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STATE OF CALIFORNIA

CALIFORNIA ENERGY COMMISSION

In the matter of:

California Offshore Renewable Energy	)	Docket No. 17-MISC-01
	)	
	)	
	)	RE: Notice of Workshop
	)	on AB 525 - Ports and
	)	Workforce Development
	)	to Support Floating
	)	Offshore Wind
	)	Development
	)	Efforts

WORKSHOP ON PORTS AND WORKFORCE DEVELOPMENT FOR OFFSHORE WIND: SUPPORTING OFFSHORE WIND DEVELOPMENT

CALIFORNIA ENERGY COMMISSION

(REMOTE PROCEEDINGS)

TUESDAY, MAY 23, 2023

10:00 A.M.

Reported by:
Elise Hicks

APPEARANCES

COMMISSIONERS

Noemi Gallardo, Commissioner

CEC STAFF

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Paul Deaver, CEC Siting, Transmission, and Environmental Protection Division
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APPEARING

Matt Trowbridge, Marine Structural Engineer and Port Infrastructure Expert, Moffatt & Nichol.
Larry Oetker, Executive Director, Port of Humboldt Bay
Suzanne Plezia, Senior Director and Chief Harbor Engineer, Port of Long Beach
Ben Pogue, Director of Natural Resource Management, Catalyst Environmental Solutions
Brooklyn Fox, Renewables Consultant, Xodus Group
Josh Williams, Principal, BW Research
Scott Lewis, Executive Director, NorCal Carpenters Training
Jeremy Stefek, Workforce and Economic Development Researcher, NREL
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Dan Benson, Bechtel
Nancy Kirshner-Rodriguez, Business Network for Offshore Wind
Jen Kalt, Director, Humboldt Baykeeper
Jerica Nolte, RWE
Adam Stern, Offshore Wind California
Mike Okoniewski, West Coast Pelagic Conservation Group
Dan Chandler, 350 Humboldt
Maia Cheli, Schatz Energy Research Center
Thalia Kruger, Principle Power

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P R O C E E D I N G S

10:00 A.M.

TUESDAY, MAY 23, 2023

MS. MACDONALD: Welcome. We're going to give it a minute for people joining us to enter the webinar.

Good morning. I'm Rachel MacDonald with the Energy Commission's Siting, Transmission, and Environmental Protection Division. Welcome to today's staff workshop, which is focused on ports and workforce development to support floating offshore wind in federal waters off the coast of California.

There will be morning and afternoon sessions. The morning session will cover ports, and the afternoon session will cover workforce development. There'll be time for questions and comments during each session.

Before I begin, we're going to go over a few housekeeping items. First, this meeting is remote access only and is being recorded. The workshop recording will be made available on the Energy Commission's website.

Please note that to make the Energy

Commission's workshops more accessible, Zoom's closed caption has been enabled. Attendees can use the service by clicking on the live transcript icon, and then choosing either "show subtitle" or "view full transcript." The closed captioning service can be stopped by exiting out of the live transcript or selecting the "hide subtitle" icon.

Next slide.

For the morning session, Matt Trowbridge from Moffatt and Nichol will present results from the port readiness plan, and there will be opportunity for questions following his presentation.

Next, Larry Oetker from the Port of Humboldt will talk about current activities and plans for the Port of Humboldt to support offshore wind.

Then Suzanne Plezia from the Port of Long Beach will talk about plans for the Port of Long Beach to invest in and upgrade the port for offshore wind activities, including their Pier Wind project.

There will be opportunity for public comment following the morning presentations as

well.

Next slide, please.

The afternoon session will focus on workforce and economic development. We will have presentations on recent studies conducted on economic and workforce development benefits from offshore wind, as well as panel discussion.

Ben Pogue from Catalyst Environmental will present his team's AB 525 workforce development and economic benefits analysis.

Next, Josh Williams from BW and Brooklyn Fox from Xodus, also working with Moffatt and Nichol, will represent their workforce readiness plan.

There will be opportunity for questions following these presentations. Then we will have panel discussions on workforce development needs for offshore wind. This will include panelists for NorCal Carpenters Training, Crowley, which is the developer for Port of Humboldt, the Humboldt County Workforce Initiatives discussing workforce initiatives and strategies, and NREL discussing training needs and studies, as well as the CADEMO state water offshore wind demonstration project. There'll be a representative discussing that.

Next slide, please.

I'll now pass it to Commissioner Gallardo for comments -- opening remarks. Thank you.

COMMISSIONER GALLARDO: Thank you, Rachel. (Speaking Spanish). Good morning, everyone. It's a pleasure to join you today for this very popular topic of offshore wind. I'm excited to learn more about the potential benefits coming from ports and workforce development.

And I will be here today, but I want to thank the team of staff who put this together and who were so diligent about making sure that we're covering all our bases here, and also to the panelists for joining us. The Energy Commission is really grateful to all of you for the expertise, the insight, and the experience that you'll be sharing with us so that we can do even better on this exciting topic, again, of offshore wind.

So I'll keep my remark short so that we can move on with the wind, and I'll turn it back to staff.

MS. MACDONALD: Thank you, Commissioner Gallardo.

Next slide.

Now, I'll provide a brief overview of AB 525 and our CEC work activities.

Next slide.

Assembly 525 became effective January 1st of 2022, and it set the analytical framework for offshore wind development off the California coast in federal waters.

AB 525 tasks the Energy Commission, in coordination with an array of specified local, state, and federal partners and input from stakeholders and tribal representatives, to develop a strategic plan for offshore wind energy developments.

And in enacting AB 525, the legislature found and declared, among other things, if developed at scale, offshore wind can provide economic and environmental benefits, advance progress towards our renewable and climate goals, diversify our energy profile, realize economic and workforce development benefits, contribute to renewable resource portfolio that can serve electricity needs and improve air quality for disadvantaged communities, and offer career pathways and workforce training opportunities.

Next slide.

In addition to developing the strategic plan, AB 525 requires interim work products or reports to help inform the plan. This includes an offshore wind planning goals report. This report was adopted at the August 10, 2022, CEC business meeting. The report identified aspirational goals of two to five gigawatts by 2030 and a total of 25 gigawatts by 2045.

In February, the CEC adopted the preliminary economic assessment -- economics benefits assessment offshore wind, and at -- most recently, we adopted the offshore wind permitting roadmap at the May 10th CEC business meeting here. And we are currently working on completing the AB 525 strategic plan, which will also include these reports.

With that, I'll hand it over to Paul Deaver to go over the purpose of today's workshop.

Next slide, please.

MR. DEAVER: Thank you, Rachel.

Good morning, everyone. My name's Paul Deaver. I'm with the Siting, Transmission, and Environmental Protection Division on the offshore

wind team.

Before getting into the seaport presentations, I'm going to talk a little bit about the purpose of today's workshop and the AB 525 requirements for either the -- both seaports and workforce development.

Next slide.

The AB 525 offshore wind strategic plan has requirements for port and workforce development. Some of these -- the Energy Commission, in coordination with the relevant state and local agency, shall develop a plan to improve waterfront facilities that can support offshore wind development.

This port improvement plan shall include a detailed assessment of the necessary investments in California seaports to support offshore wind energy activities and an analysis of the workforce development needs of the California offshore wind energy industry, including safety requirements, workforce skill training needs, and the need for a new training curriculums.

The plan will also include recommendations for workforce standards for

offshore wind energy facilities and associated infrastructure, including prevailing wage, skills, and training needs, as well as local and targeted hiring and equity.

In developing the plan, the Energy Commission shall consult with representatives of key labor organizations and apprenticeship programs.

Next slide, please.

Today's workshop will focus on the port and workforce requirements from AB 525. The morning session will present recent and ongoing work regarding port investments and upgrades, including from the Port of Humboldt. This work will and help -- this work will help inform the offshore wind strategic plan.

The afternoon session will include presentations on recent and current work on workforce and economic development from offshore wind. There will also be an afternoon panel for discussion on opportunities, challenges, and near-term strategies to support offshore wind and workforce development.

These presentations, discussions, as well as the input and feedback on ports and workforce

development will help feed into and inform the offshore wind strategic plan.

Next slide, please.

We're now going to move on to some of the morning presentations on seaports. I'm going to hand it over to Matthew Trowbridge from Moffatt and Nichol. He's going to present on their AB 525 offshore port -- offshore wind port readiness plan.

Matt, can you please go ahead and turn on your camera?

MR. TROWBRIDGE: Thanks, Paul. All right. Thanks, Paul for the introduction. And I appreciate the opportunity to speak today.

Next slide.

As Paul mentioned, I'll be presenting an overview of the work that's ongoing for the AB 525 port readiness plan.

Next slide.

So I'll give a brief introduction of Moffatt and Nichol and myself. We'll talk about the background and purpose of the port readiness plan, and then go into detail on the status of that work. And then at the end of this presentation, there'll be an opportunity for

question and answer.

Next slide.

So a little bit about who we are. My name's Matt. I'm a Marine Structural Engineer, a Port Infrastructure Expert, specializing in offshore wind ports. I work for a company called Moffatt and Nichol. We're port infrastructure consultants. Our bread and butter is working in California and U.S. ports.

Since 1945, we've been working in ports. We helped to build up the Navy shipyards in the Port of Long Beach. That was our first project. And ever since then, we've been working up and down the California coast. Pretty much every piece of sand from Mexico to Oregon, along the California coastline, Moffatt and Nichol have been involved in projects all over, working with pretty much every port and harbor in the state, and we work for all maritime business lines. So not just offshore wind, but we -- any type of maritime business within our ports and harbors, Moffatt and Nichol is involved in.

Next slide.

So I'm going to be focusing today -- this presentation is going to be focused on a specific

portion of the AB 525 strategic plan. So as we're aware and some of the background information that was just presented, there's going to be five main sections within the AB 525 strategic plan.

And the focus of today's presentation is on the port infrastructure piece and really the seaport readiness aspect of preparing our ports and harbors to serve the offshore wind industry.

