or less.

You'd have been skeptical, maybe, if I told you that many gas stations now are installing EV chargers. And all of this, while along the way you've helped us to meet the moment when our energy and national security has demanded most, producing record amounts.

I know the international environment is challenging and unpredictable. I know summer is just around the corner. We'll be counting on you again to make sure American consumers are well supplied. We can all agree that global disruptions -- Russia, China, war

in the Middle East, OPEC -- are inevitable. Our asks of you can seem at odds -- produce, decarbonize, diversify -- and in moments there will be folks who think it's easier or smarter or safer to stick to the status quo, who might think that a fight is more productive than progress, but not me, not President Biden, hopefully not you, because we all know this, that in 5 years, in 10 years, 20 years, the energy status quo is going to be obsolete.

For those who are proclaiming the future with certainty, I think a little humility is in order. We're still going to need obviously secure supplies of traditional energy, but all of those consumers and communities and countries and investors who are calling for change today will have fundamentally reshaped the markets tomorrow. And technology will reshape the market, as well. Maybe modular fusion plants, commercial fusion plants, will have supplanted traditional fuels for electricity. Maybe AI will have helped us crack the code on affordable, abundant, sustainable aviation fuels. Maybe semi-trucks will be powered with batteries made with materials from seawater or by geologic hydrogen.

The scientists who are in our labs today are experimenting and researching and discovering solutions

that will be ubiquitous tomorrow. And as long as we follow the science and not deny it and let that human curiosity and creativity and genius loose, I am optimistic that we'll continue to solve and improve and move. So keep working with us, and together I think we'll all build a trail that leads us to the summit.

So thank you -- thank you again for the incredible work on these reports, and I look forward to digging in. Back to you, Alan.

(Applause.)

MR. ARMSTRONG: Thank you, Madam Secretary; appreciate your comments this morning. And we do look forward to being a big part of the future for energy in whatever form that comes.

The next item of business we have is to consider the NPC Committee on Greenhouse Gas Emissions study, and we'll discuss the findings and recommendations for that. And we're lucky to have Ryan Lance, and I'll call on Ryan Lance now to present an overview for the Greenhouse Gas Emissions study.

Ryan?

MR. LANCE: Good morning. Thank you, Alan, and thank you, Secretary Granholm. Appreciate the kind remarks and the inspiring remarks in many ways. So

thank you.

Two years ago, Secretary Granholm asked the National Petroleum Council to conduct a study assessing greenhouse gas emissions across the U.S. natural gas value chain and the pathways for reductions of those GHG emissions. And today we're here to present to the DOE the final draft of the study, and its title is Charting the Course: Reducing GHG Emissions from the Natural Gas Supply Chain.

I think it's kind of an exciting day. We're rounding third and headed for home, folks. So here we go. And I think John and myself are eager to share the findings of this study in the role as study chair and vice chair of the NPC.

So let me start certainly by recognizing the many people whose hard work went into this 700-plus-page report. There is an executive summary, so you don't have to read 700 pages. You can go to the other one. But the study collaborated with more than 200 subject matter experts. They came from industry, academic, government, nongovernment organizations and represented a wide range of perspectives. Thank you, also, to the DOE staff for their help progressing this study.

And I'm inspired by the unique partnerships

that come about from these NPC studies and the benefits that this collaboration provides to our country and to society. I certainly speak for myself and for also our company, ConocoPhillips, when I say we are honored to be part of the study and lead this effort.

I also want to recognize the NPC members for their valuable guidance and their perspective throughout the process. Most recently, we asked Council members to review the final draft report, and we did receive some substantive comments. The study team reviewed, and more importantly incorporated, this feedback into the report that you'll see today.

Now, in a few moments, I'll introduce my colleague, John Dabbar, and he'll identify the changes for you from the last time that we met to today as part of his presentation. And after that I'm going to seek your approval for the report.

But before John begins his presentation, let me set the stage with a few general observations. The study affirms the essential role that natural gas plays and will continue to play in our energy mix and the criticality that we prioritize reducing emissions along the entire natural gas value chain.

So how do we do that? We use the integrated approach outlined in this report. That approach

includes concrete recommendations for industry and government that could eliminate more than half of our GHG emissions today that exist in the natural gas supply chain. I think you'll find our report authors have provided a comprehensive view of addressing energy security and the need to reliably meet demand.

Now, I won't sugarcoat what comes next. Reducing emissions from America's natural gas is an urgent priority that requires collaborative solutions, and there is a lot of work to be done. But thanks to the study, we have the tools and the framework to make a difference, and we can make a very real impact. Working together, we can reduce GHG emissions across this natural gas supply chain, and that will benefit the society, the United States, and certainly the entire world.

So, with that, let me turn it over to John, and he'll provide the details for the final report. Thank you.

(Applause.)

MR. DABBAR: Thank you, Ryan, Secretary Granholm, Chairman Williams, thank you very much for -- Chairman Armstrong, thank you very much for having me today. I'm John Dabbar. I was the chair of the working group that produced this study. In NPC

parlance, that's the coordinating subcommittee.

Today, I'll be presenting some of the member feedback on the draft report. And this is important because it's incorporated then in the final report you'll be asked to vote on. I'll then do a dive into the process and findings and recommendations of the study, how you and the members of the public can access it going forward, and then, in an appendix, recommendations categorized by different audiences.

So we received six pieces of feedback on the draft report, which I'll describe for you briefly here and how we resolved them. We were asked to address in two ways the importance of natural gas in electric grid reliability and to incorporate the NERC findings on natural gas and grid reliability. We were able to include those, and we've made recommendations along the lines of increased government/industry engagement on natural gas' role in the electric grid reliability.

We've been asked to incorporate some recent technology developments on gas-powered engines and their emissions reductions. We had some references that we were able to incorporate. Those are now in the proposed draft final report.

We were asked if the study could incorporate

renewable natural gas; that is, natural gas made from, for example, agriculture or waste. We explained that this was out of scope for the study. We went to the study guidance letter that we received from the Secretary and said for the purposes of this study it was out of scope.

We were also asked if we could evaluate regulatory changes to repurpose wells for non-oil and gas purposes. We evaluated that and said that was really out of scope for what we were looking at in the study letter. And, finally, we were asked to reinforce that community engagement includes all relevant community members. That's certainly in the details of the report and in the reference documents that we incorporate.

So those are the changes -- minor changes. That text has been included now in the draft report that will be for your approval later today.

So the natural gas supply chain references from the wellhead through transportation to a delivery meter -- end-user delivery meter, or through LNG delivered to a destination port. So we were able to look at the greenhouse gas emissions through that supply chain. We had a lot of detail in the study about different supply chains that we were able to

address. In the aggregate, it's wellhead through major end-user meter or LNG delivered.

The data you see here on the hundred-year supply of natural gas at current usage comes from the Potential Gas Committee at the Colorado School of Mines. Because we found that natural gas is both the largest primary energy source for heat and power and also the primary source for electrical generation, that led to a number of findings and recommendations with respect to the future for the applicability of natural gas in the U.S. supply chain.

We were also able to really research the facts on what the greenhouse gas emissions are and what those challenges are. And you can see some of the data here. We did a little focus on methane to show that the natural gas supply chain is about 33 percent of the anthropogenic methane emissions in the U.S., along with ag, coal mining, and waste.

We also were able to do a deep dive into the CO2 emissions, which I'll cover in a little bit more detail later on.

This all started with the mission. We received the study letter from Secretary Granholm a year ago yesterday, and the key point -- and this is a public document. It's available on the NPC website for

the study. It basically was the scoping document. This is the -- these are the questions and the guidelines and the sideboards that we're expected to answer. And what we found is that by working through that scope, we brought together over 200 contributors, as you can see balanced between industry participants and other NPC members and fellow travelers. As a couple of interesting statistics, that group of contributors produced, during the course of the study, over 190 peer-reviewed technical papers on reducing methane emissions, and 12 of those study members had earned Ph.D.s in methane or related sciences. So we had a lot of talent in the groups.

We had a decision team, the coordinating subcommittee, that roughly represented equally the split between industry and non-industry participants so we could bring in diverse views. We also, at each one of our decision-making meetings, we would bring in an external speaker to provide an alternative viewpoint to add a more fulsome discussion of what we were doing and how we should do it.

One key point to the scope is that we are excluding end-use combustion outside the natural gas supply chain. So this is essentially focused on the emissions in the supply chain from wellhead to end-user

meter. To the extent that there is fuel use inside the supply chain, we are addressing that and we do make recommendations about fuel use inside the natural gas supply chain.

Over that two years, our recommendations, our task groups, that's just to show you that I had -- we had broken down the Secretary's letter into manageable chunks, and it took five to get there. But one thing I'd emphasize is that during the course of the study, we incorporated societal considerations and impacts. And that is throughout the chapters of the study. It's not just bolted on at the end. It's actually threaded throughout the chapters.

And the purpose was to align what we do on the actions and construction around GHG reduction projects with the concerns of the communities in and around where they're happening. And, also, we used SCI because it describes a wide range of the external concerns related to GHG reduction projects.

