NATIONAL PETROLEUM COUNCIL MEETING

WEDNESDAY, DECEMBER 14, 2022

9:00 A.M.

Reported by: George L. Quade, III, CERT

I N D E X

P R O C E E D I N G S

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(Meeting called to order, 9:01 a.m.)

MR. WOODS: Good morning, ladies and gentlemen. Welcome -- welcome to the 132nd meeting of the National Petroleum Council. I will now call the meeting to order.

Well, again, we welcome all of you, the members of the Council, honored guests, and members of the press and public. We have what I think today will be a particularly productive and informative meeting. We have a pretty full agenda, which includes the honor of having Secretary Granholm joining us.

First, though, let me just start with the customary safety announcements. There are no scheduled fire alarms today. So if the alarm sounds, we will evacuate through the back of the room, the back doors there, and up the stairs through the lobby and out to the street.

Now, if there are no objections, I will dispense with the calling of the roll for the members of the Council. The check-in at the Buchanan room will serve as our official attendance record. Any member or observer for a member who has not checked in, please do so before you leave so we have an accurate record of

today's attendance.

We also have what has become familiar to many of us, an online audience that will be able to watch the live stream of our proceedings. This audience includes council members unable to attend as well as many of the individuals who contributed to the study efforts that we'll be discussing this morning.

I'd now like to introduce to you, for the record, the participants joining me at our head table here. On the far right, we are pleased to have three vice chairs of the NPC committee on short-term actions and transition strategies: Greg Garland, Vice Chair, Short-term Industries and Government Actions; Willie Chiang, Vice Chair, Emergency Preparedness and Planning; and Dan Yergin, Vice Chair, Evolving Markets and Transition to Net Zero.

Next is Alan Armstrong, NPC Vice Chair, and at my immediate right is Marshall Nichols, Executive Director of the Council, and next to Marshall, The Honorable Brad Crabtree, Assistant Secretary for Fossil Energy and Carbon Management, and, of course, next to him is The Honorable Jennifer Granholm, Secretary of Energy, whose remarks are next on our agenda.

Madam Secretary, very nice to have you with us today. You’re -- have become very well known to the

members of the Council and very much respected. We appreciate you joining us today here. I know we've met many times virtually. It's good to see you in person. And, of course, it's been a pretty volatile last couple years in the energy market since you've come in, so very much looking forward to your comments.

And so with that please join me in welcoming Secretary of Energy Jennifer Granholm for her remarks.

(Applause.)

SEC. GRANHOLM: Great, great, great. Good morning, everybody. So nice to see so many of you last night at the cocktail party, and I loved chatting with a number of you.

Darren, thanks for the introduction and for your leadership; appreciate the candid conversations that we've had as well. And I thank you all for coming to Washington during the holiday season. I know that you've all got stuff back home, and so it's really important -- the topics we're addressing are really important, and we really value your presence and your input.

I just want to make sure everybody is familiar with the folks on my team who've been interacting with so many of you over the course of the past almost two years. Of course, we're going to hear from Brad

Crabtree shortly, but Ryan Peay over here has been working with a few of those here especially on the reports that we're going to be hearing from this morning.

Ryan, glad you're here, as well as I think -- is Bridget Bartol here? Bridget? En route? Okay. I just wanted to make sure that people saw the folks who many of you have been talking to, and we want to continue those good conversations.

This has been a challenging year for all of us. I mean, a good year for many, but also a challenging year as we know with the global upheaval in energy markets.

And, you know, I just want to acknowledge the elephant in the room, which is that part of the challenge that we've experienced together is really the butting heads between the oil and gas industry and the administration. And I raised this -- you know, I know that a lot of those people in the room, maybe those online, have experienced frustration in the heat of disagreements, and that at times I do believe that we have talked past each other even though I think there are so many shared goals.

So I'm raising this not to rekindle those feelings but really to underscore how appreciative I am

that through -- these honest conversations, these disagreements, differences of opinion, we have still found ways to work together and for the public good, which we all care about.

For example, we've been able to have productive conversations on production and refining issues. We've been able to turn to you for advice on the strategic petroleum reserve, on hours of service waivers, on ethanol requirements. We've coordinated on matters ranging from the movement of LNG supply to Europe and the potential for the impacts of the rail strike. We've turned to you recently, members of this organization and beyond, for thoughts on whether the industry can help with providing infrastructure assistance to Ukraine in light of the bombing of infrastructure there. You know, we're really grateful for all of that, and the insights that you've shared with us through those discussions have really been invaluable.

And I want to offer on behalf of our team at the Department of Energy and my colleagues from across the Biden/Harris Administration deep gratitude for coming to the table over and over again on these key issues and more.

And I'm very much looking forward to the

presentations that will be made today on the studies that we have requested on hydrogen, on greenhouse gas emissions in the natural gas supply chain, on the short-term analysis and the net-zero transition strategy, the last of which I know you put together on a super-expedited timeline.

I really want to thank the NPC and the work that has gone into this as you'll see the significant resources that you've committed to these studies, which I know are going to clear avenues for new and enhanced cooperation and collaboration going forward.

So open communication -- and we have had really good open and honest conversations. I think that's the first step toward progress, right? So in that spirit, I want to be open and frank in this meeting as well. I want to say, first of all, that the Biden/Harris administration's commitment to a managed transition is as strong as ever. And I want to underscore the managed point, because as you have noted in your reports and in your statements, that moving too fast could end up creating unintended consequences that will hurt people, cause backlash. This has got to be done in a smart and thoughtful way in partnership.

So the first part of this managed transition means meeting our energy needs right now, and that

means today, and as we have talked about with many of you, increasing investment in production to unburden Americans and really around the world. We have a unique position in the world as this major energy supplier. And so the world is really looking at America for assistance with that, with managing that transition, and really, as we look at this sort of geopolitical realignment of the world around energy supply. The role here in this room, of the oil and gas sector, is just enormous. It's enormous.

So it means increasing production to meet that demand, and it means finding, for example, as we have spoken with a number of you, on the right approach in the United States for increasing distillate storage in areas where we need it; for example, in the New England, the Mid-Atlantic area, PADD 1, especially we're about 50 percent, I think, right now below the five-year average on storage.

And, you know, again, I understand the market at least up to a few weeks ago had not incentivized, because of backwardation, any storage. However, we are obviously in an era where these extreme weather events can come upon us at any moment, and we just want to make sure -- you all want to make sure, I know, that people have access to the home heating oil and the ways

to get through this winter without crisis.

So this managed transition obviously means, as well, keeping refineries operating safely. And safety is, I know, your first priority; it's our first priority, as well. At the same time, as we supply Americans with the fuels that they need, we really appreciate the fact that so many of you on the refining side of things have really been cranking to get your product out and have really focused on keeping workers safe as well.

We all know that we can't afford unintended outages. They're going to happen, not just in the refining sector, but whether it's a pipeline or an LNG terminal, we're going to see these things happen. We want to minimize that as much as possible, and we want to be partners in responding to those things as well.

We understand that this transition puts a sector, for example, like refining, in a challenging position. We're going to continue to work with refiners as you manage capacity while you think about creative options to reduce emissions in the future.

And so that's the now. But further ahead this transition hinges, I think -- I think you all agree -- on making sure it's done well, making sure we acknowledge that fossil fuel is not going to go away

any time soon, but that there is a moment for diversification at hand right now. Our energy security -- and when I say diversification, I'm talking about expanding and growing the pie on this. Our energy security, our economic security, our climate security, I think all compel us to meet our needs today, but then expand/invest in a widening array of energy sources.

We need this industry to play a lead role in developing, deploying, these additional resources. Some of you are, of course. This is an industry that's full of innovators, and I know many of you know that you are rising and can rise to this challenge.

We crafted the President's legislative agenda with innovation in mind. The infrastructure law, the Inflation Reduction Act, have created enormous opportunities for oil and gas companies, truly. I know the industry has taken notice of the 45Q tax credit for carbon sequestration, along with the hydrogen tax credit. I know that many of you are keenly following our updates regarding the hydrogen hubs. In fact, some of you may be participating in those. Some of you may be planning on participating in those.

It is worth emphasizing that there are also generous subsidies in my favorite, enhanced geothermal, and in offshore wind and all renewables. But as I

understand the net-zero transition study included a closer look at geothermal. I was encouraged to hear that because the Inflation Reduction Act offers a huge opportunity to turn the findings in that study into action. When you think about it, I mean, geothermal projects start with a 30 percent production or investment tax credit. Thirty percent, which could increase by 10 percent if prevailing wages are paid on the construction, and another 10 to 20 percent if they're located in a disadvantaged or tribal community.

Up to 60 percent tax credits for geothermal? That’s kind of irresistible when you consider the skills and the know-how that this industry already has in extracting energy from the subsurface. So we want to partner with you on these expansive opportunities.

You know, the fact is this Administration with the help, of course, of our allies in Congress has delivered the most comprehensive and far-reaching incentive structure that you'll find anywhere on the planet now for infrastructure and energy products, projects from renewables, to hydrogen, to carbon management, and everything in between. So it's the time to invest in these projects.

And I'll give credit where credit is due because there are many oil and gas companies that have

publicly signaled intent to take advantage of the incentives that are now on the table. Some have expressed and have made plans to invest in offshore wind given the expertise in offshore platforms, et cetera, into commercial scale carbon capture, into CO2 transport, into storage for carbon capture, obviously, to direct air capture, range of clean hydrogen projects, solar. We've heard these intentions, and it's very exciting.

And, you know, likewise we're encouraged to see momentum building around transparency for methane detection and abatement; so excited about that. And I think Brad is going to talk a little bit about that perhaps.

We hope to see all of these efforts progress, and we want to see more of them launched in the year ahead. This managed transition that we're pursuing, as I say, I know it's not going to eliminate the use of fossil fuels by 2050, as we have been having that 2050 net-zero goal. That's the reason why it's called "net." The IPCC, any credible climate analysts, all acknowledge that fact. So we've got to do all that we can to decarbonize and work together on that decarbonization strategy, even as we expand the pie and add renewables to this plate, that growing opportunity.

But it does point to lower use, I think, of fossil. And the question is how the industry adapts to that change as well. As we've long said, we're ready, we're eager to work with you on the answer to that question. And, you know, we know that that question will lead to hopefully responsibly meeting our energy security needs to rapidly decarbonizing, especially the natural gas value chain since there's such a huge uptake to protecting American families and communities, and to maintaining American competitiveness.

This work is going to involve more honest conversations. We are under no illusions about that. That's a good thing. That is a good thing. And if there's one thing I know that we can all agree on, it's that after the year we've had those kind of honest conversations will open doors to progress. So I hope we find ourselves having more frank and fruitful conversations. I intend for that to happen in 2023. I know you do, too, with your leadership.

I want to thank you all once again for being here. I look forward to the presentations, and I thank you again so much for the work that has gone into these incredibly thoughtful and well-crafted presentations and projects that you all have been working on. So thank you so much.

(Applause.)

MR. WOODS: Thank you, Madam Secretary, for your remarks. And maybe I'll just take a moment to respond or comment on behalf of the industry.

I think we are collectively committed to many of the same objectives in terms of significantly reducing emissions both from our operations and the products that we sell. And so I think the discussion, and as you pointed out, the debate on how best to achieve that in a managed way that meets all of society's needs, including reduction of emissions, including affordable and reliable energies, a critical objective set that we're all working to.

I would just compliment you and your staff for allowing for the frank and candid conversation. Having participated in many of those myself, I can attest that they are candid conversations, and very frank ones. And I think that speaks a lot to the staff and your willingness to listen to the other side of the discussion, and to try to find the right kind of solutions that meet all the objectives. So I appreciate you and your team's work with our industry.

All right. Well, the next order of business this morning is to consider the reports from the NPC committee on short-term actions and transition

strategies.

We're going to discuss the findings and the recommendations and then vote to adopt their proposed final reports, and then we'll have a discussion with the Secretary about those findings.

And I'd just comment, for the NPC this was a fairly atypical request relating to what has been a fairly atypical period in time here in the U.S and really around the world, if you think about what's been happening in Europe and for the citizens of Ukraine. So I think, you know, a lot of things evolving and rapidly changing, and so a very opportune time to dig into that and to comment on what we see happening there as an industry, and then options to respond to what we're seeing.