Next slide.

So a little bit of definitions or level setting here at the beginning. I want to be really clear in the presentation -- when we talk about port sites, what do we mean? What do we define as a port site? So starting with the definition of a port, this is a maritime facility that could consist of one or multiple terminals -- terminal sites. And a port could have many terminal sites. So an example of large ports that have lots of terminals and lots of sites would be Port of Los Angeles, Port of Long Beach, Port of Oakland, Port of San Francisco.

Next slide.

What we're talking about today in detail -- when we talk about the number of port sites

that are required, we're talking specifically about a single location within a port -- a single location that's going to be transferring cargo to and from a vessel. And so when we say we need X amount of offshore wind port sites, we're saying we need that many sites within a port. And it's possible that some ports could provide multiple sites to serve the offshore wind industry.

Next slide.

Okay. So the basis for this work, the seaport readiness plan, is based on the targets that were identified by the CEC in August 2022. We're looking, in the State of California, to build two to five gigawatts of floating offshore wind by 2030 and that we have a target to build 25 gigawatts of floating offshore wind by 2045.

And what does this mean? This means that we need to physically build, construct, deploy, and begin to operate approximately 1,300 of those floating turbine systems similar to what's shown on the screen here. This is an example of a small turbine system that's in operation in Europe. We're going to be building larger than what -- this picture, but we need, for scale, about 1,300 of these.

So this is a significant undertaking in the state and requires a lot of capacity of our ports and harbors to be able to build these turbine systems and deploy them for the industry.

Next slide.

A little just background on what it takes to put together one of these floating turbine systems.

We need sites within the state that can help fabricate components, build these large pieces that will support the turbine systems. Those floating foundations, towers, nacelles, and blades will be moved to a port where they can be integrated. So the final -- you know, the final step in the process -- last two steps in the process is number four and number five.

Port sites will receive blades, nacelles, tower sections, floating foundations, and those will be integrated into the turbine systems. All of this will happen -- steps one through four, all of this happens within California ports and harbors, within our sheltered harbors. And the final step, once the turbine system is built, is to move it out to the offshore wind area outside of our harbors.

And so most of the activity that we're doing occurs within sheltered harbors and within our ports. This model of building these floating foundation systems, this is what the industry -- the offshore industry has coalesced around. And this is the projects in Europe that are being built and have been built, floating offshore wind projects. This is the model that they use to build and deploy these systems. And this is really the basis for the work of our seaport readiness plan. Most of the activities will occur inside California ports and harbors.

Next slide.

Okay. So why do we need ports? Why do we need ports for offshore wind? Well, starting with, what are the three most important things we need for offshore wind -- for an offshore wind industry to develop in California? Well, we need a strong wind resource, which we have off the coast. We need an electrical grid that can move the power from where it's generated to our population centers. So the electrical grid and the transmission. And then the third and one of the most important is ports and port terminals.

We need places where we can construct,

operate, and maintain activities for these offshore wind farms. So we need large sheltered harbor areas. We need lots of laydown space adjacent to navigable waterways with heavy lift capacity wharves and heavy yard capacities. We also need deep, navigable water to move the vessels -- the delivery vessels and the final turbine systems in and out of the harbor.

A really important basis for the beginning of this study and the beginning of this work is that there is no existing port terminal on the U.S. West Coast that can currently support and help us build out offshore wind. This means that no matter which port we go to, we're going to require a significant investment and development cost to improve the port to a level that's needed for it to support the offshore wind industry.

Another really important aspect of this work is that there's not one port that can do everything. We need a lot of different ports and harbors within the State of California to work together collaboratively in order to build up the proper network and supply chain to really meet these targets of 25 gigawatts by 2045.

And the final really important aspect and basis for this work is that we're building a brand new marine and maritime industry in the State of California. Offshore wind is a new industry. And it's really important that as we evaluate sites within our ports and harbors to build out these terminals and to support the industry, that we do it in a way that doesn't displace or replace existing maritime users both at the port and out in the water. That's a really important aspect of this work.

Next slide.

Okay. So as we talk about the port readiness plan today, I'm going to be walking through different sections of the report that -- and providing some information on those, starting with number one, what's needed. What does a port need to look like to support the offshore wind industry? Once we know the needs of the industry, we can start to identify how many port sites are required to meet the state's deployment targets. Once we know what the ports need to look like and how many port sites we need --

We did a full evaluation of all the ports and harbors in California to look at how they

could serve this industry. And based on the very best of those sites, we identified what improvements are required to prepare the sites.

And then finally, because we have more than enough port sites within California, there's going to be an evaluation and comparison of those port sites to identify which are the very, very best for development and very, very best to serve the offshore wind industry.

Next slide.

I want touch on the -- there's a lot of work that's been going on to date through a number of different state and federal agencies that's provided a lot of excellent background information and the basis for the work that's been done here in AB 525.

So I wanted to show a handful of studies on this slide, and there's more that I didn't have space to show, but there's more -- all of these are contributing value and providing good basis for the work in AB 525 for the readiness plan.

A handful of these studies and reports are ongoing and will be published in time to be incorporated into AB 525. And one really good

one I want to highlight is that the National Renewable Energy Lab, NREL, is performing a sister study with funding through the DOE that looks at, hey, not just California, but what does it look like to build out the full West Coast offshore wind pipeline? So the 25 gigawatts of offshore wind in California, but also gigawatts in Oregon and Washington. And what does a port network look like between those three states to work together to meet the needs of the industry? So that report is another really good one that has a lot of similarities with what we're doing here for AB 525.

Next slide.

Okay. So let's talk about the port needs for offshore wind use.

Next slide.

What's being presented in these slides is input that came from a BOEM study a year or so ago that had extensive outreach to the offshore wind industry and offshore wind developers, technology providers, and OEMs to identify, what does California need to plan for? What do the ports need to plan for? And when we -- when we're building out our ports, we want to ensure

that we -- when we make these large investments in infrastructure, that we build them to a scale that can accommodate not just the first offshore wind project that's going to happen in a couple years, but can accommodate all the offshore wind projects through 2045 and has enough space, capacity, and size to handle those projects.

And so this BOEM report was visionary in that it wanted to identify, what's the biggest possible turbine system we should be planning for? And this drives all of the design criteria for the ports. It drives the loading requirements, the space requirements. Everything is driven based on the size of the turbine system that is planned for.

And in California, we're planning for turbine systems that are at least 15 megawatts capacity and up to 25 megawatts of capacity. And that means that we're designing for turbine systems that are approximately the size shown on the screen. This is foundation beams or foundation widths of the floating foundation, up to 400 or 425 feet. And we're looking at height off the water, from the water to the tip of the blade, of about 1,100 feet.

Next slide.

All right. There are a lot of different types of port terminals that are needed to -- in this network in California. And I wanted to just briefly go through each type of site because we're going to be talking about them through the rest of the slides.

And so -- and a staging and integration site. This is probably the most critical site that's needed in California in order to support the industry. This is a site -- it's a large site, somewhere between 80 to 100 acres. And it -- it's a site that receives and stages, stores and ultimately integrates the turbine system together. So it receives the foundations, it receives the towers, the nacelles, the blades, and it puts them all together.

Another type of site that's considered in this study is called a manufacturing or fabrication site. And this is a site that receives raw materials. Those materials could come from road, rail, or waterborne transport. And this manufacturing or fabrication site is building larger components in the supply chain. So in the report -- in this study, we're

considering what we call a Tier 1 OEMs. So we're looking at tower sections, nacelles, blades, and floating foundation fabrication. So that's what MF sites consider -- manufacturing and fabrication sites.

Another very critical site for offshore wind is the operations and maintenance sites, or the O and M sites. And the way we define these sites in this study is that these are really the base for day-to-day offshore wind farm operations. So these are the sites that are moving people and equipment to and from the wind farms on a regular basis. They need to be located as close as possible to the wind farms.

And there's a really key distinction here the way we define O and M in this work. When we define operations and maintenance, that site does not include a turbine maintenance site. It does not include an area that you can bring a turbine to perform major maintenance.

If we need to take a turbine out of the wind farm for major maintenance, we're moving it to an S and I site or a staging and integration site, a site that has the heavy lift capacity, the heavy lift cranes, and can physically

accommodate these turbine systems coming out of the ports. That's a really key distinction and a really key definition for this work.

In addition to the O and M sites, there's a handful of other important port sites that are required for offshore wind and that are included in the study. And these include mooring line, anchor, and electrical cable laydown sites, as well as installation support sites that are a base of construction operations for the fleet of vessels that will study and ultimately install these offshore wind farms.

Next slide.

All right. So based on industry feedback, this table summarizes the needs of a port to serve any of these types of sites. And on the left-hand side of the screen, the left two columns, staging and integration and manufacturing sites, these sites have the highest demand on port infrastructure for the industry.

So we need large areas, ideally 80 to 100 acres of space, with anywhere from 800 to 1,500 feet of wharf length, minimum water depth of 38 to 40 feet, and really heavy load requirements. We're looking for at least 6,000 pounds per

square foot. This is -- would be building a new wharf capable of 6,000 pounds per square foot capacity. This -- just for context, this is -- these would be the strongest wharves built on the West Coast.

Most container ports are designed for 1,000 pounds per square foot. So we're talking about six times as strong or six times stronger wharves would need to be built for offshore wind. And that's simply because the types of components -- the size and the weight of these components are just so much larger than any other cargo that's moving through our ports. It just has such a large demand on the capacity of the terminal.

As we start to move to the right in this table, and we look at maybe the center column, that's an O and M site. So these sites are -- based on the industry, they need somewhere between two to 10 acres of space. They would like these sites to be as close as possible to the offshore wind areas. And the load requirements are a lot more typical of what we would find at a traditional port or harbor, somewhere between 100 to 500 pounds per square

foot.