So we have a collaborative vision. Following this vision through 2050 will meaningfully reduce the natural gas emissions from greenhouse gas supply chain -- the natural gas supply chain. We put them in a circle because not one of these is top, not one of these is first. All five of them are necessary. And

I'll be describing those five and the specific actions associated with each of those five later in the study.

The key message here is that we can achieve a reduction in greenhouse gas emissions while providing natural gas -- as a crucial role in energy security, an important role in economic security, under all EIA scenarios. And it's important to note under all scenarios because, as I'll discuss later, our recommendations don't depend on us selecting a single supply-demand balance; that they're applicable under all supply-demand balances that we're able to find.

And the end result from this: We think a 50 percent reduction in greenhouse gas emissions from the natural gas supply chain, and that requires both existing policies that are in place today, which I'll discuss in a bit more detail. They're activated by technology deployments and market mechanisms to both reduce CO2 and methane emissions.

A little history, 2005 to 2019. Unconventional resources, the shale revolution created affordable and reliable natural gas, which, as you can see, displaced coal in the power-generating sector. We're not forecasting the future. This is a historical fact. But we wanted to put it in front of you because it's an important data point on the GHG

emission effect of coal to gas switching historically in the U.S.

One key finding, or theme, throughout our report is that methane and CO2 have different sources and, therefore, different actions for abatement. You can see we broke it down by the various stages in the supply chain. As I mentioned earlier, there's the fuel used inside the supply chain, which shows up on the lower right part of the CO2 graph, and then on the various segments of methane emissions on the upper left side.

Again, what's important here is this doesn't change between supply-demand scenarios. We focused extensively on source-level emissions mitigation, so able to say this is where we have to reduce GHG or CO2 emissions and, therefore, the actions become quite source-specific. That became a common framing through our recommendations process.

So, as I mentioned, we are working to reduce both CO2 and methane. Policymakers use global warming potential, GWP100, hundred-year time horizon, or GWP20, a 20-year time horizon, to combine methane and CO2 emissions into a single number. And it's often used in policy circles to describe an overall single number to answer the question.

We determined that although we used GWP throughout the study to relate to external policy -- external and policymaker views, we did not use GWP to decide whether it would reduce methane or CO2, but rather to reduce methane and CO2 in parallel with different findings and recommendations. And our recommendations -- if you take one thing away, our recommendations are the same no matter which GWP you choose to use.

We also have a bit of history on reductions and changes in GHG emissions from the supply chain. As you can see over 2005 to 2020, methane emissions went down on an absolute basis. Also, the carbon intensity, which is the overall greenhouse gas emissions per unit of energy delivered went down. However, during that time period, as we roughly doubled the amount of natural gas produced over that 15-year period, CO2 emissions did go up. Carbon intensity down; CO2 emissions up; methane emissions down.

So we did a review of both the past regulatory activities and also the technology activities over the past 10 years. Because -- this is not all inclusive. These are the significant ones that we were able to put on a slide. There's also rules that are still coming out. In fact, the Bureau of Land Management issued its

rules after we had submitted this report for approval. So it's still a fast-moving space.

What we decided was everything that was in place at the end of 2023 would be in scope for this study. The assumption that rules that had been either promulgated in law or had been published in draft regulation would go forward substantially as proposed by the relevant regulators.

We also assume that over that 2024 to 2026 period additional both regulatory policy items would come about. We did not do an evaluation of rollback. We did not say what if these regulations were reduced. We just said, this is what's published; that is our existing policies case. We also assumed ongoing technology and research advances, as described here.

We see this as a real opportunity and we do a deep dive on durable policy and durable regulation in this study. This is an opportunity for durable regulation and alignment across government agencies at the federal and state level to make more durable policy.

So going back to the point sources, we have three pathways to reduce GHG emissions across the supply chain. We call them existing policies, which is, as I mentioned earlier, everything that was in

place at the end of 2023 delivered through roughly 2026. Continued reduction, which is what if we continue on trend for what those are, basically more of the same.

And then a step change, which is the TIP pathway, and that is essentially market mechanisms which can activate additional reductions in GHG emissions, mostly CO2 in this case, as you can see. We do a deep dive into market mechanisms, discussing the pros and cons of each, and how they incentivize capital allocation to reduce greenhouse gas emissions, how they value carbon intensity reductions, and how they can incentivize differentiated natural gas; all of that built on a foundation which I'll talk about more in a moment of more accurate measurement and verification of GHG emissions as a measurement-informed inventory of GHGs for carbon intensity.

But it's not just what we do; it's how we do it. What we found during the course of the study is that everything in a community is framed by its own historical practices, its historical knowledge. It's place-based and it's unique to each community. And only by listening and learning to the community's concerns, which will frame their view of your project that you're planning to implement to reduce GHG

emissions, by historic -- by listening to that, listening and learning, you can then collaborate and respond.

We also did something innovative during the course of the study. We actually conducted polls and in-person focus groups with communities around the country to get data -- not to validate best practices, but to validate the process of how our recommendations on engaging with the community -- how people would respond and react to that. And that's incorporated in our findings and recommendations.

A bit on technology. What we found is that different technologies are applicable for different types of measurement and quantification. There's a fair bit of challenge in the quantification effort, which goes into the number of variables and the atmospheric conditions around where you might be measuring and trying to quantify methane emissions. We do a really deep dive on that.

I won't go into a lot of detail on the math and science, but what is important is that this is a rapidly evolving space. In fact, as recently as this past weekend, I was reading a pre-publication paper by one of our members on new technology that they're advancing. We interviewed dozens of technology

providers to get the state of the art and understand where the country is today on technology. I'll also note a number of those came from the National Laboratory of Science that was then moved out into the private sector and commercialized.

There is no optimum stack of technology. The technology is what is appropriate for the kind of emissions you're trying to find.

What we see is an important view of -- important benefit here from additional harmonization on the government's qualification of technologies for detection. Time and time again we saw that different parts of the federal and state government had different processes for qualifying technology. Well, those technologies are completely agnostic about which regulator is looking over the shoulder.

Meanwhile, we think that it's really important to address the needs of what we call less capitalized operators. We couldn't call them small because, you know, a couple hundred thousand barrels a day is not a small operator. But in many cases they were -- they were challenged by the cost of monitoring and measuring technology.

We held four focus groups with over 70 small operators, one guy that actually owned one well and was

thinking about buying a second one, and what we learned was that they were concerned that this was a big company science project and wasn't something that they would be able to afford to implement.

So we made recommendations for -- in a two-pronged way here. One is to scale up the deployment, get that out there, but also get it out there to abate methane emissions. Don't just measure them and quantify them and report on them, but also take actions up front to abate. We do a deep dive in the report -- and I'll be making recommendations on how industry can collaborate to more widely deploy abatement -- emissions abatement actions.

Second, we are making recommendations to support funding and tax credits specifically around the enhanced deployment with a key focus on operators of marginal wells.

So life cycle assessments are a really useful tool for determining what the carbon intensity in this case of natural gas is. And we broke out three different findings or types of life cycle assessment results for three different supply chains. But what's important is life cycle assessments can be really complicated. A typical life cycle assessment might take as many as 150 variables to be accurately

characterized.

The work that we did determined that, in fact, you can accurately characterize an LCA with only 22 variables. We harmonized that with a number of external studies. We validated it with four external study groups. And we produced a life cycle assessment model, the SLiNG model, that is publicly available. It will be -- we'll be releasing it concurrently with the study, along with the user manual, and it's available then for the public to use -- and for operators to use -- in evaluating the carbon emissions of their supply chains.

We also, as an innovation, built this model specifically so that actual measurements, measurement-informed inventories of GHGs, can be incorporated into the model. So as you, as an operator, use the model, you can also take your GHG emissions, incorporate them into the model, and come up with your carbon intensity for your supply chain.

So I discussed earlier the vision elements and why the five of these are all equal and going in parallel. I'm now going to do a deep dive into the time sequence of these five areas, and I'm going to highlight four very specific ones that are important takeaways of things that we're going to be doing -- we

want to be implementing going forward.

So taking action, things that can be done today. There's nothing holding us back.

Building foundations, things we can do today that would be supportive and enabling in the long-term.

And scaling impact, how do we move from taking action to reduce GHGs in that 2030 to 2050 time frame?

And I'll point out four very specific ones. First, on the building foundations regarding measurement, we then recommend that there should be standards associated with differentiated natural gas. How can natural gas be credibly differentiated in its GHG intensity? And we're recommending that work on standards effort is important there, to be a foundation for the future.

On the incentives for GHG emissions abatement, and we're recommending in particularly on scaling impact, introducing new market mechanisms, and we have a thorough review in the study of market mechanisms and the pros and cons of each. And they come in all sizes -- small, medium, and large -- and industry-wide and more targeted. And we think that it's worth putting a lot of effort into the market mechanisms because they will incentivize the right kind of capital deployment for GHG emission reduction.

I mentioned on regulatory effectiveness and durable policy, we see the work on durable policy that we described is also appropriate for permitting processes. Durable policy on permitting will make permitting for GHG emission reduction projects more likely to take place and more likely to be accepted in the communities where we work.

And, finally, industry actions. I was challenged by the non-industry members of the group -- so half of you -- to say, well, what is industry going to do? What are you going to do right now, and what are you going to do in the future?