I'll now call on Andy Madden, who's going to present an overview of the two reports under consideration today. Andy chaired the Committee's subcommittee responsible for bringing together the work of our three segments.

Andy?

MR. MADDEN: Thank you, Darren, and good morning to everyone. I know some of the faces, but clearly not all. So it's an honor to be here to be able to present the material from the short-term action

and transition work. I think, Madam Secretary, your comments cover the breadth of the areas that we're going to go through here this morning. Obviously, I'm presenting the work done by a very large number of people, many of whom are in this room today.

What I'm going to do is run through a high-level summary. I'll start with just a recollection of the request which was made to us. As Darren said, it was shorter than usual in terms of the reports, in terms of the time we had to do the report. The questions which are on there, some of which were for 30 days and some for 120 days, the report itself tries to cover the whole area pulled all together at the end.

And we also -- there were some other questions that were posed in the letter around areas like emergency response, which we have attempted to roll into the work so that we have a comprehensive piece of work.

We did decide in the end to issue the report in two separate parts, primarily because there are some different audiences. While there's a linkage between what's been happening short term and the transition, I felt there were some different audiences, so we actually have issued it in two parts -- the first around what's been happening in the petroleum markets

and what can we do to make supply and make things more resilient, and then the second around the principles and initiatives that the industry's been taking on the progress to net zero.

This was the organization which we had, and an awful lot of people from across our industry and including from the DOE who helped with the work. You can see that we were divided into three subgroups. The chairs of all three are there, and the study directors, Jerry, Chris, and Atul, who did the majority of this work with a very broad group of people from across the industry, are here as well this morning.

So, with that, let me start with the first report. So this is a piece where I'm going to give a bit of background around what's been happening over the last few years. I think as, Madam Secretary, you said earlier, it's been a very unusual and a bit of turmoil in the energy markets. I'll give a bit of context with that and then look to the findings and recommendations at the end of it.

So let me just start with -- and, you know, the impacts of particularly the COVID pandemic, but some other events that have happened through this period. What the chart here shows is oil demand through that period. You can see on the left it's

world oil demand and on the right is U.S oil demand.

From, you know, back to 2010, we'd had a reasonably steady growth driven by economic activity, you know, about 1 percent a year, maybe slightly over, in world oil demand. And then we had the COVID pandemic where across the world we had the lockdowns, the lack of -- the loss of mobility and dealing with the pandemic, and a very significant drop in demand as we came into 2020.

As we've seen the world getting to live with COVID, we saw that demand obviously recover, and she has recovered back to a similar sort of level to where we were just prior to COVID, as we speak today.

And that's the demand side. We've also seen a number of impacts through this period on the supply side. So firstly the cuts by OPEC Plus, or the formation of OPEC Plus, with the broader group including Russia, the cuts from OPEC Plus to get back into supply and demand. We then have seen those cuts ending as demand picked up.

We then also saw the Ukraine invasion earlier this year, which obviously has some impact on the ability to supply the oil markets and where they get supplied from and the trade flows. So those supply and demand balances, as severe as certainly in the 35 years

I've worked for the company that I've seen, have really what's caused the gyrations in the markets over the period.

And on the right-hand side is the U.S., which obviously has less growth in the early period in oil demand but very much a similar sort of impact from the pandemic.

If I then move to prices, and recognize that, you know, price of energy is a, you know, very important parameter for consumers, for industry, for the economy. And starting at the top, I have crude price on this page, I have crude, I have gasoline and diesel at the bottom, and natural gas as well, back to the same period, 2010.

So when the -- when the COVID pandemic hit back in 2020, oil prices fell below $40 a barrel. It's a price signal that the world had less demand, didn't need the oil. And you can see actually there was the famous day when it fell to negative 37. But really those levels down sub-40 is what caused the very, very low prices and caused us to pull back in terms of production.

As demand recovered, and with some under-investment in production and tightness in the markets, we see that the oil price, even before the invasion of

Ukraine, was recovered back to $80/$90 a barrel. And then in the early part of this year, we saw it back around, you know, over $100 a barrel. Some of the disruption from the Ukraine invasion, on top of the already tight supply, and then OPEC Plus keeping the supply and, you know, somewhat limited.

If we then look at over the last few months, it has moderated as the supply/demand balance has been a little bit back in balance, back down to around about $70/$80 a barrel today.

If we then move to gasoline -- gasoline, not surprisingly, which is the main raw materials, crude oil, for making gasoline, has followed very much the same trend. You can see as the spike when crude oil prices went up and coming back and moderating in recent time.

And then diesel on the right, so diesel and heating oil very much the same base fuel, diesel on the right has a similar trend through time, although what you can see is in more recent times it has been more volatile and slower to follow crude back down. You know, diesel has been more resilient in terms of demand. It's used for commercial transportation through the COVID period. And also with the Russian disruption, with the sanctions and looking forward to

February when there'll be further -- the next steps in the sanctions in Europe from importing Russian diesel, we do see that diesel markets have stayed tighter, albeit moderated a little.

Then on the top with natural gas, you know, natural gas prices have been through most of this period pretty steady and low, much lower than most gas prices in the world, thanks to the abundance of supply here in the U.S. We have seen with the Ukraine war particularly, and the impact on gas prices, an increase in natural gas price and volatility in the gas markets in the earlier part of this year from that low base.

So with that let me go back to crude. And I want now to look at the U.S. and what's been happening through this period with U.S crude supply through the pandemic and the recovery. So on the top left is the production of crude oil through this period, and, you know, often referred to with the shale revolution with the hydraulic fracturing here in the U.S, the U.S production has grown very healthy and become a significant supplier to the world.

You can see in the 2020 period the drop from the pandemic with the drop in demand and the price that went with it, which then caused pull-back inactivity to respond to those price signals and the drop in demand.

And then, you know, the nature of U.S production as the demand has recovered, as the price has recovered, U.S production has been recovering and is getting close to being back to the pre-pandemic levels as we sit here today.

Through this whole period, that growth in production has led to obviously a change in the balance, with demand about flat, of imports and exports. You can see on the top right following the lifting of the crude export ban, the U.S has become right through this period a pretty significant exporter of crude to the world. And imports on the bottom have declined. You can see in red the total imports. And I've put on there the Canadian imports, which we import a fair bit of heavy crude from Canada, and Canadian imports are now about 70 percent of what the U.S imports with an overall reduction and slight growth in Canadian crude.

The U.S. does -- you know, we export and import crude as much as anything else to balance the capabilities and processing of our refineries. We export light crude and import heavy crude, which makes for the lowest cost way of producing the products which are needed in the U.S.

At the same time, just looking at natural gas

-- and it's not just crude that's been growing -- natural gas is also along, you know, the same dynamics that have increased the crude production, have increased natural gas production, to the growth in natural gas, still a small effect of the COVID pandemic. And at the top right there, the exports of natural gas become a significant exporter of natural gas to the world in the form of liquefied natural gas, particularly from the Gulf Coast.

Natural gas liquids may be a little bit less talked about than natural gas and oil, but natural gas liquids, which are C2 through to sort of C5, come from the production of natural gas as a liquid made at the same time, have also been growing very significantly. These products -- butane, propane, ethane -- are feedstock for making chemicals -- also used for heating and cooking around the world. And the U.S. at the same time has become a very significant exporter of natural gas liquids.

The increase in export of oil and gas and natural gas liquids has clearly improved the resilience of our industry in terms of being able to export and have the products that we're moving to export, as well as obviously good for the economy.

If I move to refining through this period, and

I've put on here the capacity of refining and the actual runs, I would say one thing just to begin with, which is about the best you can ever do is get to around the low 90s percent on this metric. There's always some maintenance and calendar day versus stream day that we have. So when you're in the 90 percentish, you're really running flat out in refineries. And having spent most of my career working in refineries, if we can get to that level it's a good place to -- it's a good place to be, and we're running well.

If I start with capacity at the top of the chart, I see that on capacity having been growing capacity, advantage crude production has meant that the U.S. has been a good place to refine crude oil, have a very sophisticated refining system and petrochemical manufacturing system here in the U.S. That capacity had been growing. We did see through the pandemic with very low prices and very low margins for refineries. We did see some of the less profitable refineries close, and close for good. And so you can see that drop in capacity as we went through that period.

You can also see the drop in refinery runs, which was much more significant than the drop in capacity because with the lack of demand we were running, you know, the economics were such that we

wanted to run the refineries at very low throughputs, and so our industry was kind of bumping along at a low level through pandemic.

As we've recovered from the pandemic, the runs have increased. The utilization is back up to as good as it -- as good as it -- as good as it's been, and, you know, everyone's doing their best to keep the refineries running as reliably, safely. As you said earlier, that's the top priority.

If we then look at the products that we make from running our refineries, and so gasoline and diesel. Let me just explain the chart very briefly, which is for both gasoline and diesel, diesel on the left, I have imports and exports. The solid line is the net of the two, and then below the axis is the imports and above the axis is the exports.

So for diesel -- this is back to 2005, a little longer -- diesel has gone from being about balanced at the beginning of the period to being a very significant net exporter of diesel fuel, most of it to Latin America, some of it to Europe as well, but the U.S. is a very significant exporter of diesel.

And, in the same time period from gasoline, we've gone from being a very significant importer of gasoline into the U.S to being around about balanced,

slightly exporting at the margin. These are annual averages. There's obviously variations seasonally within each of these bars. But even though we're about balanced, there's still significant imports and significant exports as we interact with the world markets and actually look to find the lowest cost way of manufacturing and supplying the product.

Without the ability to have imported and exported during the pandemic, we can see through the pandemic we continued to import and export because without that ability, we would likely have seen a lot more refineries have ended up shuttering and not being able to continue to operate.

I have a chart here from the EIA which shows how those trade flows are balancing in the U.S. It's a little bit of a busy chart; let me just explain. The different colored arrows are crude in black and then gasoline, diesel, and jet fuel in the red, green, and blue, and natural gas in the purple, with the geography shown.

Let me start with crude, which is the black arrows. You can see a very significant import of crude from Canada, which I mentioned before at the top of the page. We're also importing crude into the west coast and east coast to run the refineries which are situated

there. And then in the Gulf Coast from a crude point of view you can see that's where most of the import and export -- that's the light crude being exported and heavy crude being imported into the Gulf Coast. Most of that's from Latin America to be able to run the refinery system as optimally as we can. And those balances of crude are what -- I say what allows us to produce products at the lowest cost we can.

On the product side, you can see on the east coast we're a significant importer of gasoline, diesel, and jet fuel into the U.S. The refining -- and obviously a lot of demand in that part of the world -- and the refining capacity there is, you know, a lot lower than what's needed to supply that product, so there is import.

There's also some import and export on the west coast, and then there's significant export of products, whether, you know, a lot of our refining circuit based in the Gulf Coast area, a lot of export of products from the Gulf Coast.

The logistics, there's also a lot of product moved by pipeline and marine movements from the Gulf Coast up to the Mid-Atlantic and into the Northeast. With those logistics being full from the pipeline point of view, with the availability of Jones Act shipping

being one that's got some limitations in terms of being able to have that shipping, that's why we need to be exporting product from the Gulf Coast and importing from the world markets in the Northeast and providing the lowest cost supply.

So the last page which I have on the industry is commercial inventories. These are U.S. And you'll see in the report we have inventories broken down by some of the areas like the Northeast where it's much tighter. So the gray area is the five years pre-COVID as a kind of typical range that we see, and then the red line is where we've been this year.

So crude's been pretty steady. This excludes the SPR. And commercial stocks of crude have been pretty steady right through the period.

Natural gas at the top right has been around the bottom end, but more recently has gotten into about the middle of the range. And then look at the bottom of the page. U.S gasoline, including ethanol in there, has been through the last few months at the low end of the range where it's been in the last five years, but has been climbing more recently back into the range.

And diesel stocks, which is where the world is tightest, have been low throughout the country. The world markets are very tight for diesel for the reasons

I mentioned before, and have been recovering somewhat recently.

And then I think, Madam Secretary, as you mentioned before, if we look at the northeast it's an even tighter position in terms of diesel, although, again, some recovery, which is good as we head into winter.