And as we continue to move to the right in the table, the last two columns would be a lot more typical of what we would expect at a traditional port terminal. So we're looking on the order of 10 to 30 acres. We need at least 300 feet of wharf, ideally a little bit more. But the wharf loading in these two scenarios, this is a lot more typical of existing port terminals, 500 to 1,000 pounds per square foot.

So it's very feasible that the -- these types of sites in California, on the furthest right two columns, those could be located at some existing port terminals, without a lot of significant investment or improvements to existing facilities.

Next slide.

All right. A number of other outcomes from some of these previous studies. Ideally, the port sites that we're -- that we have are going to be as close as possible to the offshore wind areas. The industry wants to reduce the transportation risk and the transportation cost to the extent possible. There will be a lot of supply chain items that will probably get co-

located.

So once a manufacturing site gets located in a particular port, there's likely to be a lot of secondary and tertiary investment that's going to happen around that facility to build out the supply chain. So there's going to be a lot of additional investments made in that community.

As previously mentioned, we're planning for turbine systems that are at least 15 megawatts and up to 25 megawatts. From a technology perspective, on the West Coast, it's likely that we're going to be between two different technology types, what we call a semi-submersible floating foundation and also a tension leg platform. Those are the two feasible technologies that are being considered for deployment, and those will be the ones that are built in California ports.

When we build a floating foundation at a port facility, there are a number of different ways or technologies that we could move that foundation from the land into the water. And so our port requirements in this study evaluate different ways to move those into the water. It could be done with a semi-submersible barge or

semi-submersible vessel that takes the foundation off the wharf, and then moves to a sinking basin, sinks, and the foundation system will float off.

Other methods that are being considered include building a ramp system at a wharf or other methods of direct transfer, where you physically lift or move, innovatively, in some cases, the foundation system directly into the water.

The final important piece for California ports, especially the staging and integration ports, is that we need to identify adequate wet storage. This is areas of mooring within a port that you can safely moor floating foundations or integrated turbines there. And the value of doing that is that it really mitigates the risk of weather downtime for the developers -- weather downtime, vessel traffic, other things that might delay the installation of these turbine systems.

So this wet storage is just extra capacity that will help allow the developers to maintain pace with their schedule to build out our commercial scale offshore wind by 2045.

Next slide.

Okay. So now that we know what the port

sites need to look like, let's look at how many port sites we need in California.

Next slide.

So a previous BOEM study that was published earlier this year looked at, okay, based on the California deployment targets of two to five gigawatts by 2030 and 25 gigawatts by 2045, how many port sites are needed? And so the approach to that study was to look at various levels of deployment, starting with a low deployment scenario to a high deployment scenario.

And you can see in this table in the bottom right, the medium deployment scenario that was considered in this study gives you the target deployments from the State of California, so three gigawatts by 2030 and 25 gigawatts by 2045. So that medium target is the state's target. But this study is looking at, hey, if we increased or decreased the deployment target, what would that mean for port infrastructure and port infrastructure investment?

Next slide.

Okay. So based on feedback from the industry, based on production rates of existing

wind terminals on the East Coast of the U.S. and in Europe, and based on everything we heard from developers, OEMs, manufacturers, this report took that input -- took those assumptions of production rates, and then calculated out, okay, based on how many foundations we can produce in 80 acres in a week or in two weeks or in a month, and multiply it out, if we have port sites that come online in a certain year at a certain date, how many sites do we need in California to meet the state's deployment targets? And the result of that is in this table. And we're going to really focus here today on that central column, the medium deployment target.

We are looking at -- to meet the state's goals, at least three staging and integration sites. Each of those sites has to have at least 80 acres of space. We need at least two manufacturing sites for blades, at least one manufacturing site for towers, at least one manufacturing site for nacelles, and at least two manufacturing sites for a foundation assembly.

A key takeaway here, something important to note, is that the manufacturing sites are really important for maximizing job creation and

economic impact to the state. It's possible that you don't have to build those manufacturing sites in California. It's possible that you -- that we could import those components from other places, but that would be missing a huge opportunity for the state to really maximize job creation economic impact. And so this report presents that opportunity showing with this level of investment in the ports to include manufacturing sites, that's going to really allow you to unlock all of -- you know, all these additional benefits of offshore wind.

In this table -- I just want to show a couple of last rows here. So for O and M, the report is estimating that we need, for 25 gigawatts, somewhere on the order of nine to 16 distinct O and M facilities or O and M berths for SOV vessels. And then we need something on the order of 20 to 40 acres of laydown space for mooring line and anchor storage, and somewhere on the order of 12 to 22 acres for electrical cable laydown sites.

And so when we add all this up, what it means is we're looking for approximately 10 large port sites and approximately 10 small port or

small harbor sites within California to help meet our goals.

Next slide.

Okay. So now we go and look for the sites. Where are these sites in California?

Next slide.

And we have two options when we're looking for port sites. We can -- we've got an extensive and a really phenomenal network of ports and harbors within the State of California. So we -- the first option is saying, hey, let's find space inside our ports and harbors. And if we need to upgrade a site, let's upgrade it. But let's look for that space, and then let's use that space. So that's option one is looking inside our ports and harbors.

And option two is saying, okay, well, what if we don't have enough space in our ports and harbors? Is there other locations in the state that we could build a new port or a new port terminal that's closer to the offshore wind areas? And this is really focused on the Central Coast.

It was really important to the state, as we embarked on this study, that we evaluate both

options in good detail, because we didn't want to leave any stone unturned. We want to identify the very best options for the state as we're proceeding down this path.

Next slide.

All right. So let's talk about our existing ports.

In this study, we're looking at 11 deep water ports and four industrial port areas. And when we say "industrial port areas," these are areas along a navigable waterway that are historically industrial zoned areas that basically function as ports. So there's about 15 existing sites that were evaluated in this study for, we'll call, like large scale ports.

Next slide.

And we evaluated a lot of small craft harbors or smaller marine facilities that we'll consider on the size of a harbor, starting with Crescent City Harbor District in the North Coast and quite a few in the Central Coast, because our major ports in the state are not as close to the Morro Bay Wind Energy Area. So we looked at a lot of small craft harbors in and around the Central Coast. You can see all of them on the

right-hand side of the screen.

Next slide.

Okay. So this option two that I was just talking about, can we build a port site outside of an existing port and harbor? Is there a new port site that needs to be built?

So there was a study that was completed through the California State Lands Commission that looked at identifying alternative port sites, again, outside existing ports and as close as possible to the Morro Bay Lease Area in Central California. And really the focus of this effort was to identify, is there any space for a staging and integration? You know, the other types of uses were excluded from the study. The manufacturing can be done elsewhere. But it was really looking at, hey, can we find a closer staging and integration site to Central California? And the study area -- the focus here is from San Francisco down to Long Beach.

Next slide.

In this alternative port site screening study, there was a number of criteria that was used to screen down the coast or to eliminate areas -- take them off the table from the

beginning. And so in this -- you know, it's a big study area, from San Francisco to Long Beach.

And so this study excluded any area within that that is residential or urban, is a marine protected area, has a state park, a national forest, a military base, or an area that has an airspace restriction, like an airport.

This study also excluded the existing California islands from development. So Catalina, San Nicolas, San Clemente, et cetera. And also excluded, you know, the idea of, hey, can we build an offshore wind port on top of an existing oil and gas platform? That idea doesn't really work for the type of infrastructure that's needed for offshore wind, so that was also excluded.

In this alternative port study, the existing and proposed national marine sanctuaries were considered, as well as engineering feasibility and permanent environmental impacts to developing a new port facility within the study area.

Next slide.

Okay. So, as part of this study, approximately 77-percent of the coastline was

immediately screened out because of those -- what we'll call non-developable areas.

Next slide.

And the study did consider the potential to develop within national marine sanctuaries. Most of this coastline is in either an existing or a proposed national marine sanctuary. And so in order to complete the study, it was considered, hey, let's assume that we could develop within one of these areas.

Next slide.

And based on that -- based on that and after we screened down most of the coast, there was approximately 11 sites that were identified -- that were evaluated. And from that evaluation, three of those sites moved forward to be compared to existing port sites in the AB 525 work. And so Port San Luis, China Harbor, and Gato Canyon were three sites that were identified, that were then compared with our larger ports and harbors within the state.

Next slide.

Okay. So the outcome of a lot of these background studies for AB 525 was that we identified this short list of port sites to be

evaluated in more detail in AB 525. And so the locations of the ports and the types of uses that were being -- that are being considered in AB 525 are summarized on this screen. And these sites, every single one of these, there was an infrastructure assessment to evaluate what infrastructure improvements are needed to meet this type of site use, and what's the cost, and what's the schedule to prepare the site for use.

Next slide.

So that is the next step here in the readiness plan is to determine those port improvements.

Next slide.

And so for each of those sites, identifying infrastructure improvements. This is summarizing a bunch of different potential types of site improvements. Not every site required these. Some sites only required a couple. Some required many. But I just wanted to give a summary of the types of improvements that are needed at some of our port sites to prepare them for the industry.

So at sites, we need to demo, in some cases, existing infrastructure. In some cases,

we need to remediate site contaminants. We need to construct new wharves or new berths. In some cases, complete geotechnical ground improvements to stabilize the soil or stabilize the slope. Some sites require dredging or deepening of the berth pocket, and some sites require deepening or widening of the federal navigation channel or the entrance channel. Many sites require increasing the elevation for sea level rise and to provide a working surface for the terminal. And then, standard in port development, we have miscellaneous site civil improvements, electrical improvements, and the construction of different types of buildings. And then finally, when we're building port infrastructure, we always need to plan to mitigate any environmental impacts that are a result of our development.

Next slide.

Okay. So after we identified the improvements to each site, then we started to evaluate and compare those sites.

Next slide.

And there's a really detailed treatment in the report on towing and navigation of fully integrated turbine systems. And I want to thank

one of our project partners on this report. Mott MacDonald did an excellent job, and there's a lot of detailed information -- we're not going to go through it today, but it'll be published in the report -- that shows a couple of key takeaways for the towing aspect.