And there we really recommend, and we see a path forward, on enhancing industry and operator cooperation. We see a big role for the federal and state trade associations as a convening authority. We also see a role for the federal government in restarting the PTTC with a focus on using that for GHG emissions reduction technology sharing.

In closing, the six key themes that we worked on, the crucial role of natural gas and the importance of harmonized government policy to encourage both energy and economic security through the use of natural gas; societal considerations and impacts, reducing GHGs requires building and taking action in your

communities; measurement, the role of technology and the role of measurement informed greenhouse gas inventories; research and development with a strong leadership role for the national laboratories, deployment at the operator level and basin level; life cycle assessments where we have democratized the use of the model, allowing you to bring in real-world measurement; and, finally, industry collaboration on greenhouse gas reduction.

Here's how you can access the study report: website, QR code. This will be on the website, those of you who can access it directly from us. I'm not going to review them, but down in our appendix, which is also available on the website, we have some slides on target-audience-specific recommendations.

Mr. Armstrong, I'm finished.

MR. ARMSTRONG: All right. Thank you, John.

Now we come to the part where we open it up to any final questions or comments. I'll ask John to stay at the podium. But we want to open it up to Madam Secretary, to the NPC staff, folks that are in the room here today, part of the NPC study for any questions, comments, or deliberation before I read a motion for acceptance. So we want to have that time for discussion.

Madam Secretary?

SECRETARY GRANHOLM: Great. Thank you. Just a couple of questions. Thanks so much, John, appreciate it.

On the issue of MMRV and making sure we get the monitoring right as it coincides with trust in the community, does the report take a look at third-party validation and how that monitoring and reporting out should be done in order to engender trust?

MR. DABBAR: Yeah, we had a rather lengthy discussion about third-party validation versus validation against a third-party standard. And I think that's where we differentiate. We see that the validator shouldn't also be the standards -- be the standard-setting organization, but rather that third-party validation should really come from validation against the standard that is adopted by the operator or in the basin. So a bit of arm's length between the standard setter and the third-party validator.

SECRETARY GRANHOLM: Great, great. Thanks for that. And then just another quick one if you don't mind. I know there may be other questions here. On the incentives that you referred to in your solution grid there. I'm assuming the new market mechanisms -- are you referring there to a price on carbon?

MR. DABBAR: So that is one of many that we've studied. We took a look at a number of different options that are both regulatory market incentives, structuring the market like a low carbon fuel standard. We refer to that as one example of a working one. We do refer to a price on carbon. We also look at what we call voluntary market mechanisms. The very fact that a company commits to net zero by 2050 is essentially a market mechanism. They're saying that's what we're going to do. So we have a number in there. The price of carbon is only one of them.

SEC. GRANHOLM: Thanks.

MR. LANCE: Thank you, Madam Secretary.

Any other questions from the audience?

Yes, Mark?

Mark, I think we have a mic.

MR. MILLER: Thank you. Sorry about that. Can you talk for a moment about the rollout plan to industry, especially the smaller operators that you've mentioned before, and elaborate a little bit on that, please?

MR. DABBAR: Sure. So we have a two-pronged rollout plan. Through DOE, we've set up a list of federal and state agencies, Capitol Hill, et cetera, to roll out the findings in the study, specifically with

recommendations for them.

The second prong is using the trade associations as convening authority, both here in D.C. and also at the state level, to roll out these recommendations for actions by industry. And that's taking place over the next roughly six weeks.

MR. LANCE: Thank you, Mark.

Any other comments or questions from the floor?

MR. CHIANG: John, great work. My question is, did you include any of the benefits of LNG exports and the impacts of that? I know it's not in the U.S., but for the world?

MR. DABBAR: Yes. We actually did a pretty thorough review of the impact of U.S. LNG from an energy security standpoint. We sort of focused on deliveries to Europe versus deliveries to Asia and where the alignments are. While we didn't make any specific recommendations on fuel use in destination countries -- that was out of scope, fuel switching was out of scope -- we do talk about the energy security aspects of U.S. LNG exports.

UNIDENTIFIED MALE: Thanks for all your work on this, John. You mentioned at the outset that renewable natural gas produced from dairy farms,

landfills, et cetera, is out of scope here. Has that been looked at in other NPC reports, or is there a more appropriate place for a study like that? I think it makes sense that it's not a part of this study, but just other places that could be looked at.

MR. DABBAR: Mm-hmm. Yeah, so it was -- it was something during our initial scoping work with DOE. We said that for the purpose of this study it was out of scope. With respect to future studies -- past study -- I don't think it's ever been evaluated in a past NPC study explicitly. In terms of future studies, I would defer to the chair of the NPC Agenda Committee to set the agenda for future studies. Thank you.

MR. LANCE: Thank you.

Any other comments or questions?

(No response.)

MR. LANCE: All right. Thank you.

Mr. Chair, Madam Secretary, I move that the draft final GHG emissions study report, titled Charting the Course: Reducing GHG Emissions from the Natural Gas Supply Chain, be approved by the National Petroleum Council, subject to final editing; further, that the Council makes available topic papers and access to the life cycle assessment model and user guide that were developed during the study process. These additional

materials are not part of the Council's report but provide useful background material on the report.

Mr. Chair, that concludes the motion.

MR. ARMSTRONG: Okay.

UNIDENTIFIED MALE: Second.

MR. ARMSTRONG: Thank you for the second.

All in favor?

(Chorus of ayes.)

MR. ARMSTRONG: Any opposed?

(No response.)

MR. ARMSTRONG: Okay. Thank you all very much. That motion carries, and the report is adopted without objection. So thank you, Ryan and John, for your great leadership on this study. And thank you, members of the committee and the subcommittee. I know John's giving a big thumbs-up out here.

(Applause.)

MR. ARMSTRONG: So that really was, as you can see, a very comprehensive report; studied a lot of a very wide range despite some of the limitations that John mentioned. It was a very wide-ranging topic and a lot of opinions to be reconciled. The team did a fantastic job of getting that done.

So our next order of business is to consider the proposed final report from the NPC Committee on

Hydrogen Energy. We will discuss their findings and recommendations and vote on adoption of their proposed final report.

Mike Wirth, Chair of the Committee, will present a report overview. Mike?

MR. WIRTH: All right. Thank you, Mr. Chairman. Madam Secretary, esteemed colleagues, I'm pleased to present the findings of our study entitled Harnessing Hydrogen: a Key Element of the U.S. Energy Future.

Over the past two years, this committee has evaluated the current state and potential future state of our domestic hydrogen ecosystem and the role hydrogen can play in reaching U.S. climate goals. Over 200 experts from more than 100 organizations served on the study's committee, subcommittee, task groups, teams, and subgroups. These representatives included policymakers, academics, nonprofits, NGOs, DOE staff, hydrogen consumers, industry experts, and other relevant parties.

It's noteworthy that a study of this magnitude achieved very high levels of alignment across such a broad and diverse group. While this approach took a little longer, we believe it ultimately yields a higher quality work product and better advice to the Secretary

and Department of Energy.

Importantly, this study included a regional analysis of supply and demand, to provide a detailed view of the pace of growth for low carbon intensity hydrogen along different production pathways and in different parts of the country.

The report includes 19 primary findings and 23 primary recommendations organized in three categories of critical enablers that could aid in rapid low carbon intensity hydrogen deployment and progress across all regions.

The policy and regulation category focuses on the requirements to overcome cost gaps between incumbent fuels and feedstocks and low carbon intensity hydrogen to increase investor confidence, and to streamline regulatory frameworks.

The societal considerations category addresses impacts and safety to ensure reliable value chains, while also providing societal benefits, improving community engagement, and enabling workforce development.

The technology, and research and development, and deployment category evaluates what’s necessary to close technology gaps across LCI hydrogen value chains, address technical bottlenecks, and support

public/private research programs. Already, programs such as the hydrogen hubs, production and demand side incentives, and technology development programs are helping lay the foundation for progress towards U.S. climate goals.

That said, significant and rapid progress across many areas must occur to move through the phases of low carbon intensity hydrogen market development. Acting on the findings in the study will enable innovation, accelerate solutions, and help advance a hydrogen ecosystem that can help drive progress towards achieving the world's energy and climate goals.

And I'll turn it over to Austin Knight, Chevron's Vice President of Hydrogen and the coordinating subcommittee chair, to provide an overview of the Harnessing Hydrogen report. Thank you.

(Applause.)

MR. KNIGHT: Hi, everyone. Thank you. Last December, we were able to share some major findings from the work that we had been putting together, and I am very excited to finally be able to talk about recommendations. I think this report is outstanding. It is a robust report that's very grounded in the fundamentals, and we believe it will have high impact for many years to come.

We think that this report is complimentary and additive to a lot of the great work that DOE has been doing putting out the hydrogen roadmap, the liftoff reports, other things that have been developed in the past two years while we've been working on this study. And this report is very much aligned with the "Charting the Course" study that was just presented, especially around the carbon intensity of natural gas value chains and also in the societal considerations and impacts approach that we use and the recommendations that we make.

Just to emphasize the diversity that we had in this study, we believe this is one of the strengths of the NPC, is to bring together this great group of experts from across industry, but beyond industry and into other parts of the economy, of interested parties, and hydrogen.