So that was the backdrop for the recommendations that I'll get to on the short-term actions in a second, and they're in the report. I wanted just to talk about the emergency response work. One of the questions that was in the letter was also for us to look at the emergency response because there's -- it's obviously -- we need to be able to manage the supply during normal times but obviously emergency responses when we get the extra stress on the system. So the team which Willie chaired worked through four areas, and I'll just touch on them briefly.

The first was the resilience of the energy system. And if we look at, you know, the increased oil and gas production and exports we do have -- not to be complacent, but the system is more resilient with the exports than we had in the past just from that balance of exporting across the board in terms of petroleum

products.

We did look in some depth at the infrastructure-permitting process. There was a study done by the NPC in 2019. Many of the recommendations have been being worked, and the infrastructure-permitting process remains a fairly complex one. And you can see from the picture I have on the left, which is the U.S pipeline, this is just the pipeline network. It's an incredibly complex and extensive energy infrastructure across both traditional forms of energy and also the newer forms of renewable energy, and the permitting process is an extremely important one to be able to keep the resilience to be able to respond to emergencies.

We did also go back and look at the 2014-2016 NPC studies on emergency response. The 2014 study was after Hurricane Sandy, which was set up -- a very comprehensive piece of work. And that was, you know, very much a joint look back with DOE -- Mara (phonetic) from the DOE and others who looked at it.

And I think one of the good things, though, is we really have made across industry and government very, very significant progress in responding to the issues from that period. And there is a need to keep sustaining that and keep improving it, and there's a

few suggestions in the report on that. But we're very pleased with the progress that has really been made.

We also looked at potential new threats. And the world continues to evolve around us. Obviously cyber security, and there have been some very significant threats to, you know, incidents with energy infrastructure around cyber security; also looked at the threat of physical damage to infrastructure and damage from extreme weather, all of which we've seen evidence of of late.

And the team had to look through those. There's been good collaboration between government and the industry. There are some -- again, some suggestions in the report about how we can further strengthen that.

And then last, the group looked at the government and industry response, which we feel is back to the 2014-16 study, is generally working well. But we do have some areas where industry and government collaboration could be further improved. I think we've particularly picked up on some of the work that's in other sectors, which where our sector around areas like looking at how to -- in times of emergency, how do we get the right folk from across the industry involved to be able to respond at an executive level, is an area

that we picked that the electricity industry has done well and that we can probably make some further improvements.

So, with that, I mean these are the key findings. I've touched on most of these, so I'll go very quickly. The resilience has been increased by the increase in oil and gas production. The global markets have rebalanced, driven by those price changes which have been very severe. The tightness we're seeing today in crude and products is global.

The U.S. is a very key part of that. We recognize that the price swings in both directions have had significant impacts on consumers through the period. We still believe that reducing barriers to resupply and product movement is what will help ensure resilience more than any other steps at the lowest price. And then the emergency response has been enhanced, but several potential improvements have been identified.

And so with that the recommendations, again which are detailed much more fully in the report, the first is continue to support crude oil and product exports. It's both improved the resilience of the industry, it allows us to interact with the market and helps us to have the lowest cost supply to the markets

in the U.S.

We do believe there's a good case to reform certification and permitting of energy infrastructure and logistics. And when I cover the energy transition piece, that's both for traditional energy but also for renewable energy and new forms of energy as well.

The Jones Act -- we recognized the Jones Act is an important piece of transportation policy in the U.S. It does add some constraint recognizing the unlikelihood of us not having the Jones Act in place. I think there are some opportunities to facilitate and expand the waivers and the process which we use.

I think already the intent, which is to postpone rebuilding the strategic petroleum reserve while products are tight -- while supply is tight. There are opportunities to relax fuel specifications and labeling during times of supply disruptions. Clearly relaxing fuel specifications has an environmental impact as well. So the balance of the environmental versus the supply side is an important consideration.

The one part of the world where there is under-utilization of refining today is in China. Now, China has moved recently to increase their utilization of that capacity, which is one of the reasons that we

have seen some moderation in the product markets. That does remain an area where there are opportunities to short-term to increase supply.

And then lastly the continued progress on strengthening the ability of the U.S. to respond to supply disruptions. And I've mentioned the sub-points there as I went through earlier.

So that was a summary of the short-term and emergency response piece. I think, you know, we did very much appreciate having the opportunity to include the energy transition. Many of it -- you know, with with what we've seen through the last three years and what did we learn from that in terms of making the energy transition as manageable and managed as you mentioned before, this was an opportunity to step back with a separate set of people and look at how we do that.

So, with that, let me move to a few slides on that piece of it. So the principles and the industry initiatives and technologies for progressing to net zero now looking a lot further forward. And firstly this is CO2 emissions. U.S CO2 emissions over the last -- well, back from 1990 over the last 30 years, and they have reduced while the economies continued to grow. You see the impact of COVID at the very end.

This goes up to 2020. And those emissions actually will have come back up since COVID as recovery and demand.

The most critical aspect of this page -- and I think you mentioned it earlier -- is the energy transition. It is a CO2 emissions issue that we are trying to solve -- and solve with some urgency. And I think everybody in this room recognizes the urgency with which we need to to move and to help solve that.

It is not a choice of fuel. It's the CO2 emissions that will change the choice of fuel, I think as you rightly said earlier. But the primary driver is CO2. And the more that we can -- one of the findings is the more that the objective function of what we do is indeed CO2 and greenhouse gas emissions -- the better place that we'll likely be.

The energy mix is a piece of it, but not the sole piece. You see the world energy supply, coal, nuclear, oil, hydro, renewables in green and gas at the bottom, have been growing through that period. The U.S., that drop in GHG we had on the previous page, a very large piece of it is the switch from coal to gas. There's also the growth of renewables in this period. But, as I say, this is -- energy source is just one. There will be cases where switching energy source will

be the right way to reduce CO2, and there'll be cases where it is to manage the emissions from existing -- existing fossil fuels.

We do recognize this is a very long chart, back to 1750. It's in the report, which just to show energy transitions, the gray line is the total energy demand in the world, and then the shaded areas are the transition from biomass through to coal, through to oil and gas, and nuclear at the very top in the sliver, and renewable solar and wind are in here, too.

And over time we've seen a couple of things from this, which is historically the transitions have taken time. We recognize that there is, you know, urgency in terms of managing the CO2 and the climate impacts. But then the energy system is a lot bigger today than it was through many of these transitions.

And the last piece I'd say on it, as we've gone through previous transitions, the previous sources of energy have not gone away; they've been supplemented. They may have changed in terms of size, they shrunk, but they haven't gone away, which, you know, when we look at oil and gas will be an important piece of this transition and how do we find our way through it both expeditiously and urgently, but also which allows us to manage the transition needs to

recognize the size.

I don't do justice to the work on the next page, which is the different technologies. The team which Dan chaired and Atul led have looked extensively at many of the technologies which leverage the competencies of the oil and gas companies. And indeed many of the companies in our industry -- and academic institutions -- are already involved in many of these -- different companies involved in different ones. But they really do leverage many of the competencies which our industry has.

You can see that everything from carbon capture and sequestration, improving the energy efficiency of what we do, reducing demand, direct air capture, geothermal, which you talked about earlier, renewable fuels, methane abatement, and hydrogen. And there are more which are beyond the scope of this page. But these were the large ones which we wanted to go through.

And in each case we have the status of it and some recommendations on how best to progress these. And, as I say, there are many people in this room who are spending a lot of their time working on doing just that.

The group then looked at, well, what are the

principles to enable a successful, timely transition. And I just wanted to run through these and then talk about the recommendations to finish.

So the first one is the transition should be focused on greenhouse gas reduction and the energy source agnostic. It will cause some of the energy sources to change, but the focus should be on greenhouse gas reduction.

Increased technology collaboration will be required in order to accelerate transition. Very lucky in this country with such a strong industry, such a strong academic environment, and of course the government's involvement to be able to do that. It will involve very significant investments to get there, and effective policy support is required to be able to get through the kind of transition which we aspire to, and to do so in a cost-effective manner.

Policies that inadvertently cause shortages by phasing out one energy source too early or deliberately doing so should be avoided. And the oil and gas role has a very essential role to play in helping reduce emissions both from existing operations but also from some of the technologies which I talked about on the earlier page.

And clearly government at all levels,

especially with policy having to play such a key role, it will be an essential partner with industry.

And so with that, the last page which I have is the recommendations just summarized here, clearly detailed more in the report. We should focus the policies on reduction of CO2, and very closely linked -- these are all very closely linked to those principles, and avoid selecting favorite technologies or industries. There are many examples around being worked, such as low-carbon fuel standards, which do use CO2 emissions as the objective function. And if we do that, we have a much better chance of allowing technology to flourish and to find the best solution and lowest cost solutions.

Taking account of the uniqueness of the U.S energy endowment means that the right answer for the U.S may not be the right answer as they have in other geographies in the world, and we should look at the endowment which we have and how do we have the right policies recognizing that, and avoid premature phase-out of traditional energies, and in doing that focus on incentives for renewable energy and decarbonization technologies versus penalty for traditional energy because we will need all sources of energy as we go through this transition. And I think a focus on CO2 is

what will allow that to happen.

Consider energy security and economic robustness, as well as greenhouse gas reduction. Clearly the last three years have shown the importance of energy security. And the country is in a good position from an energy security point of view, but that is clearly going to be an important factor as we look for the policies. And then continue to accelerate innovation and technology through government policy and DOE funding. Great progress being made, but more that we can do.

And then I mentioned permitting before in the short-term work. It also came out very strongly in the move to renewables. The predictability of infrastructure permitting will be important for all forms of energy as we go forward. So that kind of step back and make that process as straightforward and clear as we can will help.

And then last but not least, managing the impact to consumers is vital for a fair and well-managed transition in terms of keeping energy as such an important part of everyone's daily life.

So that was an attempt to just run through the high level of what we've covered. Clearly there's a lot more in the report. And as I mentioned before,

there's many from across industry and government who've helped us to get the report to where it was.

MR. WOODS: Thank you, Andy.

(Applause.)

MR. WOODS: Really nice job summarizing what was a very long report into a very concise presentation. I also would like to recognize all the folks, you and your team members, the vice chairs, for the work that they've done in this in a fairly short period of time. And I think you'll see if you had a chance to read the reports, it's a fairly comprehensive coverage of the topic. So a lot of work's gone into that, and appreciate that.

In a moment, I'm going to move that we adopt these reports, to approve them, but before I do that I just want to open it up to the membership for any questions or comments that you might have for the chairs or the subcommittee heads to address your questions.

Any comments or questions from the membership?

MR. PEREZ: One comment. Jose Perez with Hispanics in Energy. I just wanted to commend the review, the staff, and the effort that went into this. It's very comprehensive, and I really appreciate it. We look forward to sharing this information with Latino

leaders across the country.

MR. WOODS: Thank you, Jose. Other comments or questions?

(No response.)

MR. WOODS: I think that attests to how well written these reports were. So without any other questions or comments, I'm going to move that the NPC approve these reports, subject to any final editing, and make the study and related materials available to the public through the NPC website.

Do I have a second?

MR. PEREZ: (Raises hand).

MR. WOODS: Second.

All in favor?

(Chorus of ayes.)

MR. WOODS: Any opposed?

(No response.)

MR. WOODS: Very well. The motion carries and the reports are adopted without objection. Again, we just thank the members of the committee, the subcommittee, and the subgroups who helped in what I think is a very important effort.

Madam Secretary, the council members have adopted these reports in a response to your request for advice and recommendations on these matters. The vice

chairs and I would now like to join in a conversation with you and Assistant Secretary Crabtree.

And to start that off, I'm going to ask each of the vice chairs to comment on the key takeaways for their sections of the reports. And I'll start with Greg Garland, who led the work on the short-term action subgroup.

Greg?

MR. GARLAND: Thank you, Mr. Chairman. Well, first of all, compliments to Andy. He did a very thorough job in condensing that report. It’s really well done, and he didn't leave much for the vice chairman to say. But maybe just a couple of things on my mind this morning as I think about it.

There's no question we've been through unprecedented times geopolitically, economically, also in the global energy markets over the last few years. A couple takeaways. One is markets work. It's not always instantaneous, as fast as we'd like it, but eventually the markets catch up. And we've certainly seen the markets are rebalancing today.