Could you actually go to the next slide, please?

So I just want to touch on the towing piece. The very best sites for staging and integration that were identified in the state are in Northern California and in Southern California. And one of the key takeaways from the towing assessment is, hey, Port of Humboldt can provide turbine systems to any of the lease areas in the state, North Coast or Central Coast. No problem. Southern California and Central California ports can also provide turbine systems to anywhere in the state, Central Coast, North Coast.

The towing assessment shows some of the limitations, the drawbacks, the durations, the risks, but it is feasible that any of these staging and integration ports can provide foundation systems anywhere else in the state.

That was a really important takeaway.

And, sorry, can we go back one slide?

The report -- the seaport readiness plan also goes into good detail on environmental considerations for each of the sites. Is there any impacts to development? What are the challenges from an environmental perspective? What are the types of things that the ports are going to have to consider as they begin to plan these projects and go through the environmental process? And then there's a detailed cost and schedule prepared for each port on -- with these types of improvements. This is a level of investment required to prepare this site to support the industry.

Next slide.

Okay. So the staging and integration sites. These are the most important sites for the state to meet our targets. And without these sites being invested in and being built, we do not have an industry, we do not have offshore wind. And so it's really critical that these sites are prioritized for development. And we're fortunate to have representatives from both of these ports, the Port of Humboldt and Port of

Long Beach, here to talk in a short while in this workshop. Both of those ports have announced ambitious projects that really are going to serve to kick-start the industry and prepare for this offshore wind build out.

Next slide.

When we look at manufacturing sites within the State of California, there's a lot of great sites throughout the state. Port of Humboldt has a good space for manufacturing. There's a number of Bay Area ports that are very well positioned to provide and serve as manufacturing sites. And Southern California also has opportunities for manufacturing space. These are really important to be -- if the state wants to create significant job creation and economic impact is funding and developing these manufacturing sites as well.

Next slide.

And finally, there's a number of great ports and harbors within California that could serve as O and M bases and are in close proximity to these wind energy areas, and these are summarized here on this slide.

Next slide.

Okay. So in summary, we need about 10 large port sites with at least 80 acres within the state, and we need 10 smaller port or harbor sites, anywhere from two to 10 acres. And that will allow us to meet these California targets of 25 gigawatts by 2045. By investing in the manufacturing sites, that will maximize job creation and economic impact.

And finally, our California ports and harbors are ready to support this industry with adequate and timely investments in their infrastructure.

Next slide.

We'll be publishing this report with a lot more detail very soon.

And then we can open it up for questions and answer.

MR. DEAVER: Thank you, Matt, for the presentation on the port readiness plan.

Well, we're now going to open it up for questions and answers. I would like to hand it over to Hilarie Anderson to help with the Q and A.

MS. ANDERSON: Great. Thanks, everyone.

I am going to be helping to facilitate

the Q and A. So for those of you that are logged in on your computer, we're going to use the raised hand feature to indicate that you have a question. And this is going to be focused on the presentation that you just heard. We will have a public comment section a little bit later on in the morning session and in the afternoon for general comments.

So, again, we're going to use the -- in Zoom, we're going to use the raise hand icon, which is at the bottom of your screen. It looks like an open palm. Please press that if you have a question. If you are dialed in on the phone, that is going to be "star nine" to raise your hand, and then "star six" to unmute.

So once I call your name, I'll open your line. And make sure to unmute on your end, state your name, any affiliation, if you have any, and then ask your question. And just a reminder, for general comments, we will please hold that until our public comment period. We have two in this workshop today.

So starting off, I see Dan Benson.

Dan, you should be able to unmute on your end. Please state your name, affiliation, if

any, and state your question.

MR. BENSON: Yeah, sure. Thank you very much.

Great presentation, Matt.

So it's Dan Benson from Bechtel. I'm responsible for our offshore winds business globally. I was just wondering, what assumptions did you make with regard to the foundation sizes for the manufacturing facilities, with regard to how much space that you made available for laydown areas? If you could go into a little bit more detail there, that would be fantastic. Thank you.

MR. TROWBRIDGE: Yeah, Dan. That's a great question. Maybe we can go back to one of the slides in the presentation. Let me see. I think it's my 13th slide.

MS. ANDERSON: I'll just keep backing up, and you tell me when to stop, okay, Matt?

MR. TROWBRIDGE: Yeah. Keep going.

MS. ANDERSON: Great. Thank you guys for your patience as we go through this. It forces me to go a little slower on here.

MR. TROWBRIDGE: That one. Okay.

MS. ANDERSON: This one?

MR. TROWBRIDGE: That one. Perfect. Yeah.

MS. ANDERSON: Okay. Great.

MR. TROWBRIDGE: Okay. So, Dan, thanks for the question. I'm just going to repeat the question. The question is related to, hey, what were the assumptions that were used when we were sizing the port sites for foundation manufacturing purposes?

And this slide summarizes the maximum foundation size that was assumed. And based on the feedback from the industry, you know, there's -- I -- the last number I heard this morning, I heard from someone that, hey, there's 140 different types -- technology types for the floating foundations, right? So that's a lot of different technology types to keep track of. The goal of this study is to bound or to envelope the analysis. We want to make sure that we capture the worst case so that our ports are ready for all the different variations of technology that might happen in between.

When we started to get up to a size of 80 acres, that started to get to a size of site that a lot of developers and OEMs gave really positive

feedback, that it's large enough to where they can -- they have enough space to build enough production lines of these floating foundation systems to be able to hit their deployment targets and their production targets.

And so there's not one specific technology or one specific design that was used. It was more of, in general, Dan, can we make sure that we have enough space and design the terminals in a way that gives the industry enough flexibility to do what they need to do?

MR. BENSON: Yeah. Okay. So great approach, similar to what we've done on other port studies. So thank you for confirming that. Just what -- just final question, if I may. What did you use as the turbine size that you talked about? Are you at 15 megawatts or are you above that for the integration?

MR. TROWBRIDGE: That's a great question, Dan. And so the question is related to, what's the turbine size that was considered? And so in that initial BOEM study, in addition to the industry outreach and talking to the OEMs, there was also a lot of discussion with NREL, who's been looking at, you know, technology and the

market and where these offshore wind turbine systems are headed.

And so there was agreement -- general consensus in that study that, hey, we're somewhere in the range of 15 to 25 megawatts of a turbine system, and as long as we -- our ports can handle turbine systems up to the size shown on the screen, as well as can give them at least 6,000 pounds per square foot on the wharf and at least two to 3,000 pounds per square foot in the uplands, that would give enough flexibility for where the industry can see from today, you know. And so we can accommodate, hey, not just the first project, but projects all the way to 2045.

MR. BENSON: Great. Thanks for your answer.

MS. ANDERSON: Okay. Thank you so much. We're going to move on to our next hand that I see raised. And, again, let's -- we're going to use our raise hand function at the bottom of the screen, or if you're calling on the phone, that is "star nine" to raise your hand, "Star six" to unmute. So we have --

Nancy, I'm going to unmute your line. You can unmute on your end. Please state your

name and any affiliation, if any, and then ask your question.

MS. KIRSHNER-RODRIGUEZ: Great. Thank you.

Good morning. Nancy Kirshner-Rodriguez with the Business Network for Offshore Wind. Thank you for this great presentation. My question is, in the final report, are you going to also address what we all know are the gargantuan cost to do all of this work? I know that the ports that have already put out their own proposals have numbers in there, but, as you know -- and all of us that are working extensively on ports and vessels and ports and logistics like the Business Network, we've come up with these huge cost estimates, which are definitely going to require, as you discussed, state and federal investment in order to get us to the place we need to get to.

MR. TROWBRIDGE: Yeah, (indiscernible) make sure I didn't interrupt you there. But yeah, we -- that's a great question, Nancy. We -- can you just summarize one more time? Like, there was a lot in there. One more.

MS. KIRSHNER-RODRIGUEZ: My basic

question is, are you going to do any cost estimates?

MR. TROWBRIDGE: Yeah.

MS. KIRSHNER-RODRIGUEZ: Okay. (Indiscernible) a simple question.

MR. TROWBRIDGE: Yeah, so the report has detailed cost estimates for every report site in there that'll be published. And I think the important thing to look at and how it's going to be framed is, look, this is a big investment in ports and harbors. This is a big number to crack for every single port. And, you know, commercially the way that ports do business, the numbers don't add up.

So it requires, as you said, significant state and federal funding. And that's really how the ports -- offshore wind ports in the East Coast got developed or in -- under -- or in development is significant state and federal money to help make the projects go. The other thing that's important to highlight as we present these numbers is, hey, when we look at the investment in the ports -- this is a big number in the ports. But when we compare it to the full pie, when we look at the total cost to build --

you know, we're talking about building power plants, right? We're building major power plants, major generation facilities. When we look at the cost of the port investment in that bigger pie, it's not that big a number relative to all the rest of the investment that has to happen to build out these offshore wind farms. And so we also are presenting this in the context of the greater picture.

And so -- yeah, Nancy, great comment, great question. I think we're fully aligned on the challenges, and we're going to be presenting enough information to -- so that the decision makers can look at those numbers and adequately begin to plan for these projects.

MS. KIRSHNER-RODRIGUEZ: Thank you.

MS. ANDERSON: Thank you, Nancy.

And we're going to move on to our next hand that's raised that I see in that -- Jen Kalt.

So if you could please -- as I allow you -- open up your line, please unmute yourself, state your name, any affiliation, and ask your question.

MS. KALT: All right. Thank you. My

name's Jennifer Kalt. I'm the Director of Humboldt Baykeeper. And my question is whether the report includes recommendations for the permitting roadmap as far as how site remediation will be coordinated and funded to ensure timely cleanups without shortcuts that could impact water quality and habitat and other port users, and if you can describe that, if so. Thank you.

MR. TROWBRIDGE: That is a great question. This report focused on the readiness of the ports. So it's not addressing that specifically.

MS. KALT: Okay. Thank you.