And I'll just point out here, about 30 percent of the 100 organizations participating were from the oil and gas industry, but the vast majority here came from outside oil and gas. We have manufacturing people that are building new technologies to scale up solutions. We have, of course, industrial gas companies here, power companies, and a number of nonprofits, university participants, NGOs at the table,

as well.

We had very strong leadership. In addition to Chevron, from McKinsey & Company, from the University of Texas at Austin, Air Liquide, Southern California Gas, Wood Mack, who partnered very closely with MIT, which you'll see led a lot of the modeling effort; ExxonMobil, BP, the Great Plains Institute, and the Mitchell Foundation. Just fantastic leadership from the task group leads that created all of the content that you see in the final report.

I won't spend a lot of time on the timeline here, but it has taken us a while. And this report work actually began before the Inflation Reduction Act was signed into law. It began before the hydrogen hub selections were made. And while we incorporated policy like the IRA that developed along the path here, we were not working to address directly and respond to each shift in the market as it occurred.

We recognize this space is moving very quickly and the landscape changes, and so we believe that we put the best expert thinking into this report, taking what was happening in the current environment as policies were developed, but we were not necessarily tailoring our approach as we went to every change that happened. And we think that that does give the report

quite a bit of good credibility on the basis of the expert input that came, the long-term thinking as we worked to develop the targeted role of hydrogen.

And we brought regional granularity that we believe is a first of its kind in any one of these types of reports. Working with MIT, we were able to go into comprehensive regional analysis and really target hydrogen adoption where it made the most sense in order to reach U.S. climate goals and looked at the economics behind that and, where possible, gaps were in deployment.

And so we've talked about this in detail before. The next bit is some of a repeat from those of you that saw the report findings in December. And I want to make sure we get to the recommendations. And so I'll go through this, but maybe a bit quickly.

Just to reiterate, we partnered with the MIT Energy Initiative in the modeling effort. We calibrated the inputs to the IEA World Energy Outlook 2022, and we incorporated projections and data from many, many experts in the field that are working all of these topics today.

We essentially built out two different scenarios. One was based on stated policies as they exist today. We modeled the deployment, the

optimization of all solutions in the energy market to model what would occur under policies as they're stated now. That's the stated policies case, and then we forced a net zero by 2050 outcome. And what we wanted to do was to be able to look at increasing carbon prices over time for a deterministic outcome that would deliver an optimized view of achieving net zero by 2050 in the U.S.

We believe this is an extremely useful tool. It is not a crystal ball. It can continue to be modified and accessed working with MIT, and it is not precise, but we do believe it provides many, many regional details that are available in the model that can be accessed in the report. And in the printouts that you have of this presentation and the appendix there, you'll also see we recognize there's some important assumptions that have gone into the model, there's some limitations of it, because it's a model for the future. But, again, we think it is very useful.

I'll start with a couple of the findings. And these will look very familiar to what some of you have seen before. First, when we look at the model and the overall optimization of the entire energy system, we are not on the path to net zero with the current

policies. And that's why we've modeled the two stated policies and the net zero case.

We do find that in the goal to achieve net zero by 2050, low carbon intensity hydrogen can account for a reduction of about 8 percent of the U.S. emissions. This mostly comes from the more hard to abate sectors, which we'll talk about.

We also find that the total cost to society in the U.S. of reaching net zero with our projections would cost society about 3 percent of projected USGDP in 2050, but without deployment of low carbon hydrogen that number can be much higher. The report points out specifically a range of $160 billion to $260 billion per year higher cost to society of reaching net zero if you deploy the next best alternative, which is more costly than hydrogen in these sectors.

I want to speak a little bit to what's going on in the background of the model. In order to force a net zero scenario, the model increases in the background the cost of carbon over time and builds adoption of alternate solutions that recognize those lower carbon intensity values over time to 2050. And you can see here the way, on the top line, the model is ramping up that cost. This is what's required to gain adoption relative to alternatives, which we'll talk

about a little bit later.

You'll see overall in 2050 the average cost of CO2 abatement is about $250 a ton in this model. The top marginal cost for that last ton abated is around $700 a ton. We've included a lot of expert input here from MIT. Direct air captured, DAC, is one of the limiting factors on the top end. This is not a DAC study, so we used the expert input to model this, but we do not comment on the rollout of direct air captured more broadly. We just want to show here that that is -- that marginal rate limiting solution at the top end of the model projections.

So what does that mean for hydrogen adoption on the demand side? We do see some increase in hydrogen adoption under states policies going from about where we are in the U.S. today of 10 to 11 million tons per year, possibly as much as doubling by 2050 under states policies as they exist. So we are seeing some foundations being laid. That comes from hydrogen hubs; that comes from the IRA 45V credit; it comes from other programs that DOE and others are implementing.

And so we see the scale-up, but it is just not enough to reach scale, and it's not enough to get the carbon abatement that's necessary in support of net

zero. That would require a seven times scale-up by 2050. And what we see here is the primary adopter of hydrogen, about 60 percent of that hydrogen, would go to industrial use. This is refining and petrochemical processes, steel manufacturing, heavy industry, where hydrogen is the best alternative to achieve that carbon reduction.

You also see the remainder split about equally between dispatchable power in certain markets where there's variability between supply and demand to be dealt with as the electrical grid moves to a zero carbon electrical grid. Also, transportation, primarily in heavy-duty applications, heavy-duty transportation, and finally exports. And we think exports is a significant number here in the total that you will start to see primarily from the U.S. Gulf Coast supporting other countries' decarbonization goals when they're not energy-independent.

We looked at then how are those molecules best produced, and, again, here you see the difference in the stated policies and the net zero scenario. Obviously the seven times scale-up in net zero is substantial. We see both -- the natural gas plus carbon capture and storage pathway and the renewable electrolytic hydrogen pathway having a role to play in

the future. And so we've -- we've looked at how the model best optimizes that regionally based on the resources and the end use across each region.

So you see a scale-up in both pathways while carbon reductions are achieved. It's important to point out here the lines that we have, the solid and dotted lines, reflect the amount of capital cost that the model is estimating will be required for achieving hydrogen at scale. And in total on the net zero case by 2050, that number is $1.9 trillion U.S. dollars invested across these value chains for production; $1.8 trillion of the $1.9 is to that renewable electrolytic pathway. The model is assuming -- because of the need to model the entire system, the model is assuming that all electricity towards hydrogen production is behind the meter production. This would mean equivalently that it's additional, it's in the same region, and it's time-matched because the way we had to model specifically all of the complexities here, behind the meter, was the way to model that.

It's not the only way it has to be implemented in reality, but what you see here is a substantial amount of the capital is required for that pathway because this is new infrastructure, new manufacturing, capabilities. It's different than the natural gas and

carbon capture pathway where you're already building off of some foundational infrastructure elements that exist.

Regionally, the model goes into a lot of detail. So in the report, you will see quite a bit of regional detail. This is available to you, and I'm giving you here just one example of how we break down the U.S., and then after this we'll talk specifically about the outcomes around economics, looking regionally as well.

What we see here is that there are three main geographies of adoption. In those geographies, the report goes into even further granular detail. Primarily seeing about 60 percent of demand showing up on the U.S. Gulf Coast, in particular. This is because of the resources that exist there with natural gas, with geology for carbon sequestration, with wind and sun, and also export capabilities, including the fact that it is a major industrial hub. So a lot of the demand comes from the U.S. Gulf Coast. But you also see scale-up in significant demand in the U.S. West and the Great Lakes region.

Again, this model is targeting what is the best alternative for each region and optimizing around those solutions. We think that there's really great

and novel data here that will allow people to unpack the specifics that are important to them as they look to deploy solutions in the regions in which they operate.

Now, the challenge with all of this is that long-term the math still doesn't work. So the study provides estimated levelized costs of hydrogen, looks at the primary production pathways that we have across regions. This chart has a lot of information, and you have it in front of you. Similar to what we showed in December, just to ground you a little bit, on each side here, one side you have U.S. Gulf Coast industrial demand, and on the right you have U.S. Gulf Coast transportation demand. This is looking at the trajectory of cost improvements over time that we anticipate. This does not include IRA incentives because in 2050 those are expected to be phased out based on current policy stated as 10 years.

And so what we see here is very clearly there continues to be a cost gap in the comparison of low carbon intensity hydrogen to the fuels it is replacing. There is also notably, and importantly, a difference in the carbon intensity of those solutions. And that's what the report tries to speak to.

In this case, if you take the U.S. Gulf Coast

industrial demand sector on the left side here, we see the natural gas plus CCS pathway at about $2 a kilogram, with the renewable electrolytic pathway just under $4. That is not in parity with where it would need to be to replace current refinery feedstock or industrial heat unless carbon intensity is valued in some way.

And so you see here where that would need to be -- and the report will go into lots of details of getting to something lower. In the transportation sector, it's similar. There is a large gap there, as well. The prices are higher because in the transportation sector there's more distribution and -- transportation distribution costs involved. And so the cost gap is only part of the story.

But of course, carbon intensity and the comparison here is really the big story, and we believe policy efforts are needed to start to close that cost parity gap, in addition to technology developments and building out social acceptance. And so that's what I want to speak to in the key recommendations.