Secondly, the United States is the world's largest global energy producer, and we have a very significant role to play. We export crude, we export natural gas, natural gas liquids, refined products.

And that helps the stability and the resilience of a global energy business, as it's good for our economy and the balance of trade.

And as I think through the recommendations, we've given you some tools of short-term actions that you can use at your disposal, like waivers, but I think more importantly, longer term, I think we need to encourage investment in our domestic energy business. And we need to encourage financial investments on all types of energy, all the above and all the below. And I think there's also an opportunity for all of us to be champions of serious, thoughtful, permitting reform. So I'll leave it at that, Madam Secretary.

MR. WOODS: Thanks, Greg.

Willie?

MR. CHIANG: Well, I'll ditto the comments on Andy; well done. And from our perspective, when you think about emergency response you tend to just kind of focus on the event. But my observation is it's much broader than that. And when I think about supply chains and the efficiency that you can get materials from point A to point B matching supply and demand, I think it's very critical that we focus on streamlining that as much as we can.

Because there's all those price signals, and

to Greg's point the markets do work, and if we can do things around infrastructure to match that supply to demand in a shorter period of time, not only can you get things there more efficiently, hopefully it's lower cost, which goes right back to the consumer as well as the most efficient emissions -- lowest emissions possible in getting energy from point A to point B. And this applies not only to traditional energy sources but to any energy source that we are able to develop.

And I would make one more point on permitting. That was where I was trying to get to, is I think the permitting is so key to allow some of this infrastructure to get built. And I just draw the observation as we watch Germany and the re-gas plants that they've built in less than a year. So it can be done, and obviously there's a balance for advocacy engagement while getting projects done. But it can be done in the world. And I think that's a great example of how the world is responding to some of these supply chain disruptions. Thank you.

MR. WOODS: Thank you, Willie.

And then finally Dan Yergin, who led the work on a transition to net zero.

Dan?

MR. YERGIN: Thank you very much. I have to

say as somebody who's used to taking a little longer to write things, 120 days is a really short time to get something like this done. And the team -- Atul, the team, Andy, it was great to do it and the amount of effort that people put in.

So we had two sort of related focuses. One was principles, and then the other is around technology, and specifically the technology of the oil and gas industry to meet these objectives.

On the transition, as we were writing this clearly aware that it's become more complicated because energy security, which had kind of faded, had very much come back at the table as these other studies made clear.

Secretary Granholm, you made clear that being mindful of risk, and I think you talked about avoiding unintended consequences, meeting energy needs, and in that spirit it did seem worthwhile that one of the key points we made is that indeed be careful of policies that inadvertently lead to energy shortages with the impact both on energy security and that impact on consumers. Clearly what we were saying is it's emissions that count, and therefore being fuel agnostic.

I guess I just need to say the word

permitting, because of course that permeated our study as well, but it's been addressed obviously very much in the other studies. And I remember Secretary Granholm earlier this year, the session that we did on the permitting challenges for renewables, so it's across the board.

I think the other thing that came clear to us on principles is it's not a straight line. I mean, who in their scenarios had COVID, who in their scenarios had a war in Ukraine, and so things will happen that -- things will not go straight in that way. Our focus was clearly on the United States, but we were mindful the U.S has a 2050 goal, but two of the biggest emitters, China is 2060 and India is 2070, so different speeds in different countries.

So just quickly the key point was to focus on emissions, not fuels, being agnostic. I think that point about incentives that we saw, as opposed to penalties, is the way to go.

The other part of the study was what the industry -- the oil and gas industry -- is doing in terms of the range of technologies it's applying. We identified seven of them -- and, yes, Madam Secretary, geothermal is among those seven, and it just shows, I mean, how much activity is happening. And what we saw

as we were working the study is the tool kit that the industry brings to bear. The challenge here is not just technologies but the scale, and that's what this industry does. It has its engineering and science capabilities scale, and the ability to execute, and that's unfolding.

You know, what this room represents here is the spirit of the NPC, which grew out of the cooperation between government and industry during the Second World War, and that's very much on the table here. That was one of the key things that we wanted to stress, is that collaboration. And the U.S has a unique energy ecosystem that no other country in the world has, stretching from the national laboratories to the marketplace.

National laboratory, we saw that amazing announcement yesterday about fusion, basic science, and then all the way to the marketplace. And right now with the IRA, it is to promote things happening in the marketplace. We're aware that the Department of Energy is also this country's Department of Science, and that collaboration all along that chain of that ecosystem is very important, and we see really working together is what will meet the objectives laid out in the studies and really the objectives of bringing down emissions.

So we've all learned a lot doing this study, and 120 days is a pretty short time to get anything done.

MR. WOODS: Thank you, Dan.

I will add that many in the industry mentioned to me they liked having 120-day deadlines. So there's a balance to be struck here.

Madam Secretary, I'll hand the floor to you. Where would you like to begin?

SEC. GRANHOLM: I have a couple of questions and maybe a couple of observations

You know, on this permitting you're totally right about it. I mean, it's insane how long it takes to get something, you know, in the ground, on the ground, in the United States. And, you know, we know that Senator Manchin's Permitting Reform Bill sought to address that. I know that Senator Schumer is giving that one more chance on Thursday for a vote. Hopefully it flies, but if it doesn't then it opens up more opportunity for collaboration in the next Congress.

We just have to figure -- we have to crack the code on how to do things faster, especially in an environment where we all need access to affordable energy. And so I think that's something that is worthwhile to pursue both on the renewable, any clean

and fossil side.

Second, on the notion of incentives versus penalties, the Inflation Reduction Act, other than the methane fee, the Inflation Reduction Act was an incentive. It's carrots. It's a series of carrots. I mean, the Bipartisan Infrastructure Law, too. It's all about carrots.

So I hope we agree, right, that the methane fee notwithstanding, that was really a bill about carrots. And I'm excited about that. I mean, really, we view the energy transition and energy investment in general is that it is government enabled but private sector led, and that's why this partnership, the collaboration, the NPC, its birth was noted as an industry-government collaboration, but really it's the private sector that does all of this.

And so figuring out how we can best allow the private sector to do its work is what's embedded. That’s why tax credits are a nice thing, because, you know, we're not owning any of these facilities; we're just enabling the private sector to do it.

I have a couple of questions on the report, and I don't know if I should address them to Andy. Where is he? Where’d you go? Over there.

Andy, that was such a great presentation, so

crisp, et cetera. I'm wondering on the cyber security -- and maybe this is a broader question on the cyber side. In light of, for example, in the shooting up of electricity energy infrastructure, how you all are viewing and how the government can be of any assistance, your cyber threats to, you know, some of these, you know, it's a query, there's still an investigation going on, but there seems to be something more nefarious than a bunch of guys riding around just shooting up infrastructure because, you know, it was two substations, it was obviously planned.

If there is more of this nefarious activity in the United States, how do you view your protection of your assets? And I'm curious what else you need to have that happen.

MR. CHIANG: Maybe I'll start with that.

SEC. GRANHOLM: Yeah.

MR. CHIANG: Obviously we've put a tremendous focus across the industry on all infrastructure facilities. At the end of the day, it's -- it's difficult to cover 100 percent of all assets across, you know, our country.

So in my opinion, we need to continue to harden our assets to make sure we protect against bad actors, whether it be cyber or physical security, but I

think the one thing that I would say is laws to prosecute people that do need to be severe. And I know a lot of that is state and local, but I can tell you there have been other situations where people have come in, shut valves on pipelines and done damage, and the repercussions have not been as severe as I believe they should have been. I think that's a key thing.

And then I think the other thing that I would make a point on is whether it be physical or cyber, back to emergency response and how the government and industry are working together, I think there's some very established protocols in working together to be able to assess, manage, mitigate, and communicate between government and industry and the public as we go through any of these industries.

So I don't think you need to have separate procedures for a cyber, a physical attack, a weather. The systems that we've got right now do work.

MR. ARMSTRONG: Secretary, I would just add on the cyber security note, first of all, Deputy Turk actually raised that as an issue in terms of having executive involvement, much like the electric industry does today.

SEC. GRANHOLM: Yes, yes.

MR. ARMSTRONG: And so he did a nice job in

our steering committee meeting of raising that issue and wanting to elevate those steering subcommittees that exist within the structure, first of all.

Second of all, giving credit where it's due, Administrator Pekoske from the TSA has done a really nice job across the pipeline industry of really listening and making sure that our approach towards cyber security is practical and something we can deploy in a time frame that's important. So I would tell you I think that's been a really great example of government and industry working together, and he's been a really big leader in getting his organization to listen to industry about what we can do in short order. So great example of things working together well.

SEC. GRANHOLM: Great, great. I'm excited that there is furtherance of replicating what we do in the electricity sector because it really is effective. It is one phone call, everybody gets on the line. This has happened, you know, everybody's on high alert, this is what we're seeing. I mean, it's just really helpful to be able to have access to CEOs who talk together about what they're doing to protect and what flags are out there. So super, super helpful both on cyber and physical.

Can I go a little more granular on that

permitting side of things? And I'd love to hear your thoughts on if you're comfortable saying provisions of the Manchin bill, or even separate from the Manchin bill, what you would like to see, what have been the -- you know, some more detail about what you think should be triage, if you triage your order priority in terms of permitting, what needs to happen; does there need to be a shot clock; there is sort of a shot clock on some already, but what else would you like to see?

MR. CHIANG: Well, I'll take a stab at that. Probably the most challenging piece, these are more themes and principles --

SEC. GRANHOLM: Yes.

MR. CHIANG: There's just got to be certainty, right? So a shot clock, a period of time for review. We know there's a critical need for stakeholder engagement, but it feels like we need to put some structure around permitting where it can't go into never-never-land. Right? And so I think there needs to be a process that's respected, and then there needs to be a ruling on the permit, yes or no. And the more certainty we can give before people make these large investments to move forward, the better off I think we'll all be.

SEC. GRANHOLM: And I'm wondering for those of

you who have international organizations -- if there's lessons from other places that you think who do it well.

MR. YERGIN: I think one of the things that's mentioned is the ability of agencies to talk to each other.

SEC. GRANHOLM: Yes.

MR. WOODS: Well, in terms of international, I think one of the unique characteristics of the U.S challenge is the legal system and the legal challenges, and the unending legal challenges that can end up taking it -- once a decision is made, then later being challenged, we've seen that with many infrastructure projects. I think that's fairly unique in the U.S with respect to the uncertainty that that introduces, and then the timeline and the recognition that there have been a number of examples in the U.S that, despite approvals and initiation of work, that many years down the road these projects get canceled.

SEC. GRANHOLM: Yes.

MR. WOODS: And I think that creates a lot of disincentive to move forward.

MR. ARMSTRONG: I would just add the 2019 infrastructure study had some very detailed recommendations on permitting, particularly dealing

with things like the Clean Water Act, 401 Water Quality certificates from the states, and the judicial standards for which that comes through the courts. So today the court has to find that a state agency is acting in an arbitrary and capricious manner. That's a very difficult standard for a court to say that a state agency is acting arbitrary and capricious.

So the judicial standards, coupled with our very complex court system, really tends to lend a lot of opportunities for handles on projects and allows about anybody to step in and stop a project. So I think there's some great detail laid out within that. But clearly if you look back to the gas pipeline industry, allowing the FERC to have more authority, and crisper authority over things like the 401 water quality certificates, would be a really big step in the right direction, and actually very consistent with the original Natural Gas Act as it relates to pipeline infrastructure.

SEC. GRANHOLM: Okay. That's helpful. Can I switch over to the opportunities in the infrastructure and Inflation Reduction Act? I'm curious if you can speak maybe from your particular perch about what you think are the most promising areas for potential collaboration or an opportunity just for investment

from your side. I'd love to hear how you're viewing it.

MR. WOODS: I can comment on that because we're pretty active in this space, as you know. So I think if you look -- I'll take it in three stages. Carbon capture and storage, which the IRA looked to incentivize, I think has done a very good job of what I believe will open the envelope in terms of the opportunity set for capturing carbon. And one of the challenges in this space is the more dilute the streams, the more difficult it is to economically justify capturing those streams.