MS. ANDERSON: Okay. Thank you so much.

So the next hand that we have raised is Jerica Nolte. Hopefully, I pronounced that correctly.

Your line is unmuted. Please state your name, any affiliation, and ask your question.

MS. NOLTE: Hi. Yes. Thank you for your presentation. Yes. I'm Jerica Nolte. I'm with RWE. My question was in regards to when you started looking at different manufacturing locations. Were you assigning them for the type of manufacturing? You know, were you looking at,

okay, this site might be a little bit smaller, so it might be better for anchors, chains, or cables, or this site is bigger, it could do, you know, some of the bigger components? Did you go into that level of detail?

MR. TROWBRIDGE: Jerica, that's a great question. So for the manufacturing sites that we are presenting in the report, we're going to be providing, you know, the area that's available on those ports. So some ports may not have that much space available, some may have a lot more space available. But what we're trying not to do is we're trying not to say, hey, this site can only be used for this, this site can only be used for that.

So we're keeping it relatively open. When we say we have a manufacturing site, that site could serve any of those types of manufacturing. And, you know, it's up to those ports themselves and the industry to help decide, hey, you know, this is the type of manufacturing that really makes sense here or there, and this is where the investment needs to be.

MS. NOLTE: Okay. Thank you.

MS. ANDERSON: All right. Thank you so

much. And I see another hand raised, so we're going to go to Adam Stern.

Adam, your line should be open. State your name, any affiliation, and ask your question.

MR. STERN: Thank you. Adam Stern with Offshore Wind California. A question for Matt.

How much did you look at the timetable for developing these ports and sort of mapping out scenarios in which each of the three categories would be needed? Did you look at how far you -- the state could get if it did certain things in various scenarios?

MR. TROWBRIDGE: Yeah, Adam. It's a good question. So the report looks at development timelines for each port. So it says, okay, if we assume that this port has a project that's a go by a certain date, that means that the port is moving forward on the project, the project receives funding and starts going through the environmental approvals process, at what date can we anticipate roughly, approximately that that site will be ready for industry use?

And so it addresses it from that perspective. But it doesn't do a bunch of what

ifs of, hey, if we don't get investment, you know, by this date, what happens if we only invest in this -- you know, if we only partially fund the ports, you know, what is the impact?

I mean, the basic takeaway is, hey, we've got to invest, at least to this level, to hit the deployment targets. And we're probably -- you know, we're probably going to be pretty challenged, you know, to meet the 2030 targets, but the 2045 targets are very, very feasible if we start moving now, you know, if we continue the momentum that's been going, right, and start to invest in these sites and get them ready.

So we're close to the 2030 target, and we're in a great place for 2045, assuming that we continue to move forward on a very, you know -- I won't say urgent, but, you know, focused pace.

MR. STERN: Thank you.

MS. ANDERSON: Thanks so much, Adam. Okay. We are going to move to our next hand that is raised for this question and answer period. And I have Mike.

Mike, your line should be open. Please state your name, affiliation, if any, and ask your question.

MR. OKONIEWSKI: I'm Mike Okoniewski, West Coast Pelagic Conservation Group. I'm curious, having run operations in the fishing industry most of my life -- you know, we get suppliers that will give us deals for long-term arrangements. And when you start to talk about manufacturing, it's -- and one lady pretty well encapsulated what it means is usually heavier duty cost for development of the manufacturing site, the new machinery, finding a workforce and that kind of thing.

But has there been any attempt to -- or have the developers had any feedback as to the present supply chain they're using for manufacturing and what those costs are based -- and then comparative to what the cost of doing it at the port might be?

MR. TROWBRIDGE: Mike, is it okay if I ask a clarifying question just to make sure I understand your question?

MR. OKONIEWSKI: Sure.

MR. TROWBRIDGE: As I understand it, the question is, hey, what's the cost difference of manufacturing components in California versus manufacturing them overseas or outside the State

of California? Is that the question?

MR. OKONIEWSKI: Well, that's part of it. The other thing is, we've -- I know we've frequently formed relationships with suppliers that gave us long-term deals.

MR. TROWBRIDGE: Yes.

MR. OKONIEWSKI: And would that upset any of your developers', I guess, plan to do business?

MR. TROWBRIDGE: Okay. Let me -- yeah, let me see, Mike, if I can address both of those. So related to the inside versus outside California manufacturing question, we're not going to be addressing that in detail in this report, but that -- there's another report that I mentioned that's being produced by the National Renewable Energy Lab, NREL. That report does do a treatment on the -- you know, does have some treatment on manufacturing domestically versus overseas and what impact that might have and looks at some pros and cons. So that report touches on that.

And then related to long-term deals, as I understand the question, you know, as the supply chain builds up or as the project pipeline builds

up -- so right now, California, we have 4.6 gigawatts of offshore wind lease areas. As we move and continue to auction off offshore wind areas and build that pipeline to 25 gigawatts, once there's enough committed pipeline with -- you know, projects with people signed up and contracts in place, manufacturers are going to look at making investments, right, making investments in the state because they have enough book of business to locate a factory or a facility within the state. And that's the type of investments that you're seeing start to happen on the U.S. East Coast, that there's enough project pipeline of offshore wind projects that it makes sense financially, economically, and also as part of some of the policies for these projects and part of the power purchase process to locate some manufacturing within those states.

And so I -- to the respect that I understand the question, you know, that comes from long-term relationships between developers and manufacturers and working together as they develop that project.

MR. OKONIEWSKI: Thank you.

MS. ANDERSON: Okay. Thank you so much,

Mike, for your question.

I see no other raised hands. So this is going to be our last call for any questions for Matt's presentation. I have -- I see Commissioner Gallardo, and then I also have 350 Humboldt. So we'll go to Commissioner first.

And then 350 Humboldt, you'll be next.

Commissioner Gallardo, go ahead and ask your question.

COMMISSIONER GALLARDO: Hi, Matt. Thank you so much for that wonderful presentation. I'm the newest commissioner at the Energy Commission, and I oversee siting and the division that handle this workshop, but not -- I don't handle offshore wind. So it's really good to learn. So this may be a very basic question, but I just want to -- you did a good job presenting and explaining. I just want to make sure I have it clear.

You made a point towards the beginning that there are no existing port terminals on the West Coast that can support offshore wind. And so by that, did you mean -- so I was thinking about two things. One, there is no port right now that can support all the things that offshore wind would require. And there is no port that's

ready as is to handle any of the various pieces and phases that you described. Is that correct? I just want to make sure I fully understood.

MR. TROWBRIDGE: Yeah. Commissioner, that's a great question. And thanks for the opportunity for that clarification. Yeah, we're talking about no port or harbor has the infrastructure today that is needed to support the industry. And regardless of which port we work in, there's going to be an investment needed in that port to build the type of infrastructure that's required to support the industry. And so that's really the purpose of that statement.

COMMISSIONER GALLARDO: Got it. And we will need then a multi-port strategy. It can't just be one that handles everything.

MR. TROWBRIDGE: Yeah, and it's absolutely critical. And we looked at the number of port sites here, 10 large port sites and 10 small port sites, and the -- you know, the location of those and the quantity of those.

That means, you know, that to meet our goals, we're going to have a lot of different ports and harbors involved and working together in this network. And we can't do it alone with

just one. We need every one together. And so there's been a great collaboration among California ports and harbors to date starting to prepare and work together on getting ready. So, yes.

COMMISSIONER GALLARDO: Excellent. And then final question. I think this is a quick one as well. It caught my attention, the manufacturing and fabrication sites that would be needed. And I was just curious, given how extensive those would be, if those sites -- like once the manufacturing and fabrication is complete, can those sites have another purpose, or do they -- you know, do they remain manufacturing and fabrication sites, and those -- and that will -- it will be required for us to do more and more of that? It's not just a one-time type of exercise?

MR. TROWBRIDGE: Yeah. That's a great question. So when a manufacturing facility investment is made, that investment is going to try to maximize the benefit for as long as possible.

And so in California, if someone is investing in -- let's just say it's a blade

factory, and we put a -- we build a blade factory somewhere. That blade factory is going to -- now has its flag in the ground. It's going to be in a very strong position to supply every single blade to every single offshore wind project in California and also be in a position that when Oregon comes online, when Washington comes online, when Hawaii comes online, that when people are procuring their blades, they may be procuring them from that factory. And so it's -- there's a larger supply chain than just California.

And then it's also possible that, you know, as we go, right -- when we build out these turbine systems, over a number of years, that turbine system is going to be replaced. There's going to be a new turbine system more efficiently put in its place. That means they're going to need -- we're going to need three more blades for that turbine system.

So there's an opportunity for a manufacturing facility to have a really long life serving this full West Coast supply chain, as well as repair and maintenance and replacement of turbine systems as they come offline from the

original construction.

COMMISSIONER GALLARDO: Excellent. All right. Well, thank you. I appreciate that, Matt.

MR. TROWBRIDGE: Thank you.

MS. ANDERSON: And thank you for that. We will -- okay. I see two more hands. So we're going to start off with 350 Humboldt.

Your line should be open. Please unmute yourself. State your name and your question.

MR. CHANDLER: Hi. My name is Dan Chandler. I'm with 350 Humboldt. And I know that in L.A. and Long Beach, they're planning on zero-emission ports. Different kind of port, of course. But I wondered if you included in your criteria for looking at port sites and port requirements achieving zero emission.

MR. TROWBRIDGE: Dan, that's a great question, something I should have mentioned but didn't. You know, the fundamental base assumption for these offshore wind ports is green and clean. And so that means that when we look at developing these, one of the fundamental design criteria for these facilities is, you know, as little to zero emissions as possible.

That means that all the equipment on the site needs to be electrified, right? So we're talking about electric vehicles, electric equipment, SPMTs are electrified. We're talking about cranes that are electrified. We're talking about vessels that when they come to the port, they plug in so that they're not polluting when they're at berth, right. And so these types of thing -- this is the baseline assumption or design criteria for an offshore wind port.