As Mike mentioned, we came up with 23 recommendations with very strong consensus across that diverse group of participation that you saw. This is just a fantastic outcome going into a lot of detail.

And when you pull the report, for those of you that have seen it, or go look at that report later today, you will see many details of exactly what we think looks appropriate within these different recommendations, but we split these into three categories: the policy and regulation, the societal considerations and impacts, including safety, where you have five recommendations that are fully aligned and consistent with the "Charting the Course" study, and also a technology, research, development, and deployment.

I'll speak a little bit to what's in these, and the first, biggest thing that can be done to move the needle in this space is to deploy an economy-wide price on carbon. The NPC reports in the past have also made a similar recommendation. We believe that that's going to be most effective and should be transparent, should be technology-neutral, and should also make sure there's a level playing field, not putting the U.S. at a disadvantage relative to imports or exports.

But we also recognize that there may be necessary policy to bridge the U.S. to getting to an economy-wide price on carbon. And so I want to point out here that we look at other demand and production side incentives, including looking at and proposing low

carbon intensity standards, both in the industrial space and the transportation sector.

And, so, again, being technology-neutral and providing a level playing field, if there's not an economy-wide price on carbon, we make recommendations to implement a carbon intensity standard in industrial operations, and also a low carbon intensity fuel standard for the transportation sectors. In addition to that side of the incentives, we do address the 45V production tax credit under the IRA in some areas.

Now, the study participants, with the diversity of the group that we had, could not agree to every aspect of what good rulemaking would look like in 45V. There is diversity of views here, especially around the three pillars of electricity matching. As I mentioned, the modeling is all behind the meter, and so the results show you what that looks like in that case. We don't speak to that specifically in our recommendations.

What we do speak to are two areas. One would be to match the 45V tax credit to the way companies look at investment and the investment analysis matching that better with asset life cycles. And there today when we look at a 10-year credit for the IRA, 45V, the participants believe that is just not long enough to

appropriately weigh into the analysis of making investment decisions.

The other area was to utilize GREET and the GREET capabilities in the calculation of carbon intensity, to allow for differentiated gas, co-production of other products, allocation of carbon intensity in a way that is verifiable and reflects the real carbon intensity of the pathways being used, not only the average of the -- of the GREET model.

Not all study members could agree on exactly the best way to do that, but there was strong alignment and consensus around the need to have better recognition of these pathways to get to the real carbon intensity and carbon reductions.

I'll also point out we talk about codes and standards, including deployment of infrastructure and a global carbon intensity certification, some way to translate those standards and have certification across geographies outside of the U.S.

We also specifically point to regulation around permitting processes. And so no surprise, we've talked about that at NPC meetings before. We would like to see a more efficient process for permitting. We talk generally to permitting. We also talk specifically about interstate hydrogen pipelines that

are not blended. These would be pure hydrogen pipelines crossing state boundaries. And we speak to Class VI well permitting for carbon storage in support of the natural gas plus CCS pathway of deployment.

Next, on the societal considerations and impacts and safety, we recognize that many companies do already conduct robust community engagement processes. Those companies have been intentionally addressing societal considerations as a project development for quite some time. And this space continues to evolve and improve.

And so there is an opportunity for broader adoption of community engagement. There is an opportunity to bring best practices, to be more visible, and to show what the real impacts of those activities are.

And so we will speak specifically in the recommendations to the transformation of the way community engagement is done, really working to shed light on best practices and the impact of those best practices working in communities to provide some clarity to structures of how to communicate with outreach materials, how to involve others from the community in those processes to ensure that there's appropriate work force development and also labor engagement. And, finally, all of this, of course,

needs to be done safely. And so we speak to the safety elements that are crucial to gain the social acceptance of hydrogen.

And then finally on the technology and R&D rollout, this is another way to close the cost gaps, to bring costs down for the solutions that are still in a very nascent stage. There may be tech breakthroughs, there can be ramp-up of capabilities and manufacturing and deployment that help close the gaps that you saw a few slides back.

And so we speak to targeted investments in specific areas that are intended to lower the costs that are to improve efficiencies, that are to look at other needs in the value chain, such as specifically hydrogen leak detection, which is a -- something that is still quite early in the technological development. All of those things are to get costs down across the value chain.

We also address potential bottlenecks that can occur in that value chain, and we speak to things like material sourcing, ensuring clarity of codes and standards, so that we have a robust value chain in the future to meet the supply and the scale-up that we project is needed in the net zero case.

And so finally, to close out, just to

reiterate, low carbon hydrogen can play a vital role in the energy future. Current policies do start to build the right foundations to allow scale-up, but significant and immediate actions are needed beyond the current policies to get to the expansion phase and to get to scale in reaching net zero.

We speak to a lot of regional specifics here, and those regional specifics matter. Please see the full context of the report. We hope that that is used by the market participants to develop real, lasting economic adoption of low carbon intensity hydrogen.

Just like with Charting the Course, we have a QR code and a website that contains the full study, the about 70-page executive summary with all of the details and appendices behind that. It's been an outstanding piece of work from the participants. And, with that, I will turn it over for questions.

MR. WIRTH: Okay. Thank you, Austin, on behalf of the entire team.

(Applause.)

MR. WIRTH: On behalf of the study committee the steering committee, the coordinating subcommittee, and all the task groups, I'd like to thank Secretary Granholm and the Department of Energy for your leadership and commitments to determining how hydrogen

at scale can best be deployed.

We'll open it up now to members of the Council for questions, comments, or feedback, and I'll start with Madam Secretary.

SEC. GRANHOLM: Thank you so much. This is a bit sobering given all of the effort that we have been putting into hydrogen -- clean hydrogen, both on the deployment side as well as on the research side. And so I want to just ask a couple questions on the incentives.

I get the, you know, price on carbon obviously is an issue, and that's a heavy lift from a policy point of view. But -- so I'm wondering on the incentives. So obviously the incentives for 10 years don't give the certainty necessary. So it'd be great if those were expanded.

The $1.7 trillion that you identify as associated with electrolyzer-based hydrogen, is that -- that is not an annual number? That is a -- that's a capex number.

MR. WIRTH: That's total -- total capital for deployment.

SEC. GRANHOLM: Right. And so is there -- was there a recommendation regarding a production tax credit or investment tax credit increases? I mean, is

there a level at which that -- that it makes more sense to pursue if we extended those?

MR. KNIGHT: The way we've looked at it is with the modeling, where do we land in that gap? And then that gap is what needs to be closed. And so we give some examples of what we think -- types of policies could be to close it. But it's not necessarily specific on this is the -- this is the size of the tax credit that is needed for this or that. What we believe is when you look at that gap, that if the credits are designed right, whether it's a credit, whether it's a price on carbon, whether it's some other types of incentives there, supply or demand side, then people say economically I can justify the switch. And so that adoption --

SEC. GRANHOLM: Yeah. We have work to do on that, then.

MR. KNIGHT: Yeah.

SEC. GRANHOLM: So I noticed that your evaluation of the fuel stock, if you will, was based on natural gas and renewables. Was nuclear considered?

MR. KNIGHT: We did not model nuclear specifically in the overall rollout, but it is spoken to in the narrative as a pathway towards the low carbon intensity hydrogen, yes.

SEC. GRANHOLM: Although that's expensive, too, of course.

And then finally, you referenced the export market potential, and I'm wondering did the study look at which markets were most fruitful in terms of export?

MR. KNIGHT: So for export, we took -- there's quite a wide range of uncertainty and views of where exports will go longer term, but we took input from a number of the participants in the market now. A lot of that is assumed to be ammonia exports going either to Europe or to Asia, as the U.S. still remains one of the best low-cost energy producers in supplying those markets.

SEC. GRANHOLM: Thank you.

MR. WIRTH: Steve, I think I saw a microphone delivered to you.

MR. HIGHTOWER: Yes, thank you very much. In your presentation, you talked about the U.S. Gulf Coast demand. And I don't want to be presumptuous, but in the Great Lakes, does it outline the demand of the Great Lakes as well?

MR. KNIGHT: We do. Regionally, we go into all of those details, and Great Lakes is one of those regions where we see adoption. It has ample wind and some sun, and it also has industry there that would be

prime to adopt.

MR. WIRTH: Other questions? I see a hand back up here and up front.

Yeah?

MR. PEREZ: Jose Perez with Hispanics in Energy. And thank you very much for the work. It's really tremendous, and I'm glad that I was part of this. And I totally appreciate what you guys go through to put these things together. So it really is an amazing task.

Well, I agree with the Secretary. It's a little sobering, some aspects of the study, but we're still encouraged and we're hopeful. And we would love to see hydrogen developed in the United States, as it was envisioned. And so we are making sure that 20 percent of America's population which is Latino is engaged. So we are doing these community forums to bring the leadership along.

And so I really appreciate what Chevron is doing, and ExxonMobil, and so many other companies that are supporting this effort. So I just wanted to commend you and tell you that I really appreciate playing the role in this. Thank you.

MR. KNIGHT: Thank you, Jose.

MR. WIRTH: Thank you, Jose.

Question back here, row one, two, three. Over on the end.