And what the IRA has done is provided additional incentives to open the aperture and bring in more dilute streams of CO2. And I think our sense as a company is that we're seeing those opportunities manifest themselves. And, in fact, as a company we're pursuing some of those opportunities. I think that was a good step forward.

I think to make the advances that ultimately are going to be required in that space will need additional incentives, but let's get started on what we've got and try to let the technology drive the cost of capture down and see where we get to. But I think a good incentive there.

I think on hydrogen I would say a really positive element of the IRA is that it focuses on intensity and carbon intensity and incentivizes lower carbon intensity steps. I think those were manufactured -- or they were engineered in a way to try to drive colors, but our view is, you know, we shouldn't focus so much on the colors as much as the carbon intensity.

I think what will be very helpful and what we've yet to see is as that legislation is translated into the regulation and, you know, actually implemented is how are those intensity measures judged and evaluated. And our view is that we should keep in line with Dan's report, agnostic with respect to, you know, how you achieve those intensity levels. But to the extent you achieve them, then that ought to qualify for the credits. And, you know, we'll look to see, but I think there's an opportunity there. And, again, I believe we certainly see opportunities to invest in that space, as I suspect the broader industry will.

And then I think the third area of biofuels, actually there's a need to improve on the biofuels side of the equation because it's prohibited co-processing. So you mentioned refineries in your remarks and the fact that we're seeing a transition come. We're a

fairly big refinery, as I know there's some big refiners in the audience here. You know, we shouldn't ignore the fact that, you know, those facilities can be used in the transition to process biofuels.

And recognizing it is a transition and one that we want to manage and have a trajectory towards, we ought to be open to utilizing those facilities in a mixed mode so that you continue to process hydrocarbons as necessary, or oil, but at the same time open that up to biofeeds and allow the co-processing, which I think today's legislation doesn't incentivize that or allow for that. But I think that's an opportunity that we could improve upon that would facilitate more cost-effective, faster transition to lower emission sources.

Any other comments from anybody?

MR. GARLAND: That's good. I think that that does work in the United Kingdom, so you can co-process in the United Kingdom. And so, I mean, what we do is molecule management, and so that's what this industry is really good at. And so renewables are going to have a role to play, and, you know, many of us in this room are prosecuting that. Certainly in transportation fuels for diesel, but also sustainable aviation fuels can be very, very important in the future as we work to

decarbonize airline travel. So that's one segment we just don't want to forget.

SEC. GRANHOLM: Right.

MR. WOODS: The other thing I would add, you know, there's a lot of focus on colors of hydrogen, and I think Andy made the point in the report, but we should not ignore the natural endowments and the solution set as you move around the world will be, I think, fairly tailored to the circumstances of where in the world you are. And so, as an example, here in the U.S, we have, you know, the advantage of cheap natural gas which we can convert to hydrogen. Many places in the world don't have that advantage. And so blue hydrogen for them doesn't make as much sense.

We also have the advantage of a lot of storage facilities. So we can convert natural gas to hydrogen, store the CO2 that comes from that process, and achieve the objectives of lower emissions at a lower cost by utilizing the natural endowments that the U.S has. Europe won't have the same opportunity set, so the solution set in Europe may very well be different. We should be open to the possibility that that solution set and mix will change as you move around the world, based on the circumstances and the context in which you're progressing those.

SEC. GRANHOLM: Yes.

MR. WOODS: One size will not fit all.

SEC. GRANHOLM: 100 percent. 100 percent. And, you know, some countries -- I mean, Africa is very interested in green. We don't like the use of colors either because I do think -- and nowhere, whether it's the Bipartisan Infrastructure Law or the Inflation Reduction Act, do they talk about colors. They do talk about carbon intensity, so to your point on that. But, yeah, I mean, some places of the world it's green hydrogen to green ammonia, you know, the opportunity's there.

You know, on that side, we have to get the cost of electrolyzers down, and on the fossil side -- on the natural gas side, in particular, we've got to figure out the upstream and downstream, you know, buttoning down methane and CO2. So I think there's a technology add-on that really makes that. And, you know, we'll be discussing -- the department will, I think, before too long here -- the initial cut from the hydrogen hubs, Bipartisan Infrastructure Law, where we invited concept papers to see what it looked like. And then there will be a down selector at least to encourage versus discourage letter that goes out. And so that will happen fairly quickly, and we'll sort of

see what the mix looks like.

The law requires a certain number of inputs, if you will, fuels to base the hydrogen from. So we'll see how that comes out. But it's exciting because every region of the nation is a little bit different, in addition to the world. We have to have these place-based strategies.

One other question because I know I've got to leave at the bottom of the hour. You know, my obsession, of course, as I have said with the geothermal side of things, I know you manage molecules, but, you know, you can manage a lot of things, too, right?

MR. WOODS: We drill holes as well.

SEC. GRANHOLM: You drill holes, yeah. You go beneath the surface. You know where it is. Yeah. And fracking really opens up this huge opportunity for enhanced geothermal. So I say this because in the report on page 58 -- this is on page 58 on the transition strategies report at the bottom -- you talk about the Production Tax Credit, and you say although the PTC -- this is the addition -- but the PTC in general works well for solar, wind, and battery storage.

Geothermal will find it difficult to meet the

sunset date because the statute has these specific technologies identified and then sunsetting, but it flips over immediately to a technology neutral credit. So the geothermal as well as all these other clean energy credits will continue, but in a technology neutral fashion. So just to let you know that the incentive is still there and will be there for the next 10 years to be able to take advantage of that.

MR. YERGIN: We got it.

SEC. GRANHOLM: All right. So those were my questions and comments.

MR. WOODS: Thank you, Madam Secretary.

Brad, any questions you had?

MR. CRABTREE: I actually don't have any questions. I have some observations. I can either offer them in my closing remarks or I can do them now. What's your preference?

MR. WOODS: We can save them for your closing remarks.

MR. CRABTREE: Okay.

MR. WOODS: I know that you've got a tight time table.

SEC. GRANHOLM: I do. And unfortunately I have to leave before Brad speaks. So you'll just have to relay your observations to me separately. You know

where my office is.

MR. WOODS: Well, we appreciate your time this morning, Madam Secretary, and your engagement on these important topics, and your engagement with the industry. And, as I said at the podium, your willingness to have frank and candid and honest conversation, very much appreciated for what is a very complicated space but one I think that we all are aligned on in terms of what we're trying to achieve.

And I think given the history of our industry and the history of innovation in the U.S., a lot of confidence that we can make good progress in meeting all of society's objectives, including emissions reduction. So, again, thank you for your time and your active engagement.

SEC. GRANHOLM: Thank you, thank you all so much.

(Applause.)

MR. WOODS: Okay. All right. Well, the draft reports approved today will be posted on npc.org while the final editing is being completed.

We'll move now to our next agenda item, which is to hear the progress reports on the two other studies requested by the Secretary. Austin Knight chairs the NPC coordinating subcommittee on hydrogen

energy, and he will provide an update of their progress.

Austin?

MR. KNIGHT: Good morning, and thank you, Mr. Chairman and Madam Secretary. So it's exciting to be here. It's a dynamic and exciting time in energy, obviously. My name is Austin Knight. I'm the vice president of hydrogen at Chevron, and I am the coordinating subcommittee chair for the study, which is called deployment of low-carbon intensity hydrogen energy at scale.

This is a progress report today. It's intended to describe the request, how we're organizing for the study, and what to expect. I will not be sharing any preliminary findings or analysis today.

But first for some context, NPC member Daniel Yergin speaks to the energy transition in one of his recent books, The New Map. He mentions the words “energy transition” are the two most used words in talking about the future of energy, and he adds there is certainly no consensus as to the speed of the transition nor as to what will the transition look like decades from now, nor as to the cost, nor as to how it is all to be achieved. He goes on to remind us that these transitions in energy are not new, as we saw in

the last report.

One thing is certain, is that all serious views of the future of energy, especially when considering lowering carbon emissions, include a role for hydrogen as an important vector for achieving affordable, reliable, and ever-cleaner energy in a growing world.

And so it's in that framework that we talk about hydrogen? Now, what is hydrogen all about and how is it linked to the reduction of CO2 emissions: First, hydrogen is potentially a low-carbon intensity energy source for hard to abate industries, industrial processes, transportation, power, and heating. This is especially true in sectors that are not easily electrified. Technologies already exist today to produce and distribute this hydrogen, although at varying levels of technical and commercial readiness.

The U.S has abundant natural resources for the production of hydrogen both in natural gas and also wind and solar. And there are multiple production pathways then to produce this low-carbon intensity hydrogen at scale.

And finally recent policy and legislation, such as the Inflation Reduction Act and the Bipartisan Infrastructure Law, provide incentives for the scale up

of this hydrogen. It's quite appropriate given the topic of the last study and the discussion we just had.

So it's within this context that Secretary Granholm has requested the NPC to study the deployment of low-carbon intensity hydrogen, and the request is timely. We certainly appreciate it, and we believe it's extremely important. She has posed the seven questions shown here in her request. Now, I won't go word by word through these, but I will hit some important elements included in each.

First, the request is for recommendations for policy, regulatory, and other actions that we recommend to be implemented. Next, to evaluate the key drivers and various hydrogen forecasts, and to help in the evaluation of understanding the drivers behind those forecasts and make recommendations around that.

Third, to comment on infrastructure requirements to integrate all of these solutions.

Fourth, to look at the role of hydrogen transportation alternatives for moving hydrogen, such as ammonia or other hydrogen carriers.

Fifth, of course, make sure we address health, safety, and environmental considerations to facilitate the acceptance of hydrogen in the energy system.

Sixth, dive deeply into the environmental and

economic impacts of hydrogen compared to other alternatives, and in particular consider pollution, environmental justice, job creation, and other factors resulting from that.

And then finally research and comment on existing R&D gaps and describe pathways to address what's needed in research.

And so to answer these questions we've organized under this structure, you will see that we formed a study committee of approximately 60 NPC members. The study is chaired by Mike Wirth, the chairman and CEO of Chevron. It is co-chaired by Deputy Secretary David Turk. A portion of those members from the study committee sit on the steering committee, and then I lead the coordinating subcommittee, the CSC, along with my government co-chair, Dr. Jennifer Wilcox, also supported by Dr. Sunita Satyapal.

We have about 30 participants that sit on the CSC, and that group drives the direction of the study, has developed the work plan, and has organized into five task groups with leads from the CSC that have invited in additional participation to support the development of chapters beneath that. And those seven chapters and that participation is what we will talk

about next.

So we've structured the study to be deep and to be wide. We want to cover the full hydrogen value chain, economic modeling, provide policy analysis and recommendations, and of course make sure that we appropriately address societal considerations and impacts. And it's important to note that throughout the chapters, safety, technology, and environmental impacts are themes that run throughout all of these chapters. And so that will be well integrated in as we proceed through.

I'll spend a bit of time describing each chapter. Chapter 1 will cover generally the role of low-carbon intensity hydrogen in the U.S, providing an outlook now and as that economy scales.

Chapter 2 will look at the demand side, where could possibly hydrogen play a role in the energy systems, how will it be used, and what are the alternatives and drivers for using hydrogen.

The third chapter will look at the supply pathways to produce that low-carbon intensity hydrogen. There are many different pathways. There is varying carbon intensities associated with those pathways, and we want to evaluate all of that and be very clear on carbon intensity and those boundary conditions.

Chapter 4 covers infrastructure to tie all of this together and connect those ecosystems.

Chapter 5 will look at integrated economics, a deep and rigorous techno-economic modeling of these value chains to really unlock and help share the potential and the impact that hydrogen can have and where it best fits across the value chain.

The 6th chapter will look at and make recommendations on policy. We'll review the legal and regulatory landscape for scaling hydrogen in the U.S.

And then 7th is safety and what we call SCI, societal considerations and impacts. I will talk more about this in a moment, but, again, safety and societal impacts, these are themes that run throughout. It's not Chapter 7 as an afterthought. These themes will go through the rest of the chapters on supply and demand and infrastructure, but we did find them important enough to call out these topics in a specific chapter that would cover a broad range of considerations, including environmental justice and equity.