MR. CHANDLER: Great. Thank you very much.

MS. ANDERSON: Thank you. And we are going to go to -- please forgive me if I misstate your name. Maia Cheli.

Please go ahead. State your name, any affiliation, and ask your question. You should be able to unmute yourself. There you go.

MS. CHELI: Okay. Thank you so much. Can you hear me okay?

MS. ANDERSON: Yes, we can hear great.

MS. CHELI: So this is Maia Cheli. I'm with the Schatz Energy Research Center up here at Cal Poly Humboldt.

Thank you for a fantastic presentation.

It was super informative. I missed the first couple of minutes, so I apologize if you prefaced this.

I'm particularly interested in how the ports analysis maps against current tribal activities and anticipated and shared tribal activities and lands. And I'm wondering if that overlay is going to be available as part of the final report so that we can make sure that that aspect of the conversation is something that's visible to all partners, especially people who may be only dropping in, you know, for pieces of it, and so that we can be planning around those opportunities and desires going forward. Does that make sense?

MR. TROWBRIDGE: Yeah, that makes sense. So I appreciate the question. I'm not going to be able to speak to it, though, as the tribal activity overlay or coordination was not included within the scope of the seaport readiness plan that we were working on. Maybe someone else -- maybe someone else can address that question, or there may be another session where that question (indiscernible) made.

MS. CHELI: Yeah. So then just hearing

silence, I'll -- I guess I'll just reiterate that I know that we're thinking about, you know, the projects in at least three regards, so -- meaning the transmission aspect, the offshore wind aspect, and the ports aspect. And we're obviously going to have a lot of different players and nations engaging. And I think it would help to have that -- those map of participants be consistent throughout the reports so that we're not having to catch each group up separately each time and that we begin to develop a shared narrative. So I guess that's a request and a -- just, again, thank you. This was really helpful.

MR. TROWBRIDGE: Thank you.

MS. ANDERSON: Okay. Thank you so much. That is going to conclude our question and answer time.

Thank you so much, Matt, for your presentation and for answering all those questions.

I'm going to pass this back to Paul Deaver.

There you go. Thank you, Paul.

MR. DEAVER: Thanks, Hilarie.

So we're going to go on a 10-minute break. We are at 11:15, so I guess 11:25. There are still -- well, we have two more port presentations this morning, but we'll all reconvene back at 11:25. So I hope to see all of you back then. Thank you.

(Proceedings recessed briefly.)

MR. DEAVER: All right. Welcome back, everyone. So we have two more presentations this morning. Our next presenter is Larry Oetker from the Port of Humboldt. He's going to discuss current and ongoing activities at the port that are related to supporting offshore wind. And I'm going to hand it over to Larry now.

Larry, can you please turn on your camera? Great. Take it away, Larry.

MR. OETKER: Okay. Well, thank you very much. My name is Larry Oetker, and I'm the Executive Director of the Port of Humboldt Bay.

And so can you go to the next slide, please?

I wanted to just sort of start out by putting it into -- a little bit into context, this. This is the south jetty of Humboldt Bay. And the -- so the entrance is about a half-mile

wide. And these are the longest jetties on the West Coast of California. And the Army Corps of Engineers maintains the federal navigation channels and these jetties. And they were -- they just completed a $22 million jetty reconstruction project. The Coast Guard just upgraded the age to navigation. Humboldt Bay has one of the -- I believe it's five harbor safety committees in the facility. And so we're the second largest natural bay in the State of California. And so just to kind of put this into context a little bit.

Can you go to the next slide?

And so within this, what California's overall sort of plan -- and I'm not going to go over this, but I wanted to just sort of put this into context because Matt, in one of the questions, brought this up, is that if you look at the port infrastructure in relation to all of the transmission, all of the other power generation, everything else that's going to happen between now and 2045 in the state, you know, port infrastructure is one of those investments that the state is going to have to do in order to achieve its carbon-free energy

upgrades in order to meet the goals.

Go ahead.

And so when you look at California's offshore wind resources and you look at the proximity to Humboldt Bay, you can really see the areas in red are really surrounding Humboldt Bay. And Humboldt Bay is strategically positioned to handle offshore wind and to meet California's goals. And so when you look at these wind resources, and then you look and see where things are going to be developed over time, this is one of the reasons why Humboldt Bay is important.

Go ahead.

And so, as everybody knows, (indiscernible) five offshore wind leases of Humboldt Bay and Morro Bay were awarded, and the chair of the California Energy Commission had said a couple of weeks ago in Sacramento that California is really in the implementation phase of offshore wind at this point.

And this really highlights this point. We're not just talking about it. We're looking at exactly what needs to happen in order to meet the state's goals in an implementation phase perspective. And so the California Energy

Commission and the Governor's Office awarded the port ten and a half million dollars to really jumpstart offshore wind. And we really had these overarching goals that we had laid out.

Go ahead.

And so when you look at the State of California, and you look at -- what we consider as phase one is Humboldt and Morro Bay, and then where these future phases are going to come from, and about two-thirds of all of the power for the State of California for their offshore wind goals is going to come from within 120 miles of the Port of Humboldt Bay.

And this just really sets the stage where not just the Humboldt and the Morro Bay call areas, but also the future Cape Mendocino, Del Norte, Brookings, Coos Bay, these other call areas and lease areas that are going to be happening in the next few years.

Go ahead.

And so when we look at the size of these things, they're just -- they're huge, and they can only be done in certain locations. You know, you can see -- I'm sure you've seen this slide many, many times, but we're essentially targeting

the 15 to 20 megawatt offshore wind towers that are going to be happening in Humboldt and off the West Coast.

Go ahead.

And so you can kind of see the difference between the onshore and the offshore. And one of the important things to put into perspective about the offshore is we're not limited by the transportation system. The bridges, the roads, the highways, the rail lines, all of these things really limit the size of onshore capacities. And when you focus on what can happen on port, then the sizes dramatically increase.

Go ahead.

And so when you look at the -- California's collection of ports, and all of the deep water ports are -- and the members of CAPA, which are the California Association of Port Authorities, these are really the ports, the deep water ports, the ones where the shipping goes in. Not the smaller harbors. These are the ports. And this is where the brunt of most of these facilities are going to happen.

So we've been working, Humboldt Bay and the other ports, through CAPA. We have an

offshore wind subcommittee, and we've been collectively meeting and preparing for this for some time now.

Go ahead.

And so, as Matt mentioned, there's these port assessments that are coming out in these three areas, staging and integration, component manufacturing, and operation and maintenance.

Go ahead.

And so with the component manufacturing -- Matt went over this in great detail, but I'm not going to go over it too much, but -- other than to say these component manufacturings (sic.) are really a critical piece, and they're going to need port facilities to load them onto the ships and to take them to the staging and integration area, because these final products are not going to be able to be shipped by truck or by rail. They're just too big and too heavy. So they can only be done through port facilities.

Go ahead.

And the staging and integration is the most difficult to do. And this is the one that needs to get started the fastest.

Go ahead.

And the operation and maintenance facilities, those will come in after the deployment takes place. And one of the key things with the operation and maintenance that we should really take into consideration is that once these are deployed, because these are floating, when they need to have large repairs, they'll be able to untether those and tow those back to port if they need to replace a nacelle or blades. If the ports -- O and M ports are close enough, they could return those back to port and do those repairs in port.

Go ahead.

And so, again, when you look at these collection of California's ports, you'll see the Port of Humboldt Bay is the only one in the state that can do all three, operation and maintenance, the staging and integration, and the manufacturing. And then L.A. and Long Beach are the only other ports that can do the staging and integration.

Go ahead.

And so when we look at growing this offshore wind cluster, and we really look at where are all these different pieces going to

come from, and how are they going to be set into play, and how is this actually going to happen in the real world?

Go ahead.

And we really look at, like, these metal bending factories. When you make these towers and these corner pieces on the foundations and all of these things, what is it going to take to actually do these manufacturing pieces?

Go ahead.

And the blades.

Go ahead.

Nacelles, 15 megawatt, the size of these things. Where are they going to be made? And we want them to be made in California.

Go ahead.

The anchor facilities.

Go ahead.

And the undersea power cables, miles and miles and miles of these undersea power cables, where are all those going to be manufactured? Where are they going to be staged? And then (indiscernible) they going to be deployed to these final assembly areas?

Go ahead.

And so when you look at California's goals, if you just assumed we had a 15 megawatt turbine, that would be about 1,600 of these turbines, with the floaters, 5,000 blades, a million feet of towers, 15 million feet of mooring lines, 6,000 plus anchors, and miles and miles and miles of transmission cables. We're talking about full production. These manufacturing facilities will stay busy all the way through 2045 and beyond.

Go ahead.

And so, again, when you look at these, and you look at -- this is a relatively small one that happens on land.

Go ahead.

And there's no way you can transport these through the larger cities and on the bridges and highways. It just will not work. It has to be done in the port facilities.

Go ahead.

And so they'll be either -- hopefully manufactured in California or shipped to the staging and integration areas.

Go ahead.

The nacelles would be either manufactured

on site or transported by ship.

Go ahead.

And so when you just look at the size of these foundations, approximately 425 feet triangles by 100 feet tall. 420 feet and 100 feet tall, 100 feet is approximately a 10-storey building.

Go ahead.

And when you look at these in the context of the -- like a Dodger Stadium, you know, you're talking about the size of the infield of Dodger Stadium, and the height of all the bleachers is how tall these are.

Go ahead.

And so when we really focus in on Humboldt Bay again, the entrance between the jetties is about a half-mile wide, and the main navigation channel ranges from about 1,500 to 900 feet. And then it switches into the Samoa Federal Navigation Channel, which, at its narrowest point, is about 450 feet wide. And so we -- we've looked at this and -- with our partners at the Army Corps of Engineers and at the Coast Guard, and the sizes of the turbines, we believe, will fit out of the Humboldt Bay with

the existing navigation channel configurations that we have.