MR. LIEWEN: Yeah, I want to return to the export question. So just looking at your cost gap slide, what does that look like for Asian markets, European markets, how big are those cost gaps for 2050?

MR. KNIGHT: We did not model the adoption overseas, just given the complexity of that and the role specifically looking at the U.S. And so we looked at other reports and analysis that exist to determine what volume to put on that export assumption. As you probably know, other geographies are looking at their own incentive programs as well, whether it's price on carbon or other demand side subsidies to close that gap, as well. And so today those gaps still exist, but they vary region to region.

MR. CARDENAS: Daniel Cardenas, National Tribal Energy Association. I think this is a great report. Maybe as we look for questions for the future, I know that -- and maybe Secretary Granholm will be able to chime in about our allies, like Japan. I mean, the Japanese, their green plan, just to replace their coal power generation, is looking at 40 to 50 million tons of ammonia, importing that. And they expect about a third of that to come from Australia, a third from

the United States, and then a third from other places.

And so have -- have we been working with our allies -- even though maybe it's not in this report, but maybe for future talking about how we work with our allies to get them to also -- us to meet their goals, because if they expect us to produce several, you know, 15, 20 million tons of ammonia for their market, they ought to help us get there, as well.

So I was just wondering how that -- I mean, the answer will probably be you guys didn't look at it, but maybe from the Secretary, have you been in contact with our allies like Japan on how we help each other?

SEC. GRANHOLM: Yeah. It's a great question because this is a global market for clean hydrogen, and all of our allies are eager to -- I mean, many of them are jumping in the game with both feet. We're all experiencing the same sort of challenges on the price side of things.

One of the things that's really important for us to do as we work together, as Dave knows, because we've been working with our allies, is making sure the standards are uniform globally so that it's easy for the trade to occur. But our allies are looking to us because we're in a leadership position right now given the amount of money that we've invested in the hubs.

So we -- we intend to keep that leadership position. This report helps us to really focus a bit more.

I don't know, Dave, if you want to add anything on our conversations with our allies.

MR. TURK: Yeah, just to add, I think the numbers in the charts Austin showed are sobering, just as you said, right? Like, we're going to need an awful lot of investment, an awful lot of collaboration, and I certainly think -- and we've had these conversations with Japan, with Korea, with a number of folks in Europe -- everyone's going to have to be a part of the solution to provide some funding in order to do this at scale and drive those costs down.

So Germany is a good example. They put some real money on the table, several billion Euros, in order to have that pull for the clean hydrogen, whether it's coming from the U.S. or North Africa or Australia, or elsewhere, or the Middle East for that matter. And so Japan, there's a role there, there's a role for others to play.

But I'm not sure there's an alternative, especially for the harder-to-decarbonize sectors than really stepping up and all of us really putting some funding and tools and incentives on the table in order to get there.

MR. WIRTH: And maybe, Dan, the last thing I would add is you mentioned some other countries. While not within the scope of this study, certainly many of the participants in the study are working in Australia, in the Middle East, have relationships with customers in Korea, Japan, and other markets trying to help bring the pieces together.

The natural advantages, just as you heard, there are regional differences in the U.S. in terms of production pathways or demand sectors that exist globally, as well, and then you introduce a transportation leg, which in the U.S. tends to be pipelines and probably more efficient than sort of the things where you get into marine transportation and converting to another form and then converting the hydrogen back. So it gets complex globally, but there's a lot of work going on just beyond the scope of what the study was asked to address.

Other questions? Yes?

MR. TUDOR: On the simplifying assumption about the power source being behind the meter, that strikes me as a really big, really important, assumption. Could you talk about that a little -- a little more, and kind of why you felt like you had to make that simplifying assumption? That'd be the first

part.

And the second part would be, do you feel like that simplifying assumption actually understates the ultimate cost, or the opposite?

MR. KNIGHT: We're working with MIT, so they have these very complex models. They have a SESAME model, and their USREP model, and all of that is to optimize the total energy system and then determine what is the life cycle emissions coming from those solutions.

And when we were looking specifically at how do we deploy hydrogen, there's just too many unknown variables where we're not experts in the electricity markets to try to model all of what that might do over time and you have to force some assumptions in. And so one of the forcing assumptions was the grid will decarbonize by a certain point in time.

And separate from that, for deployment of hydrogen, you have different pathways. One of those is based on electricity. But to simplify it, we would say that electricity is already dedicated to hydrogen. We think it provides kind of an upper end. To me, this feels more like a ceiling where that would be all new generation specifically matched to hydrogen production and not optimized.

And so what it does is it gives us a lot of information then as we look at policy and we look at implementation of solutions to then optimize around maybe there is nuclear that's currently not at capacity, maybe there's other ways to look at the electricity matching. And if you do that, then maybe you start to bring down both that total capex and also that cost gap starts to close. We just couldn't model it that way with all those different scenarios.

MR. WIRTH: Okay. Looking around for any other hands. Anything else from the podium?

MR. TURK: Maybe if I could just make a bit of a comment from the DOE perspective, at least on that question, which I think is a really good one. It is a near-to-medium-term issue, and that if we're successful on the electricity decarbonization goals that have been set and the progress that we've been making, we will get to a clean electricity grid. The goal the President has put on the table, rightfully so in line with the science and what we need to do, is 2035. But you have until now and then, and it is a big assumption, the behind the meter from a modeling perspective.

And so this is where we need, as the Secretary said at the outset, need feedback from all of you in

terms of the hydrogen production tax credit, other tools that we have in the tool belt, to try to get the mix right. As we're going to need clean electricity for clean hydrogen, for green hydrogen, we're also going to need it for data centers, for all the manufacturing facilities that are being built around the country, for heat pumps, for EVS, as well. So this is something that our department spends an awful lot of time working through, and certainly you-all's feedback is very much appreciated.

MR. WIRTH: Okay. Seeing no other hands, Mr. Chairman, that completes our report. I move that the NPC approve the report as the Council's response to Secretary Granholm's request for our advice, subject to final editing.

UNIDENTIFIED MALE: Second.

MR. ARMSTRONG: Okay. Thank you. We have a motion and a second. All in favor, aye?

(Chorus of ayes.)

MR. ARMSTRONG: Any opposed?

(No response.)

MR. ARMSTRONG: Okay. Thank you. That motion carries, and the report is adopted without objection.

(Applause.)

MR. ARMSTRONG: Okay. Next order of business

is we are very lucky this morning to have Deputy Secretary David Turk with us this morning, who will also speak, and I just want to recognize he was the representative to both the studies at Secretary Granholm's request, and so he was very engaged in both these studies, and both him and his team were right there in the midst of this.

So I just want to recognize your engagement, Deputy Secretary Turk and Secretary Granholm. Thank you for letting us have him on the studies. So, thank you.

And, with that, we'd love to hear some thoughts from you, Secretary Turk.

(Applause.)

MR. TURK: Well, thanks very much, Alan, and it's great to be with you. And I just want to thank again, and I know the Secretary did it at the front end, but I think this is appropriate to thank -- to Ryan and John and to Mike and Austin and everyone who's worked on these reports. I know everybody has said this has been a long lift, and I think our folks up here in the front, Austin and John in particular, are pleased that these reports are done, and to thank our own DOE team.

So if we just give everybody, especially the

worker bees, right, who really spent the time and effort, if we could just give them another round of applause.

(Applause.)

MR. TURK: And I'm going to focus my remarks, as the Secretary said, on what's ahead, what more we can do to collaborate between our department and the NPC, and with all of you more generally. But I want to take a bit of a step back if that's okay and just think about the last few-year period of time.

It's really quite remarkable, I have to say, what we've all been through. I know I've been traveling a lot through airports. Our Secretary is on the road even more, and I suspect all of you. You don't see too many masks these days, and it feels like we've all moved on a bit from COVID. And probably our fellow Americans don't think as much about Russia/Ukraine and some of the other geopolitical challenges that we've had, but it's really been a remarkable and a very challenging few-year period of time.

One thing that I've certainly seen in this role is the world is absolutely better off because the U.S. is an innovative, a dynamic energy powerhouse. There's no doubt in my mind that that's the case. I

certainly look to our European colleagues as they've been dealing with challenges from Russia/Ukraine and what that's done with natural gas, but otherwise, and so just wanted to recognize that very clearly the U.S. being an energy powerhouse -- a dynamic, innovative energy powerhouse, is not only good for the world now but will be good for the world for many, many years, and just wanted to recognize that and appreciate that as we look back on the last few-year period of time.

I think it's also incredibly important, and the Secretary referenced this, there's not a conversation that we have as we work with the White House and others in this Biden Administration where we don't focus on affordability and what prices mean for folks trying to live their lives out there around the country. I know you all focus on that, as well, as we approach the summer driving season, as we think what we all can do for our fellow Americans, all our neighbors, all our moms, our dads, or kids, out there.

We need affordable energy. We need affordable energy now for Americans and just wanted to say how important that is on behalf of all of us and the Administration. And we will do our part to do whatever we can on that front.

Looking back and taking a step back, thinking

of sustainability, just a few candid remarks, if I could, from my end. The Secretary referenced some investment numbers on the clean energy side. We have seen -- we have seen progress. But as I think Austin's charts showed so well, in the hydrogen context, the numbers are the numbers and the science is the science.