So that's how we're organized in the chapter. And we found it extremely important to bring a cross-section of views, diverse views and voices, to the topic to address it holistically. And so you'll see here that we have a study team, a wide range of

more than 170 participants across 50 different organizations, participating already today in the development and formation of the content within those chapters.

This is not just an oil and gas study. You will see participation from oil and gas, of course, also industrial gases, the power sector, EPCs, manufacturers, equipment OEMs, infrastructure companies, management consulting, we have non-profits and NGOs and universities participating with us. It is a diverse group, and we believe that is extremely important in addressing the topic holistically, recognizing and addressing skepticism, looking for gaps that may exist in order to comment on real world deployment with impact.

And we are progressing very well at this stage. Here you'll see a bit about our progress Hydrogen's role in the future of energy is extremely important. We want our output to be relevant. We want it to be timely, and we want it to have lasting impact. We recognize that within that framework governments and policies, private sector, actors, continue to advance actions in this space while we are still performing our efforts. This moves in parallel and it's very dynamic.

And so where possible we will be looking to

consider information from existing work products, but we intend to draw our own conclusions independently. And we are finding that in many cases a lot of the information that exists out there does not necessarily go deep enough for our own purposes and looking at full deployment of hydrogen at scale with regional impacts and full well-to-gate life-cycle assessments of carbon intensity. And so here we will also be working with, and have started working with, the IEA, MIT, and the EIA, to align on data and baseline assumptions and model in detail those full impacts and tradeoffs.

Here it's worth noting again SCI, the societal considerations and impacts, we've structured very well for this. This is a topic that is very important to this administration. It's also a newer topic in terms of the emphasis that's coming to be placed on that topic within the NPC studies. And we're advancing this very intentionally to make sure that the benefits and any impacts of hydrogen development on local communities, and society as a whole, are fully evaluated and communicated clearly through the framework of environmental justice and equity.

The safety aspects certainly apply there. And we hope also to bring some best practices around community engagement that we can share with the members

and with DOE for addressing local stakeholder needs as hydrogen is deployed at scale.

And so finally we are close to the halfway point of our effort so far. It is an ambitious and aggressive schedule. We have mentioned we want it to have strong impact, but we recognize that the world is not waiting on our report in order to advance these topics and make decisions. So it's extremely important that we do work very closely together and very quickly in order to deliver something of high impact in a timely manner.

Here you see we aim to deliver the final report by about this time next year, by the end of 2023, and so I hope and look forward to being here again with you about a year from now to go through the full analysis and the recommendations and have more detailed conversation around low-carbon intensity hydrogen energy being deployed at scale.

So I thank you for your support, for your company's support, your organizations, everyone that's participating in this study. And I'll hand the floor back to you, Mr. Chairman.

MR. WOODS: Thank you, Austin.

(Applause.)

MR. WOODS: As a progress report, there's no

action required by the Council, but we can take the opportunity of Austin being here if you have any questions or comments or guidance you'd like to provide him. Open the floor to any comments.

Yes, over there?

MR. LIEUWEN: Yeah, hi. I'm Tim Lieuwen, I'm at the Georgia Institute of Technology. I'm also chair of the Electric Power Research Institute's advisory council. So it's actually in that role, that hat, that I wanted to frame up this comment.

So outstanding study. It looks like a really comprehensive team. I just really want to encourage you to engage EPRI, Electric Power Research Institute. They have launched a fairly significant set of hydrogen initiatives, particularly around engaging the end-use application; some really exciting demonstrators on modern low Nox gas turbine technologies.

You know, a lot of the -- for example, the societal concerns, a lot of these societal concerns today come around Nox emissions from hydrogen. And so what's really exciting about these EPRI demonstrators is they've -- you know, one was with NYPA, the New York Power Authority, as well as with the The Southern Company, was they utilized modern really ultra clean gas turbine technology. So, anyway, I'd just encourage

you to engage because there's a significant thread that's happening there as part of their LCRI program. Thank you.

MR. WOODS: Very good. Thank you.

MR. KNIGHT: That's really appreciated. Thank you.

MR. WOODS: Other comments or questions?

In the back?

MS. TAYLOR: Thank you. This is Cindy Taylor with Oil States in Houston. And we're on the manufacturing service and supply chain side of the equation. And your question six is key to me, which is how are you going to really assess the environmental and economic costs and benefits not only of hydrogen? I could apply this to solar and wind and compare -- it's a broader question, really, for the committee and the Council, I think.

As a supply chain participant, as an example, we're investing in floating offshore wind largely in Scotland, but the problem with that it -- and that's because the permitting process is so far advanced compared to what we're doing in the United States, whatever we develop will be beneficial in the U.S, but I always say I have no visibility into owner economics, meaning it seems like a good thing but I have no idea

what the cost per kilowatt hour is ultimately going to be if I do a floating installation offshore Scotland or anywhere else.

And so the question is, it sounds great. What is the road map to answering those two questions on both environmental and economic costs and benefits for this transition broadly, and does that create a road map for other investments?

MR. KNIGHT: Okay. Thank you for your question. And as you'll see, we've organized to respond to the specific seven questions, and then beyond that, of course, we have many other questions we aim to answer in order to get to a comprehensive study that addresses all of this. And a part of that will be recognition that within the U.S the resources are not uniform and there will be regional advantages in different parts of the U.S for different production pathways, there will be different value chains. They're to be considered, and so that analysis, I think, will answer your questions. And it's intended to bring that view.

MS. TAYLOR: Thank you.

MR. WOODS: The economic equation is a fundamental element of this transition. I think one of the modeling that we're doing and the work is to make

sure that we can answer that question so that as a policymaker you have to choose. There is a cost to every benefit, and that we're weighing those off appropriately. And more importantly for limited resources, funding being one of those, is that you're choosing the lowest cost/highest emission reduction steps available. And so it's a critical point to these studies, as we did with the carbon capture study. It'll be critical to these as well.

Other questions or comments for Austin?

(No response.)

MR. WOODS: Okay. Pardon? Do you see one, Willie?

Okay. All right. Well, thank you, Austin. We appreciate your leadership on this, and the team's work, and look forward to the report out. Good luck.

MR. KNIGHT: Thanks.

(Applause.)

MR. WOODS: Next we have John Dabbar, chair of the coordinating subcommittee of the NPC committee on GHG emissions, and he'll report on the progress of their work.

John?

MR. DABBAR: Thank you, Mr. Chairman. So today I'll be providing an update on the natural gas

GHG study. This was commissioned by Secretary Granholm and voted out by the NPC. We kicked off that study late last year. We've reached a couple of useful milestones that I'll discuss, but we are far from having any recommendations or findings, so I won't be able to provide any update on that.

The key message as we went into the study is that natural gas can continue to provide reliable and affordable energy, and the emission footprint can be reduced. You know, as we looked at the content of GHG emissions in the natural gas value chain, looking at how that compares to kind of the overall GHG and methane footprint, you know, we see, for example, that although there are other sources of GHGs and methane emissions, and notably the agriculture sector produces as much methane as the oil and gas sector, that's really the focus of this study, is the natural gas value chain in the oil and gas industry.

And the scope we determined -- and this was approved in the work plan -- is emissions from drilling and completions up to delivery to the final consumer, or delivery to the LNG export location. So that is the value chain. We then broke that down into different elements. That's described in some more detail.

We're going to be assessing the reduction

plans across the value chain, and a big part of that is identifying where are there opportunities within each segment of that value chain to reduce emissions.

We're following the standard NPC process with respect to governance. We broke it down into task groups, which I'll describe in a bit more detail on a following slide, addressing the DOE requests, and a few additional questions that arose as we reviewed them, and with the milestones that we've completed and the approval of the work plan and the target completion in 2024.

So this is a summary of the key points in Secretary Granholm's letter. I won't repeat them. In fact, you voted on them, so we'll proceed to implement them. One of the key areas we did as we organized this study was to map all six requests into an actual cogent work plan so that we could give people an opportunity to sit down and work on this. And that's what I'd like to talk about in a bit more detail.

One of the key areas that the last two points here on tradeoffs and evaluation, one of our challenges is to evaluate quantitative and qualitative metrics associated with GHG reductions. We would like to quantify everything where possible, but there will be some qualitative effects that we'll have to also take

into account.

This is where I'd really like to spend some time on how we've organized. The five task groups address the various questions that the Secretary asked, and the additional questions that arose in our review.

So the first is around the baseline and pathways. So when we talk about expected pathways, the study scope is not to create a brand new way of mitigating GHG emissions and methane, but rather to look at what are the known and well-defined regulatory, policy, industry actions, and voluntary ways to reduce GHG, including methane emissions through the value chain, that if more broadly adopted would have a more effective way of reducing that. And that'll then feed into the tradeoff. So that's what is known, how can they be better implemented, better adopted.

We're also assuming all existing laws, including implementation of the regulations that will come out of the IRA, knowing that there's some concurrent work that's going on during the study. The EPA is not sitting on their hands waiting for our final report, but are progressing on their regulatory front. So we have an integration effort, great support from our DOE team to help bring in EPA and other regulatory agencies.

The detection and quantification -- and I think Secretary Granholm mentioned that, also, the detection and abatement. That's a core part of the study that we're working on here. And we're looking at the detection for mitigation as well as the quantification for GHG inventory and methane inventory. We also hope and have included in our work scope to deliver DOE with an integrated recommendation on the various technologies, the various platforms, and their cost effectiveness at detecting GHGs and especially methane, quantifying, where appropriate; providing detection and mitigation actions, where appropriate.

The cost of those is going to be one critical input into the tradeoffs analysis. We have a group working on life-cycle analysis. The key there is how to attribute GHG emissions over the value chain, over the life of a particular segment of that overall value chain. It's also a core integration with the hydrogen study, where, for example, the life-cycle analysis of methane delivered to hydrogen production is an input to the hydrogen study and fits into their life-cycle analysis.

We're also working effectively with the LCA team on hydrogen to make sure that methodology standards, definitions, segments, are all common, or at

least if there's a difference there's a reason why they're different.

Our analytics and tradeoffs group, that is essentially the decision analysis team that's going to be looking at the cost effectiveness and the quantitative and qualitative tradeoffs that we have to address.

The three key levers that were in Secretary Granholm's letter that we're able to consider on the tradeoffs are what are the technology market and policy options that can be used to implement all of these different tradeoffs on GHG emission reduction.

And then finally the societal considerations and impacts team will be really taking sort of two key areas. The first is to provide the evaluation of benefits, co-benefits, and the impacts in the value chain and in different elements through the attribution of GHG emissions to see how those benefits and co-benefits can be equitably distributed while also providing each one of the task groups with consistency on how the terms of societal considerations are considered within those task groups, and then pulling it together also with the hydrogen study -- and thanks to the Cynthia and George Mitchell Foundation for agreeing to represent on both studies and providing the

glue between the two studies on societal impacts.

So we've fully staffed up the study. The coordinating subcommittee with my co-chair, Ryan Peay, and his deputy, Christopher Freitas. We also have co-chairs named for all the task groups and active participation from both DOE staff and national laboratory staff supporting what we're doing.

We strove to have a diverse membership on the coordinating subcommittee, and this describes categorically roughly half come from the value chain participants and roughly half from other NPC members representing groups from the service and construction side, financial consulting services, state and regulators, academics, and also tribal interests. We have now kicked this off and we've got a fully formed CSC, and we're up and running.

Our integration with the concurrent NPC study, oh, you'll notice that there's a bit of overlap and handoff between the study, so most importantly from the STATS study the input from the stat study -- excuse me, the output from the stat study becomes input to the study that we're working on, and we're going to pick up the ball and run with it. That would be the metaphor, is I've gotten what Atul had written and he was creating a big part of my to-do list. So, thank you.

Also, a lot of integration with the hydrogen study, as I mentioned earlier, and then, you know, working with the SCI work, societal considerations, that's overreaching on all the studies. A lot of life-cycle analysis, integration between the hydrogen and GHG studies, which I mentioned earlier.

I won't dwell on progress to date, but rather I'd like to talk about our path forward. So in addition to Atul and the team -- and a big thanks to the Pioneer Natural Resources folks who had ownership on the methane section, they were very strongly coordinated with us as they developed the chapter content so that we knew what we would be picking up and running with. And that was a direct feed into a lot of the detection and quantification work that we're going to be doing.