The Army Corps of Engineers was just here two weeks ago. They did touch up dredging on the navigation channel, and they re-dredged (sic.) the entrance channel back down to 48 feet. The Army Corps of Engineers comes here every year and does the dredging.

A couple of other things I want to just point out here. Like I said, the teal areas are the existing federal navigation channels. The purple areas are vacant and underutilized industrial sites that are -- have terminals adjacent to them that could be available for other offshore wind components.

Right here in the -- directly opposite of the entrance channel, there's the PG and E power plant, which the main transmission lines go out of there. College of the Redwoods is less than a mile from the port, and Cal Poly Humboldt is five miles from the port. These are really critical factors for workforce developments and training activities.

Go ahead.

And so when we look at this in context of

the offshore wind lease, you may say, "Why is he showing the broadband sea cables?" Well, because within the last two years, the State Lands Commission and the California Coastal Commission approved the world's longest broadband fiber cables. And they go -- two of them go directly adjacent to the northern Humboldt offshore wind lease, and two of them go right through the southern offshore wind lease. And they go directly, and they land right at Humboldt Bay.

This is an important because they executed fishermen's agreements with those undersea cables. They also did the environmental review, mapped out the locations of where the cables are and really of what the mitigation and minimization measures are for the cable connections, just within the last two years.

Go ahead.

And so, as I mentioned, Humboldt Bay has the required existing channel width, channel depth, no vertical drafting restrictions, and we have all this land that is directly adjacent to the existing federal navigation channel that is vacant. And we're just geographically in the center point with California's future offshore

wind.

Go ahead.

And so last year, we signed an agreement with Crowley Wind Services to be the developer and operator of our new heavy lift marine terminal. This was a huge step for us, is to pick our partner. Who's going to be the private sector partner that's actually going to develop and lease to the offshore wind industry to make this happen? And we entered into an agreement with Crowley, and they're going to be our key partner in developing Humboldt Bay to meet the needs of the offshore wind industry.

Go ahead.

And so when we kind of focus in on Humboldt Bay -- and what we're looking to do is that we have -- this is approximately 190-acre site. And so in the first place, we -- you heard from Matt earlier that to do the staging and integration, you need approximately 80 acres of offshore wind area. And so what we set up is that we could lease this area to two separate companies simultaneously, and both companies could do the staging and integration from this one facility, essentially split in the middle.

And you would bring in the components, either manufactured in Humboldt Bay or somewhere else in California, to the site. They could stage them on the area, and then they would assemble them and fully integrate them into the facility.

And one of the things you'll notice here is that we also included approximately 600,000 square foot of manufacturing space that we're currently permitting and that these manufacturing spaces are -- were sized according to the manufacturing facilities that are in operation in Europe and are in development on the East Coast.

Go ahead.

And so when we really kind of hone in on this area of how is this going to work is, they're going to fully assemble these areas, and then they will, with the wet storage, have the sinking base in there. Then they'll tow them over to the shoreline and do the assembly. And what you'll notice is there are -- as Matt said, wet storage is really a critical component.

So we have two separate areas of wet storage. One area that is to the bottom of the screen is essentially only the foundation only. So they don't have the towers, the nacelles, or

the blades on those. And then the areas that are adjacent to the pier between the two wharves, those are fully assembled offshore wind towers. And part of the reason for that is, once you have them fully integrated, they have to connect to power because the nacelles, they have to work them, they have to test them onshore, and they have to be directly connected to the shore power in order to really make sure that they're fully operational and engaged.

Go ahead.

And so just to kind of give -- put this into context a little bit is, these offshore wind towers would be fully manufactured in the staging and integration port of Humboldt Bay. And, again, these are about 425 feet triangles, 100 feet tall. You can see there's a person down on the very bottoms, just to put this into context, the scale of these.

Go ahead.

And then these essentially are moved almost like the space shuttle. So they would move them and gradually put them onto a semi-submersible barge adjacent to the new terminal, and then they would sink that terminal. The

floating foundation would float. They would move it out of the way. Then they would resubmerge the barge, and then they would start the full assembly process.

Go ahead.

And so once they get it offshore, then they start to fully assemble and put the tower on top, and then the nacelle, and you can see the blades are on the tarmac ready to start to be assembled.

And then go ahead, the next one.

And then once they're fully integrated, then they would tow them fully upright. And, again, this is -- really is a -- was a pilot project. This is a relatively small scale one. But they would tow these fully upright out the port to the offshore wind leases. And this is kind of -- just in a nutshell, kind of the process that would happen at the port facilities.

Go ahead.

And so what is our progress today? With the help of the California Energy Commission and the State Lands Commission, we've already completed almost all of the technical reports, all of the surveys, geotechnical reports, the

cultural resource surveys. One of the questions earlier was about contamination. We're in the U.S. EPA Brownfields program, and they're our partners at the U.S. EPA. They're helping us to do the phase one, phase two environmental site contamination. And if there is remediation that's required, then we want to get that done in early stages.

We've pre-identified what some of the mitigation is, where -- our wetland mitigation, eelgrass mitigation, and we've already identified the mitigation areas and are about ready to assemble the permits to jumpstart the mitigation on the site.

One of the core things that you'll see down below is the sea level rise planning and analysis. As you're building these new terminals, all of them will be designed to accommodate sea level rise and tsunami protection that would take place within those.

Go ahead.

In 2023, we're just about ready to really kick-start additional public engagement. We submitted a port infrastructure development grant in May. We requested the Army Corps of Engineers

to be the lead agency under NEPA, and the Humboldt Bay Harbor District will be the lead agency under CEQA.

And so we're anticipating releasing the notice of preparation of that environmental impact report here in the month of June. And then we're going to start by submitting these -- our permit applications to the regulatory agencies and getting their -- all their comments.

But we have planned later this year to do tow out modeling, where we will take the foundations, and there's models of Humboldt Bay, so that the (indiscernible) could actually do the simulation of the fully upright towers based upon the existing channel configuration and different wind speeds, current speeds, and other things of what the tow out facilities would look like. And we're really knee-deep into the project financing stage.

Go ahead.

So just kind of in conclusion here is, we've been discussing this as California's port -- the collection of ports. And at the end of the day, there's going to be -- need to be these three different port types and 10 terminals

throughout there. But not all of these 10 terminals have to come on at the same time. The staging and integration are the most critical. And so that's why in Humboldt, we've really been focused on setting the stage and preparing California's main staging and integration port that will be set up to handle approximately two-thirds of all of the transmission development that'll happen in -- for the State of California, of constructing these offshore wind towers and full deployment out of the Port of Humboldt Bay.

And in order to do this, each one of the California's terminals are going to have to have funding for planning, permitting, design, and construction and that California will have to do a significant amount of state investment in infrastructure so that we can use those funds to leverage public and private investment funds.

And so we believe that California has the existing capacity in our 11 deep water CAPA ports and that the significant investment -- if the significant investment is made, then Humboldt and the other ports can meet the state's needs for offshore wind.

And so we think that overall, in

Humboldt, what we set out to do is to identify a clear pathway for the development industry, remove as many barriers and uncertainty as we can within the process, and then complete all of the technical studies and begin the environmental review process as early in the process as we can so we can do full disclosure to the tribes, the communities, the industry, and so that at the end of the day, we believe that Humboldt has been able to shave a couple of years off of the time frame and that we will be ready to begin development within the next couple of years.

And so I'm going to conclude there.

And I'll turn it over to you, Paul.

MR. DEAVER: Thanks, Larry, for presenting on current activities of the Port of Humboldt and the current work -- all the work that's going on there. Very helpful.

Next, I would like to hand it over to Suzanne Plezia from the Port of Long Beach. She's going to talk about current activities and planning at the Port of Long Beach, all that seems to support offshore wind development, as well as the Pier Wind project.

Suzanne, go ahead, and please turn on

your camera. And I'll turn it over to you.

MS. PLEZIA: Thank you, Paul. And good morning, everybody. Suzanne Plezia, Senior Director, Chief Harbor Engineer at the Port of Long Beach. And thank you for having me here today to present on Pier Wind, the Port of Long Beach's concept for a purpose-built offshore wind facility.

Next slide. You can go to the next slide too.

All right. So first I want to provide a little bit of background on why offshore wind is important to the Port of Long Beach. And it starts with the port's commitment to the environment as the green port and transitioning our operation to zero emissions over the next decade.

And this transition is critical to mitigate impacts to the communities closest to the port that have been disproportionately impacted by our operation, which has historically been fueled primarily by diesel. And one of the key strategies identified in the port's zero-emission energy resilient operations policy is supporting offshore wind development in

California.

The reason is, in order for the port to transition our operation to zero emissions, we will need an abundant supply of renewable zero-carbon energy to power California's grid and ultimately the port's operation. We're estimating up to a sixfold increase in annual electrical consumption at the port over the next decade, with an even bigger increase in coincident peak load, and the grid and power supply in California are already stressed.

So it is vital the state is successful in developing offshore wind, so there is sufficient, reliable, resilient, and renewable power in order for the state to meet its renewable energy goals and the port to be successful in transitioning to zero emissions.

Next slide.

Now, seven months ago, the Port of Long Beach did not have a plan for an offshore wind facility. We only knew we needed to help. We didn't know how we were going to help. Our involvement was really facilitated by AB 525. And I want to commend the California Energy Commission for the great work they have been

doing leading the charge on the development of the AB 525 strategic plan.

And there were three key aspects of that process for us.

One, California establishing a large goal of 25 gigawatts of offshore wind power by 2045. It's the largest goal of any state in the nation. And that helped establish how much port infrastructure would be needed.

Two, we participated in the California Regional Port Assessment by BOEM. It was really through that process that we got engaged and got educated on the unique requirements of an offshore wind industry and the port infrastructure needed to support it.

And three, the alternative port assessment. And I think that was really the one that drove the point home for us on the dire need for port infrastructure and the lack of suitable ports that can fill the need.