And I think many of you are engineers or come from backgrounds -- the Secretary and I always like to -- I don't know if we joke or we mean it seriously, we're a bunch of nerds and data nerds and scientists and engineers and technologists, at the Department of Energy. The science is the science and the numbers are the numbers.

When you think about what we need to do to get to net zero by mid-century -- and that's what the charts that Austin was showing and what that's needed in the hydrogen context -- and just in the hydrogen context, you could have similar charts, frankly, that look at a whole bunch of other technology solutions in other sectors.

In fact, one of my favorite pieces of analysis when I worked with the International Energy Agency was looking across all the sectors in technology as my colleague, Kamel Ben-Naceur, who was instrumental in this effort -- it's called tracking clean energy

progress -- looked at the progress we're making collectively as a world, private, public, all of us together, of those 50 different technologies and sectors, which ones are on track for that net zero future? And it's not just a net zero future science tells us we need to be on. A hundred and 40 countries in the world now have net zero goals in line with what the science is telling us. Over half of the major corporations around the world have those net zero goals.

I'm not sure too many people have looked under the hood of what's necessary to actually get to those goals in the real world at the pace and scale that we need to. Of those 50 different technologies and sectors, Kamel can tell you it's three, three sectors right now, that we're on track. That means there's 47 different sectors and technologies.

Hydrogen is one of those sectors and technologies that is not on track. I think you can't look at Austin's charts and not see that very graphically represented. It doesn't mean we're not making progress. We're making remarkable progress in solar. That's one of the areas that we are making progress on.

Right now, 4 percent of our electricity is

generated by solar. That's going to increase just over the next two years to 7 percent in our country. So there are areas where we're making significant progress, but it's not nearly at the pace and scale that we need to.

The consequences here are stark. I know you all know this. You all read the news, you all follow your own analysts who are looking at this. One of the things that really sticks in my mind is one of our national labs. We've got 17 national labs across the country, phenomenal technical expertise. Took a look at all the hurricane data recently and all the wind speeds and how quickly hurricanes are forming, and they're now recommending that we need a Category 6 hurricane. Category 5 hurricane is not enough; we need to have a Category 6 because of what we're seeing out there, again in the real world.

Just reading -- just reading some of the news and the clips that the Secretary and I and others at the Department of Energy get, this morning there's now a new estimate coming out of the Potsdam Institute that says global warming, if it's left unchecked, is going to be a drain of 19 percent on global wealth by 2049. So 19 percent of the wealth we would have had is going to be evaporated if we can't do what we need to do,

what 140 countries have already agreed to do, what over half of the corporations of the world -- largest corporations of the world. But it is daunting to look underneath the hood, to really look at the numbers, to explore the numbers, to have real-world conversations about what it takes to get there.

The other data point on the starkness of the challenge that faces us is we've had historic legislation, thanks to President Biden's leadership and an awful lot of key folks up on the Hill -- a couple years ago, the Inflation Reduction Act, in particular, but the bipartisan infrastructure legislation.

Our country before those pieces of legislation were passed was on a trajectory to reduce our emissions 20 percent from where they were in 2005 to 2030. Now, 20 percent is better than 10 percent, better than 15 percent, better than 5 percent, but that is not the trajectory we need to be on by 2030. The President has put a goal in line with the science of being at a 50 percent reduction by 2030, just a few years from now.

That historic piece of legislation -- and it was historic -- not only the biggest piece of climate and clean energy legislation in the U.S. history, it's actually the single biggest piece of legislation on clean energy and climate in the history of the world.

But that's only good enough to put us on a trajectory to get to 40 percent emissions by 2030.

So all of that investment in the tax incentives, all the grant money, all the work that we're doing at the Department throughout the Administration, and of course this is all driven by entrepreneurs and companies doing things out in the real world and us trying to enable it, just gets us to -- just gets us to that 40 percent reduction. So 20 to 40 percent is great, but even that doesn't get us to where we need to go.

So just to put some numbers on the table of what the challenge is really extrapolating, if I could, from Austin's charts of what's necessary on the hydrogen side.

All right. So let me share a few thoughts, and, Alan, thanks for some time this morning as the new Chair to sit down and -- some thoughts on the NPC and what more could be done together in the constructive spirit that the Secretary outlined at the beginning of the meeting.

One thing I'm struck by in this job, in particular, having worked with many of you over the last few years -- and I'm reminded by the great philosopher, Stan Lee, in Spiderman, I can't remember

if it was Aunt May or if it was the uncle in the movie who said it, and I think different ones may have said it in different movies, with great powers come great responsibilities. And I am struck by the powers that this industry has. It's really quite remarkable.

You think of the technology expertise, you think of the logistics expertise that you all have, you think of the money that you all have, you think of the lobbying power that you all have. I think the greatest power you all have -- and I know, Mike, you would agree with this, other executives up here, Ryan, Alan, others -- it's the people that you all have -- incredibly, incredibly talented folks. I don't need to tell you all that.

(Applause.)

MR. TURK: And I think the way the Secretary framed it up is, can we leverage that to be front and center looking at the numbers and being honest with ourselves and what we can do together to make sure that we're on the right track in a variety of these sectors and the technologies as we go forward.

So with that spirit in mind, a few thoughts on the way ahead. I'll comment on both of the reports really quickly. Methane, I know, is something a lot of us have worked on for years and years, as someone who's

worked on the original oil and gas methane partnership. I know we're now up to 2.0 and there's a lot of other efforts out there, voluntary and also regulatory, as well.

This is the single biggest no-brainer to all get our acts together on this front. I know you all know that, and I think this report is terrific analysis to get on with it. Right? We just need to get on with this at scale, at pace, and reduce our emissions. The technology is improving so quickly, we've got a very dynamic technological environment with the monitoring and other pieces on it. So if there's things that we can do to help Brad and his team from the Fossil Energy and Carbon Management side, but otherwise let's just get on with it and reduce emissions as quickly as we possibly can on that front.

On the hydrogen side, the one thing I'm struck by -- and I know, Alan, you've stressed this in your new chairmanship -- these big reports are phenomenal, they really are phenomenal in terms of the depth and scope, but hydrogen's an area just like methane where things are very dynamic, things are happening very quickly. We need your dynamic feedback as we're thinking of the hydrogen production tax credit, as we're thinking of the other tools that we've got in the

tool belt.

So there's an open question for you all of what is the best modality to have back and forth. There's certainly an opportunity for shorter reports that are more time-limited because things are so dynamic, and we need that feedback so we can play our role going forward as much as we can.

We have set up within our department a hydrogen group, pulling folks from all across the various offices -- Sunita's the head of that hydrogen group -- so that we can -- a joint strategy team is what we call it, so that we can be efficient in terms of our engagement and think of all those levers and how we adjust those levers to try to deal with the challenges, with the opportunities going forward. So there's a question for you all on the modality of working on hydrogen but other issues, as well.

CCUS is an issue I know you all have focused and we've all focused on from the Department of Energy side for so many years. My basic takeaway on that is similar to methane. Let's get on with it and do this in the real world. And we need you-all's feedback. We've obviously got 45Q and the tax incentive piece. There's the permitting issues. There's the way we all need to go forward.

As the Secretary emphasized at the very beginning of the meeting, we did appreciate the real focus on the hydrogen side, in particular, but the methane piece on the local communities and doing right by our environmental permitting and all that. But it doesn't mean these things need to lag and drag out for years and years. We just need to try to tighten up time frames, and eager to work with you all so we can get on with it.

I think CCUS is one that there's going to be a lot of skepticism out there, if I can put it candidly, unless we do this at scale and we show that we do this right, and there's an opportunity in front of all of us to do it. But the clock is very much ticking on that front.

Just two other areas to highlight. One is a thanks. Many of your companies now are already investing in or thinking about investing in the critical minerals and supply chain side of things. We are going to need critical minerals in the supply chain piece going forward at scales that we've not seen before. And so if there's anything that we can do with our analysis, with our partnership, to explore areas where it makes sense for your particular companies or the industry as a whole to get involved, we are very

eager, whether it's lithium or any number of other areas, very eager to partner with you all.

Last one I want to say, and I know it's a little weird to talk about electrons and not molecules, but what's happening on the electron side of things and what we're going to need in the U.S. on the grid is quite remarkable in many ways. A lot of people talk about data centers and AI and what that means in terms of the additional load that we're going to need on the grid.

We're estimating right now that data centers are responsible for about 4 percent of our electricity in the U.S. About 15 percent we think is from artificial intelligence, and that 4 percent for data centers overall is expected to grow, could be doubled as early as 2027, and could take a few more years, but the growth is quite remarkable.

What's quite striking is even that kind of growth is only 30 percent of the additional electricity growth that we're expecting in our country. All those new manufacturing facilities, this industrial renaissance we're having in our country, that's a lot of electricity, that's a lot of energy that's needed, let alone electrification with heat pumps, with EVs, other things going forward.