Again, I mentioned the life-cycle analysis and SCI work. We have identified study membership gaps, and I will have a request to you in a moment. One of our key aspects that Ryan Peay and I have agreed to is that we're going to manage scope growth. It's tempting to have more scope. It's tempting to take on more things. We don't want to do that unless we have a conscious decision to do it. We don't want to sleepwalk into additional scope. We may add it, but

it'll be something coming back to the study committee and steering committee if it's beyond what he and I can agree to.

And then we're already starting on development of communication plans and stakeholder engagement. And I'll talk more about that in a moment. And then finally a shout out to Austin and your team for all the collaboration on the hydrogen study with us. Thanks.

So our timeline, we were initiated by Secretary Granholm a bit later than the hydrogen study, but we're working hard to catch up. So the good news is we do have a pretty fully staffed coordinating subcommittee. We do have a request that if there are subject matter experts in the NPC in any of your companies that you feel would contribute to something, something that we're maybe not addressing fully or where you have unique capacity to provide that input, please contact me and the NPC staff and we'll get your subject matter experts incorporated.

The second one is around our stakeholder and engagement plan. This is a key area where both the NPC membership and the DOE are going to collaborate on how do we communicate and when with the various government offices, both in the administration, at states, and on Capitol Hill, and then also starting to prepare what

our communications are going to be and plans to get the plan out there once it's finally published.

If we do a great study and it sits on the shelf and nobody reads it, well, it doesn't really contribute much. So we're already going to plan from day one how do we communicate that there are findings and here's what we recommend you do, and here's what industry wants to do.

And then finally -- and this is my request for you. We do need support on task group 4, which is the analysis and tradeoffs group. If you have expertise in decision support, decision analysis, business strategy, that can help us evaluate qualitative and quantitative tradeoffs in a way that you would do it in your company, we would welcome in particular additional members to that task group.

Mr. Chairman, that’s the end of my report. I’m happy to answer questions.

MR. WOODS: Thank you, John. And like Austin’s report, no action is required by the Council, but let's take the opportunity for any questions, comments, or guidance to share with John for his team.

Any comments?

Yes?

MR. NEWELL: Yeah. Thank you, John, for that

very thorough description of what the study is up to. Question regarding -- Richard Newell, Resources for the Future. Question regarding the baseline assessment piece of this, which you alluded to but maybe you could give us a little bit more color. There seems to be continuing evolving evidence from various different approaches for what the current state of methane emissions is. And, you know, as one is confronting, you know, steps that might be taken to reduce, that baseline assessment piece seems like there still needs to be, you know, evidence synthesis and kind of -- to the degree we can, a consensus around the current situation as we make progress on it.

Could you say a little bit about how this -- whether the study will be tackling that, and, if so, how it will be doing that.

MR. DABBAR: Yeah. Yeah, that's an important subject that our baseline task group is working on. There's obviously published data or known data, and we can all read an EPA greenhouse gas inventory and say, well, this could be absolutely correct. What we're really looking at is how do we take what is a known inventory and how do we measure improvements towards it.

I think it’s unlikely that we will be able to

do sort of a calibration of these or exactly the differences between a current GHG inventory and some future GHG inventory. What we're really looking at is through the test group 2, the quantification part of this, is how do we both -- as industry but also with the collaboration with EPA in a regulatory world -- create more accurate emissions factors through detection and quantification.

In terms of a baseline, one of the things we're not doing, Richard, is we're not going to try to compare U.S natural gas with all other energy sources. So, you know, Salacion (phonetic) lignite or West African wind, we're not going to try to get into a comparison baseline but really just more of an absolute baseline; this is what we know the oil and gas sector emissions are that we can then compare against.

MR. NEWELL: Thanks.

MR. WOODS: Any other comments or questions for John?

(No response.)

MR. WOODS: Okay. John, thank you very much, really good summary of the work.

(Applause.)

MR. WOODS: I think you can see with both of these studies very timely with respect to a lot of the

policies being considered and as really governments all around the world look at how to effectively transition to a lower carbon-intensity energy system. I think, you know, we keep calling for more thoughtful policy, long-term policy. These studies I think are really important in contributing to that thoughtful policy. So appreciate the effort that you and your teams are putting into this.

You will have seen on the slides -- the org charts that showed Deputy Secretary Turk as the Secretary's representative at the study committee level. Brad Crabtree, the assistant secretary for fossil energy and carbon management, and his staff are DOE’s day-to-day point of coordination for the Council and the work and support the subcommittees and the task groups that are executing the study plans that we've been discussing here this morning.

Brad came to the DOE from the Great Plains Institute, where he cofounded and directed the carbon capture coalition, which works to advance carbon management technologies. And, Brad, I think the members would appreciate any perspective that you'd like to share with us, please.

MR. CRABTREE: Great. Thank you, Darren, and members of the Petroleum Council. It's an honor to be

here. And Deputy Secretary Turk was obviously supposed to speak. Dave got called away to an important trip to Europe on short notice. I'm glad to be here. I've actually worked with your industry extensively for 20 years, and it's very important to the current job I'm in as well.

Let me just start by thanking all of you for this extraordinary commitment that's reflected in the report that was presented and approved, but also the forthcoming reports that were just presented. There's obviously a huge commitment at the staff level in your companies and organizations.

What I've noticed in my role is real personal time from the leadership of the company, some of the largest companies in the United States, in the world. That hasn't gone unnoticed. Ryan and I have made that point internally to leadership at the Department of Energy, to the Secretary. She appreciates it; I appreciate it.

Also, of course, the NPC staff. You know, this is a tremendous undertaking. Given my policy background, I've also been parts of efforts like this, and it's a daunting -- especially some -- that you're at the beginning of some of these reports, it can feel daunting before they start to take shape.

The other thing I want to just take a step back separate from the reports and just thank you for your commitment to decarbonization. You know, in all the years I've worked with the industry, I've seen sort of in society how energy and climate issues have evolved and how the industry has responded to that. And it's worth both recognizing and emphasizing that you are laying out a body of work and recommendations here that accept decarbonization and net zero emissions as both an opportunity and an obligation. And part of what you need to do as companies, and as an industry, I think that's very meaningful. And I just felt it was important to note that.

Also, it's been an extraordinary several years for your industry, from the very, very lows to now the very, very highs. That's actually not all that different than the history of the industry. I recognize that. But, Andrew, your presentation was a real tour de force and I think illustrated that. So thank you for that overview.

And the other thing that I want to take a moment to do -- and I always do this when I meet with, you know, the oil and gas industry -- is to acknowledge and thank you and your industry for stepping up at a critical moment in the world today. The Russian

invasion of Ukraine, you can't overstate the impact of that on the world. In my role, I've had the opportunity in recent months to make two trips to Europe, meet with my counterparts in countries like Germany, U.K., France, the EU officials, and I just have to tell you that the commitment we've made to supply energy to Europe at this critical moment -- at this moment of need -- it has really improved our standing in the world. And your industry has been an extraordinarily important part of that.

And, you know, personally I'm old enough to have been a student in Europe at the end of the Cold War in West Germany and had the opportunity to visit East Germany and East Berlin, and that was a formative experience for me. And I really understood what our country did after World War II to defend -- during and after World War II -- to defend Western Europe. We're now doing that for our allies again, and so thank you for your contribution to that.

And I'll just say on the natural gas side, which is maybe where this is -- obviously oil matters, but natural gas at this moment is especially critical. We're seeing that, and that we have -- our production, we've become the largest LNG exporter in the world, roughly 12 billion cubic feet per day. I think we're

going to be close to 14 -- well, it depends now, but we're going to be close to 14 when Freeport comes online, and by 2024 that will increase again. And we're projecting by 2030 we'll be at 20 billion cubic feet per day of export. That's an extraordinary -- coming from a country which was an energy importer and we were building a gasification -- regassification -- we're about to build regassification terminals in the United States, and then shifted gears to develop LNG terminals, and we now have become the largest exporter of LNG in the world. It's just an extraordinary transformation.

And I want to echo some of the comments that were made in your recommendations and the emphasis that some of you put on those recommendations and the importance of markets and ensuring a robust role for markets going forward. I echo that, and we're seeing that in the transformation of the United States from an energy importer to an exporter and being in this enviable position in the world today.

And, by the way, I had prepared remarks that I brought with me, but after reviewing the report last night and this morning and listening to this discussion, I wanted to just share some specific thoughts. And so if it's a little rougher, I apologize

for that.

I also appreciate the willingness that in these reports and in this discussion to look hard at the transition -- as the Secretary talked about, a managed transition. It's not easy. I've often counseled in my discussions with others that we need to approach this with a bit of humility. Transition is not only -- it's not something new, and as Dan Yergin has pointed out, takes a long time.

We also don't have a lot of experience with doing it intentionally, and so we are in a situation -- and I've been part of the discussions with some of you in the room, with the refining sector, which is a really key example of managing a transition like this where you have a future that's changing dramatically for that sector but decades of time where the refined products that are being produced by that industry will be essential to society.

And so this report starts to provide some recommendations for how to support that kind of transition. But I think it's fair to say that this report in this realm is really just a start. I think this is something we're all going to have to work on really hard together, and the refining sector is not the only one. I think we're going to face a series of

these challenges, and we have to spend a lot more time thinking about policy that addresses transitions, as much time as we spend on policies to incentivize the new things that we're trying to accomplish.

On policy, as the Secretary said and some of you acknowledged, this is a really extraordinary moment. If you take the infrastructure bill from last year that passed, the Inflation Reduction Act that passed in August, this is not hyperbole. We literally have the most robust incentive framework in the world.

Again, in my recent trips to Europe, one of my meetings was with counterparts in Germany, and we had long discussions about the Inflation Reduction Act. They -- as I think you know -- and they're not -- it's not the only country. They are deeply concerned because they face extraordinarily high domestic energy prices, and now we have this very, very ambitious incentive framework in the United States, and they are literally concerned about de-industrialization.

And so when you all talk about in your recommendations, in your report and your comments about the enviable position we're in, we have that in terms of a resource endowment now for -- I think -- for the first time in terms of energy and climate policy we also have that in terms of a federal policy framework.

So one of the things I guess I wanted to say -- and it's a bit of a request -- is that in the context of this report, and your communication about the report, and the work going forward -- and I want to say this is not in the spirit of taking political credit. I think it's really important to highlight, and if I did have maybe a critique I don't think the report maybe spells this out enough, how important these steps are, how transformative they are, what's already enacted.

And the reason I say that is that there's years of bipartisan policymaking in Congress that went into the infrastructure bill, and into the Inflation Reduction Act. The latter was legislation that passed on a party-line vote, I grant that. But if you look at the provisions that matter most to your industry, to having the incentives that you need to innovate and deploy technology and infrastructure, to decarbonize and build new business models, the bulk of those provisions involve years of work and prior bipartisan legislation that was then rolled into these bills.

And so I think it's really critical that that be recognized because the policymakers that took these steps, they took a lot of -- they have and continue to take a lot of criticism for this legislation.

And I would note that Republicans even more than Democrats have been criticized. So the more that you can do to highlight how valuable this is, I think that's really critical.

So I'd just note -- just quickly on that point, in thinking of the incentives and as they most relate to your industry, you know, first of all it's great to see the -- thank you, Austin, for the -- I'm not sure where Austin -- there, sorry -- for the report on the hydrogen work coming forward. I think it's great timing for that. I'm very excited because I'm having meetings with companies here and overseas who are literally changing their decisions about investments to move forward with projects because of the policy that we already have.

And there's been some discussion about ways that, as we implement this policy and some of the regulations associated with it, we can make sure that it delivers for all hydrogen production pathways, and we very much support that.

On carbon management, I think for those of you who know me and my background, that's been my focus over the years, and, of course, the enhancements to 45Q. We met recently -- I didn't, but colleagues met with an engineering firm that's tracking carbon

management projects that would in different ways either benefit from or claim directly the 45Q tax credit. And they're tracking over 200 projects in the United States, and there's over a hundred that are publicly announced.

Think about, we have 12 commercial scale operating carbon capture projects in the United States today, and there's over 20 times that -- so about 20 times that number at least on the drawing boards right now in various stages. And there's analysis not from the federal government, but from the Rhodium Group that by taking the infrastructure bill, together with the Inflation Reduction Act, the federal investments coupled with the tax credits, that we could see by 2035 annual additional carbon capture and storage capacity of 215 to 250 million metric tons per year; up to a quarter of a gigaton. Now, there's a lot of factors that go into that, but it's just the fact that there's even incredible analysis suggesting that that shows how far we've come.

So that gets me to the recent discussion that I chose not to comment on following the Secretary, the importance of putting steel in the ground.

And, Darren, you and I talked about that and, you know, Darren's company and others have made these

policy commitments -- not policy, sorry, project commitments -- and I think that's vitally important.

One of the concerns which I share is that a lot of the climate policy debate -- and you discussed this in the report and discussed it today -- that we should be focused on emissions and not on the resource. The challenge is social and political in that regard more than it is policy.

And if we want to get back to a place where we're focusing on the outcome in the emissions and not the resource, we need to overcome the skepticism that is rife in our country around all types of projects, be that -- not just in your industry, and real results on the ground, real facts on the ground, about emissions reductions, jobs created, all kinds of other benefits -- it's the most powerful argument we will have for getting to that kind of a policy framework, which is consistently about emissions and incentives and so forth.

So in fairness that leads us to permitting. And so I welcome the recommendations on permitting. I appreciate the fact that you've addressed them. You can tell the Secretary cares a lot about that. And I think it's fair to acknowledge that it's -- permitting is a real challenge substantively and politically.

We'll see what comes out of this lame duck Congress and whether we take steps legislatively before the close of the Congress, but I think that's an area where we should continue to work together to try to make progress, because back to my points about the infrastructure bill and the Inflation Reduction Act, the level of deployment that the investments and incentives in this legislation is going to drive will be unprecedented, perhaps anywhere in the world, certainly in the United States. And our greatest challenge will be to actually be able to build these projects across the country.

And it's not just carbon capture at a refinery or developing a regional geologic storage site. It's transmission lines, it's wind farms. It's going to be across the board. I personally lived through battles over wind farms as a township officer on my ranch in North Dakota, and the opponents of the wind projects were conservative ranchers who stood to benefit financially from the wind farms and still were opposed to them. So, I mean, we face a real deep-seated challenge here that goes beyond just this industry.

And so that leads me to my other observation, which is building community engagement and support.

Willie, I think you made an observation about

that, and I want to thank both Austin and J.D. and the teams involved in the forthcoming reports because you are integrating environmental justice and community engagement throughout that work, and that starts to get us towards the public acceptance that will both allow for project success but also create the political space for a more proactive approach, and more accelerated approach to permitting.

And it isn't just environmental justice. We're seeing around the country growing opposition from local government officials, from farmers, from ranchers, across the political spectrum. So it's definitely the work you're going to do in integrating the environmental justice and community environmental perspectives into this work is vital, but it's really kind of stakeholders across the spectrum.

And then I'm going to end on natural gas. I was very excited to see the one slide, J.D., about the focus in your report on gas, because in our office at fossil energy and carbon management we are very, very focused on developing a new approach to natural gas. As a country, we do not have legislation or a regulatory structure in place that is what you would expect from a natural gas exporter, the Natural Gas Act, as it comes from the 1930s, and until about 10

years ago weren't considering exporting natural gas. And so we are now the world's largest natural gas producer and exporter.

We also have very, very ambitious climate commitments, net zero by 2050, and over a 50 percent reduction by 2030. So we have a challenge, and I don't think it's an inherent conflict. I think it's a challenge of reconciling our role of being a natural gas supplier to the world and all the benefits, energy, security, and political freedom and everything else that that entails with our commitment to climate stewardship.

And so across that value chain, from methane mitigation, to carbon capture in natural gas, power generation, industrial combustion of natural gas, liquefaction at the terminals, all these areas where we can, either through electrification or carbon capture, manage emissions, we're working on that. We have the incentives now and the investments in federal policy to support that.

And then I'm especially excited to see the emphasis on life-cycle analysis and basically the whole realm of measurement, monitoring and reporting and verification. We are actively trying to -- we're not trying -- we're actively working with industry and

other governments on how we develop a common global framework that allows the participation of the private sector in certification of the greenhouse gas intensity, of natural gas production, and exports in the form of LNG, while providing that really credible third-party validation and verification of those systems. And we would like that not just to be a system that has credibility in the United States but that governments, investors, companies, all over the world can use that information, and that it's credible.

So that's an area where I think the work you're doing, it's absolutely in parallel with the efforts we're undertaking right now at DOE and in the federal government, and in partnership with others, to develop this broader strategy and framework for natural gas across the supply chain.

So I think if we can accomplish those things, we have great potential to take advantage of, I think, two themes we've heard today, this extraordinary energy endowment that we have in the United States, and our history of technology innovation and commercialization, and our contributions to global energy security, and to reconcile that with climate stewardship.

And so I want to just thank all of you for this great effort and would encourage you to obviously

engage with Ryan and the team, but if there are ways that in my role I can be supportive of these efforts going forward, I look forward to doing that. Thank you very much.

(Applause.)

MR. WOODS: Thank you, Brad. And I would tell you we very much appreciate your pragmatic and reasoned approach to addressing the challenges that we've been discussing today, and I know we'll continue to discuss.

Moving on with the agenda, before addressing the administrative matters on this morning's agenda I have two announcements.

First, our webcast will now conclude. For those in the online audience, we thank you for watching our proceedings this morning and encourage you to download and read the draft report approved today, which will be posted to npc.org following the adjournment of the meeting.

Second, for the members of the media here today, 10 minutes following the meeting’s adjournment, the short-term actions and transition strategies study leaders and I will be available here at the head table to respond to your questions regarding the reports and today’s meeting.

Now, I’ll turn to the administrative matters.

Our first administrative item this morning is the report of the finance committee. Byron Dunn, chair of the finance committee, will present the committee's report.

Byron?

MR. DUNN: Thank you, Mr. Chairman. In addition to reviewing periodically the performance of every year, the finance committee met twice this year to discuss the Council's finances. We met in August virtually and then we met again yesterday face to face.

Our August meeting included the review of the calendar year 2021, the audit report, and the IRS form 990 review with Johnson Lambert and company, which is outside counsel auditors. The auditors provided a clean opinion letter, which is great because it shows that our financial controls are sound and in control.

Yesterday afternoon the finance committee covered a variety of topics, including 2022's year to date projected year-end expenses against the contributions that we expected. The Council anticipates that 2022 spending will be just under what we budgeted, which was $5.3 million, which includes the initial expenses of the hydrogen and the greenhouse gas studies, along with the approved short-term actions and transitions study reports. So we got all that in there

in last year's budget.

Contributions and collections currently anticipate that we'll end up at around 92 percent if nobody in here writes a check. If you owe us a check, we'd appreciate you doing that so we could finish a little stronger, so prompt payment is encouraged.

A number of new members were appointed to the Council in May, and they were poster children because they all responded quickly and paid quickly and responded favorable to that request. So, thank you, new members.

And yesterday we also discussed and agreed upon a proposed 2023 budget, spending authority in the amount of $6,242,000 to provide what we hope -- and I underline that word "hope" -- will be adequate resources to substantially complete the hydrogen and the greenhouse gas studies.

A lot of discussion on that, and we chipped away at it to keep it at that number. But, nevertheless, that's a 17 percent increase over the Council's '22 budget. I think you've said that the National Petroleum Council's efforts are daunting. I'd also say they're expensive. They're both.

But as part of the finance committee's recommendation, the existing membership will ask each

of you for an average of 9 percent increase in the contributions request over that which we provided last year, and it should bring us to a net of $5.4 million in new funds of operations to finance those studies. But 9 percent increase against a 17 percent total increase, you should know that the remaining balance will come from the Council's contingency fund. We have one, thank goodness, and we're going to dip into it to kind of cover this and smooth over the significant increase in the studies cost.

The committee anticipates the complexity of the study efforts discussed today and the need of the Council to provide requisite support of the group. We fully recognize that the real cost of the NPC studies is the people that contribute their time to this process. And because of that, there's a lot of expenses associated with the generous company support of that effort, the Council will continue to be prudent in managing the cost, and we will communicate that to each of those work groups.

And one last thing I want to discuss. Yesterday's universal agreement over the value of the NPC's unique ability to provide credible and actionable advice to the Secretary, and we think that's pretty special.

So subject to your approval, the budget and the contributions, the recommendations, the Council will send the 2023 invoices, or contribution requests, to those who have not made the -- they'll send them out early next year. And for those of you who have not yet ponied up for 2022, you will get a friendly reminder from our chairman.

The Council's mission is to encourage and inform governance, and it's never been more critical than it is today in this transition period.

So, with all that said, Mr. Chairman, this completes my report, and I do move that this report be adopted by the Council.

MR. WOODS: Thank you, Byron. I have a motion to adopt the report of the finance committee. Do I have a second?

MR. PEREZ: (Raises hand.)

MR. WOODS: I have a second. Any discussion we need to have before voting?

(No response.)

MR. WOODS: I would just emphasize the point that Byron made in terms of if you look at the period that we're in today, the importance of the policy being discussed here in the U.S. and all around the world providing these studies and doing the hard work behind

those studies to really make sure that we've got thoughtful recommendations and a good basis for these policies to be established, I can't think of anything more important for our industry. And so while we debated these additional costs that Byron laid out, we felt like now's the time to spend that in order to get this understanding broadly distributed so we've got a good foundation for the policy going forward.

Okay? No other comments or questions? All those in favor of adopting the finance committee report?

(Chorus of ayes.)

MR. WOODS: Any opposed?

(No response.)

MR. WOODS: Very well. So done. The report is adopted. And as Byron noted, the contribution requests will go out shortly after the first of the year for your prompt action, hopefully. And I will be sending out a friendly letter for those who are delinquent in this year.

Okay. Moving onto the next administrative matter is the report of the nominating committee. John Walker chairs the nominating committee and will now present the committee's report.

MR. WALKER: Well, as the last speaker, I'll

be the fastest. At least that's the objective. The nominating committee has agreed on its recommendations for NPC officers, chairs, and members of the agenda and appointment committees to the Council, as well as five at-large members of the NPC co-chair's coordinating committee.

Accordingly, on behalf of the committee, I'm pleased to offer the following nominations: NPC Chair, Darren Woods; NPC vice chair, Alan Armstrong.

For the agenda committee, we recommend the following as members: Deb Caplan, Bob Catell, Joe Gorder, Ray Hunt, Jeff Miller, Gretchen Watkins, Bill Way, Bill White, Mike Wirth, and Dan Yergin. And Ryan Lance will serve as chair of that committee.

For the appointment committee, we recommend the following as members: Kim Greene, David Grzebinski, John Hess, Dave Lawler, Mike Linn, Pierce Norton, Lorenzo Simonelli, Scott Tinker, and myself, with Vicki Hollub as the chair.

In addition, we recommend the following at-large members of the co-chair's coordinating committee: Kevin Book, Rusty Braziel, Willie Chiang, Kim Greene, and Lorenzo Simonelli.

This completes the report of the nominating committee on its behalf. I move the above slate be

elected until the next organizational meeting of the Council. Thank you.

MR. WOODS: Thank you, John. Could we have a motion to adopt the report of the NPC nominating committee? Do I have a second?

MR. PEREZ: (Raises hand.)

MR. WOODS: Second. All those in favor -- or any comments, I should ask first?

(No response.)

MR. WOODS: Any further nominations?

(No response.)

MR. WOODS: Okay. All those in favor, say aye?

(Chorus of ayes.)

MR. WOODS: Any opposed?

(No response.)

MR. WOODS: Thank you for that. The report is adopted, and thank you, John.

All right. Before the final item on the formal agenda, let me ask if any council members have any other matters to raise at this time?

(No response.)

MR. WOODS: Okay. Hearing none, do I have a motion for adjournment?

MR. ARMSTRONG: So moved.

MR. WOODS: Thank you very much. And without objection, the 132nd meeting of the National Petroleum Council is hereby adjourned. Thank you for your attendance.

(Applause.)

(Whereupon, at 11:33 a.m., the meeting was adjourned.)

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