The one area in particular -- and the Secretary referenced this and she's spoken about this several times -- is enhanced geothermal. I had a chance to go out to our premier -- and, frankly, this is the world's premier enhanced geothermal site out in Utah, the FORGE facility is what we call it from the DOE side. There's also a company that's collocated out there, Fervo, and I invited several folks from your companies to attend; many did, which was just phenomenal. Thank you for those who sent folks out there. Some of you have already started investing in this space; others are curious about this space.

What struck me is all the drilling technology that you all have perfected for many, many years is now being used, utilized, and expanded to drill deeper. Enhanced geothermal drills deeper, you get hotter, you get electricity production, you get 24/7 electricity production. That's something those data centers are eager -- eager to have supplied. And it's just quite remarkable the ingenuity, the drilling time reduction. Some of this has come out in the news. I think some of this will come out even further. But even over the last year we've seen remarkable, remarkable strides in that space.

So, again, this may be an area where you look

at your own companies and think what expertise, comparative advantages do I have, and this may be an area. But we're eager to explore others, and if we can do other trips or other ways to share what we're seeing in real time and what we're working on in our labs, we're eager to do so.

But thanks, Alan. Let me conclude. Thank you, Alan, for taking on the chairmanship of this group. We're eager for your feedback informally, formally. Maybe it is in the shorter duration, smaller report kind of modality, as well. But, again, thank you for all the partnership.

(Applause.)

MR. ARMSTRONG: Thank you, Deputy Secretary Turk. Really, a lot of interesting thoughts there looking forward and what we can think about for the next studies. I think all of us would like to see our studies sped up and meet the timelines that we operate under today. And obviously the width and breadth of those studies will dictate the time frame of those studies. So we look forward to further discussion on that.

Next, we're also very honored this morning to have Assistant Secretary Brad Crabtree, who leads up the Fossil Fuel and Carbon Management for the

Department of Energy, and also has been very involved -- and a lot of his team has been directly engaged in the day-to-day work on producing these studies.

So I'd love to have you come speak for us, as well, Brad. Thank you.

(Applause.)

MR. CRABTREE: Thanks, everyone. After all the remarks and great presentations, there's actually not much left to say. The Deputy Secretary actually did what I was going to do, which was to start off and just recognize everybody that's contributed so much: the co-chairs and the committees, the NPC staff, the team at the Department of Energy, I won't repeat all that except to say one more big thank-you to everyone.

And as Alan mentioned, I had the privilege to be able to join recent sessions as these reports were finalized, the online sessions of both committees and then the in-person meetings recently in Houston. And I was just really impressed with the effort that everybody collectively put in together, and so I thought I'd just conclude by just a few quick appreciations that come from having observed that process.

First of all, I just think that both of these reports are really poised for impact. The timing could

not be better. The Deputy mentioned, and others have mentioned, all the work that's happening on measurement and MRV in natural gas, the policies that are being rolled out, thanks to the infrastructure legislation, and the Inflation Reduction Act. All that's happening in real time right now, and the greenhouse gas emissions report is just an extraordinary validation of all of that at a critical moment.

Similarly, it's already been noted, but the hydrogen report, we have for the first time a set of policy tools in this country that really reward clean hydrogen production across multiple pathways. And with the rollout of the hubs and the tax credits, this report, too, will have a huge impact, and there's a lot of realism in the hydrogen report, but that itself, I think, is helpful right now.

Building on what the Secretary said, I also just really want to recognize the effort that you all put in on community benefits and environmental justice. The work of each committee, the effort to integrate your recommendations across the two committees, I really think it's groundbreaking.

The environmental justice and community benefits is the right thing to do. It's long overdue. It's also absolutely necessary for project success.

It's good business going forward, and I really believe that this report coming from all of -- these reports coming from all of you elevating environmental justice and community benefits as a co-equal focus, and for the first time in the NPC is really welcome and important going forward.

The other thing that really struck me over the past couple months is the thoughtful nuance that you've brought to all these issues. There's so much polarization in the energy and climate debates right now, and that polarization gets in the way of a lot of solutions that are right in front of us. And you put in extra effort to navigate that.

You know, I've mentioned before, and I'll just cite it as one example, but there are many. On clean hydrogen production and navigating blue and green and not making it blue versus green, but really doing a sophisticated job of showing how each can contribute, will contribute in different ways over time, and respond to the different resources that the various regions around the country have. Both reports, by doing that, really expand the audience for your work.

The other thing -- and this is -- this is not the last but least -- or I said that the wrong way -- is the effort to build consensus. Someone in their

presentation mentioned that most of the recommendations were unanimous or close to unanimous. And that's really significant and important. You can have one recommendation that doesn't have broad buy-in. That same recognition with the full breadth of support from your committees will have a lot more impact on the back end.

And you put your time in one way or another. You either invest that time up front in reaching consensus like you've done, or you pay the price on the back end as you navigate all of the unexpected reactions from various stakeholders. So that's really welcome, and I applaud that effort.

And part of that pragmatism, too, on the policy recommendations, and that's kind of my final thought here. In the past, sometimes there's been a focus on the near term and then policy recommendations that are needed long-term, but without that bridge. And I just note, again, these reports emphasize the importance of carbon pricing long-term to meet the modeled goals that have been set out in the reports, but you also put in the time and effort, recognizing how hard carbon pricing has been in this country, to recommend some really important pragmatic options if carbon pricing is not possible. So the carbon

intensity standards for industry and transportation are eminently feasible, potentially even in the -- near to medium term and very important in their own right. And I think that's a welcome addition.

And then just -- I really feel like in that your work together is a validation of the opportunity we have, in the infrastructure legislation and all the funding and financing provisions, and then the tax credits, the Inflation Reduction Act. It's a real validation of that solutions-oriented, incentive-oriented approach to meeting our climate goals while also laying out very effectively what needs to come after that if we're to get to net zero by mid-century.

So thank you for this really excellent effort. We appreciate all the collaboration and goodwill that you all showed together, and look forward -- as the Deputy noted, we are already thinking with leadership on the National Petroleum Council about options for next steps and working together. We even have a call scheduled Friday morning to get started. And so I look forward to working with all of you on bringing proposals back to the Secretary and the Deputy for their consideration. Thank you, everyone.

(Applause.)

MR. ARMSTRONG: Okay. Thank you, Brad, and

please give our thanks to your staff for their support, as well.

And I'll just say we appreciate the Department of Energy being here this morning, leadership being here. Thank you all so much for your engagement, and we wish you the best in directing the nation's energy policy, and we hope these reports are constructive in that path forward. So thank you for being here this morning.

Okay. Before briefly addressing -- we do have a few administrative matters on the remaining agenda here, and I do have an announcement, though. We will have a press conference in the Buchanan Room beginning at 11:45, and both the study leaders will be -- for both greenhouse gas and the hydrogen energy -- will be available to respond to questions for the press at that 11:45 meeting in the Buchanan Room.

So our first administrative item this morning is the report of the Finance Committee. Byron Dunn, Chair of the Finance Committee, had to return to Dallas early this morning, unfortunately, for a funeral service there.

(Brief audio interference.)

MR. ARMSTRONG: -- with budget expectations, and member contributions are coming in at or even a bit

quicker than usual.

So, that said, I would not be doing my job, and Byron would be very disappointed in me, if I didn't tell you, for those of you that have not sent in your contributions yet, that I want you to let Byron know that I told you you need to get that done. So, thank you all for -- for following up on that, and thanks for those that have done that promptly. We appreciate you doing that.

As well, Byron is a member of the Nominating Committee, and in John Walker's absence, who is the Chair of the Nominating Committee, he was also going to present that report. I think they're both at the same service this morning. And fortunately their report is a very brief report, and there are just two exceptions to their report.

First of all, the officers of the Council, members and chairs of the Agenda and Appointment Committees, and the at-large members of the Co-Chair's Coordinating Committee, who were elected this past December, are all nominated to continue for the balance of 2024 and until the first Council meeting in 2025.

The exceptions are to nominate Willie Chang to fill a vacancy that has occurred on the Agenda Committee and to nominate Robin West to fill an open

at-large seat on the Co-Chair's Coordinating Committee.

So on behalf of Byron and John and the rest of the Nominating Committee, I move that their report be adopted by the Council. Do I have a second?

UNIDENTIFIED MALE: Second.

MR. ARMSTRONG: Thank you all. And are there any further nominations from the floor this morning?

(No response.)

MR. ARMSTRONG: Okay. Hearing none, all those in favor, say aye, please.

(Chorus of ayes.)

MR. ARMSTRONG: Any opposed?

(No response.)

MR. ARMSTRONG: Okay. The report is adopted, and thank you.

So, other matters. First of all, before we get to our final agenda item, I want to see if there are any other items that need to be raised before the Council this morning?

(No response.)

MR. ARMSTRONG: Okay. Hearing none, then let me conclude by saying for those in the online audience, we thank you for watching our proceedings this morning and encourage you to download the reports approved today, which will be posted to NPC.org following the

adjournment of this meeting.

And, with that, do I have a motion for adjournment?

UNIDENTIFIED MALE: Moved.

MR. ARMSTRONG: Thank you. And so without objection, the 134th meeting of the National Petroleum Council is hereby adjourned. Thank you very much.

(Applause.)

(Whereupon, at 11:03 a.m., the meeting was adjourned.)

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