And as one of the busiest ports in the nation, you know, we don't have land available for use. But understanding that critical need and lack of suitable port sites is what got us started at evaluating options for developing a

new purpose-built facility on reclaimed land within our harbor.

Next slide.

And when we set out to evaluate options to develop a facility, we knew we needed a plan for future innovation. And Matt touched on the importance of this earlier, because it's anybody's guess what size turbines will ultimately be used for either the first wind lease areas or the last ones. We only know that the turbine will get larger over time.

There's always going to be a push for the larger and larger turbines because of the economies of scale. The larger the turbine, the more efficient, the fewer units to operate and maintain. All of that helps with maximizing the amount of energy we can produce in our precious sea space and lowering the cost of energy produced.

So we want to build port facilities that facilitate that innovation and accommodate that future scale. So we used those same dimensions out of the BOEM and NREL study on a 20 to 25 megawatt turbine as the basis of our design with buffer to allow for future innovation and growth.

Next slide.

And many of the components for the floating offshore wind are the same as the fixed-bottom wind turbines installed around the world. So we generally know what is entailed in the serial production and transportation of these large components by looking at examples around the world. It's just a matter of scaling up as the turbines get bigger.

This is a picture of a 15 megawatt nacelle, currently the largest one produced. So a 20, 25 megawatt nacelle will be even larger than this.

Next slide.

And so the same thing with the other components, like the towers.

Next slide.

And the blades.

Next slide.

But when it comes to the floating foundations, it's not as easy to plan the port facilities. As Matt touched on, the technology for floating foundations is nascent. There are a lot of different foundation designs under development and only a few that have been

deployed as a pilot or a small scale. And I believe the latest NREL report shows the floating foundation at close to 40-percent of the total CapEx for the offshore wind farm.

So the foundation represents a huge opportunity to lower the cost of offshore -- floating offshore wind energy through innovation and efficiencies, both in design and in production.

So when it comes to planning port infrastructure, we want to make sure whatever we provided can accommodate as many designs as possible and be able to provide enough flexibility for different approaches on production, all of which will help foster that innovation.

Next slide.

And once they're fully assembled, units are over 1,000 feet high. So the staging and integration can't be behind a bridge. And that limits the number of potential ports that can host the staging and integration. And depending on the size of the turbines, some combination of 15 to 25, over time, we'll need to produce between 1,000 to 1,600 of these units by 2045 to

meet our goal. And Matt touched on that number being somewhere around 1,300 in his earlier presentation.

So planning for a port facility for that scale and the economies of scale became the critical factors for us. It's the scale of the turbine, the scale of the quantity of units that need to be produced, and the scale of the production rate that is needed to achieve our goals in time.

Next slide.

And that's where we think the Port of Long Beach can help. We have some unique qualities that can be leveraged to meet the scale of offshore wind. It centers around this large area in our outer harbor that is behind a federal breakwater and adjacent to one of the deepest and widest federal channels with direct access to the open ocean and no air height restrictions. And it's in an ideal location within our harbor, out of the way of the other operations.

Once we understood the breadth of the port infrastructure needed and the timeline in which we needed it, the port moved quickly to evaluate options and develop a concept for a

facility in this outer harbor area.

Now, as we were developing the concept, we met with a number of stakeholders, government and industry representatives, to get a better understanding of the need, unique facility requirements and operation, and lessons learned from the East Coast. And we completed the concept design within our aggressive target of five months so we could get this information to decision makers as soon as possible.

Next slide.

And the result is Pier Wind, the largest purpose-built offshore wind facility in the United States. It's 400 acres with a continuous heavy lift wharf and plenty of area around the facility for wet storage of either floating foundations waiting to be assembled at the key or fully assembled units waiting to be towed out to the wind farm.

As Matt touched on previously, as well as Larry, that wet storage is an important feature, because it provides a buffer that allows for serial production at the key to proceed uninterrupted while the completed units wait to be towed out to the wind farm. So a large wet

storage capacity helps support a high production rate at the key.

There are also fixed piers along the causeway that could be used for commissioning activities and/or tugs. And all of these features together help reduce risk and facilitate an efficient operation.

Next slide.

And the concept is a gray terminal that can be divided up to meet the most critical need, which we believe will primarily be staging and integration and floating foundation assembly, but could also be manufacturing of the components, such as blades or towers. It's flexible and adaptable and large enough to accommodate serial production of larger and larger turbines as innovation and technology advances.

Next slide.

So when it comes to schedule, time is of the essence. The longer it takes to build a port infrastructure, the longer it will be before we have offshore wind. So we must develop the port infrastructure with a sense of urgency, which is reflected in the proposed aggressive delivery schedule.

The schedule is based on starting construction January 2027, with the first 100 acres operational in early 2031, the second 100 acres operational in late 2031, and the last 100 acres coming online in 2035.

Now, in order to achieve this schedule, we will need the whole of government supporting it. The cost for the entire 400 acres is estimated at 4.7 billion in 2023 dollars, which is about 1 billion per 80-acre site.

Now, it's much more cost effective and efficient to build a larger 400-acre facility than building five separate 80-acre facilities needed to meet our offshore wind facility needs. So this is a lesson learned, we heard, from the East Coast model, which has a lot of smaller offshore wind ports spread across many different states with different offshore wind goals and different workforce and supply chain strategies.

In California, we have the opportunity to develop a much more cost-effective and an efficient port strategy to deliver large scale offshore wind that will also support the economies of scale needed to lower the cost of that energy.

Next slide.

But it's not just a port facility that is needed to launch this emerging industry. It will also require a significant workforce. So being located in Southern California, we are adjacent to the state's largest manufacturing base and skilled construction and marine workforce, as well as a large oil and gas industry that will be shrinking as we transition away from fossil fuels.

So there's an existing workforce that could be drawn upon and retrained and retooled, and it will create new jobs and career opportunities for the communities closest to the port that have been proportionally impacted by climate change and the port's operation to participate and benefit as we transition away from fossil fuels and into a green economy.

Next slide.

So a lot of the jobs needed to develop offshore wind will require new training and certifications. The port has a significant and well-established workforce development support network that spans from grade school through high schools with dedicated STEM and logistics

academies, partnership with community college for a vocational training, and partnership with universities for research. We have a Maritime Center of Excellence at Long Beach City College, and the port is developing a Goods Movement Workforce Training Campus right here in the San Pedro Bay Complex with -- in partnership with the state, Port of Los Angeles, ILWU, and PMA.

And I want to touch on project labor agreements a little bit further. So the port also delivers all of our construction projects under project labor agreements with dedicated, disadvantaged, and transitional worker goals, in partnership with L.A./Orange County Building and Construction Trades Council.

Now, to help achieve those targeted worker utilization goals in our project labor agreement, the port also has a jobs coordinator that helps connect pathways into the trades and onto the ports construction projects. There are many pathways into the trades, and those pathways are not always linear.

The jobs coordinator works with the building trades, pre-apprenticeship programs, union apprenticeship programs, and community-

based organizations to identify workers who meet those hiring goals and refer them to the appropriate path. Examples of community-based organizations we work with are Brothers' Keeper, Women in Non-Traditional Employment Roles, and Helmets to Hardhats, amongst many others.

Now, some individual may also face barriers to employment, such as a lack of transportation or unable to afford tools. So the jobs coordinator can help connect those individuals with organizations, such as Pacific Gateway, that provide financial assistance to overcome these barriers. And the Port of Long Beach's already well-established workforce development support network is something that we think can be leveraged to help launch careers in this emerging industry.

Next slide.

And as cited in the AB 525 preliminary report, "Creating an industry cluster is key to maximizing the jobs and economic benefit." Matt and Larry already did touch on this. We believe Pier Wind is an essential element of a multi-port strategy that will establish that industry cluster here in California and build a robust and

sustainable supply chain.

And Larry touched on this as well. But Pier Wind, along with Humboldt's project, will create that robust staging and integration capacity, right. That is what will enable the rest of the industry in California to take off as Matt touched on earlier.

That staging and integration capacity will dictate the upstream component manufacturing capacity that would involve other ports and harbors. The larger the staging and integration capacity and production rate, the larger the manufacturing capacity to feed the S and I sites at that production rate.

So that makes setting up manufacturing facilities in California more attractive and viable. And, again, manufacturing is where we see the big economic benefits, with preliminary assessment showing the potential for 39.7 billion in state GDP for construction and another 7.9 billion in long-term O and M, along with 17,500 new full-time jobs by 2045 using that cluster-based strategy. And California's goal is actually higher than the goals used for those scenarios. So we would expect these numbers to

be even higher. And that's a huge return on investment for both the environment and the economy.

Next slide.

All right. So the benefits of Pier Wind come back to scale. The economies of scale, building the largest purpose-built facility in the U.S. that's big enough to build the largest floating offshore wind turbines in the world at an efficient serial production rate to achieve the economies of scale that will maximize the reduction of greenhouse gases while lowering the cost of energy and create that industry cluster that will maximize jobs and economic benefits, all of which will position California and the United States to be at the forefront of floating offshore wind development.

Next slide.

So I can't emphasize the importance of schedule enough. The port has been developing infrastructure, including developing reclaimed land for the past 100 years. And, you know, we've consistently had the largest capital program of any non-energy port in the nation for the last decade. So we know what it takes to do

this. And it is a heavy lift to maintain the aggressive schedule that we've outlined.

So the next phase will be a significant level of effort consisting of five main parallel work streams. We're initiating the environmental documentation process now. We are continuing with preliminary design, including geotechnical investigations and weight modeling. We'll be evaluating business finance and delivery models, performing community engagement and stakeholder outreach, and we'll be working with the state, labor, and education partners to further develop strategies for workforce development for offshore wind.

Now, a copy of the full concept report, the design cost, and schedule is posted on the port's website, on our Pier Wind webpage, with the address shown here.

Next slide.

Okay. Thank you. That concludes my report. And thank you, again, for allowing me to present the Port of Long Beach's Pier Wind concept.

MR. DEAVER: Thank you, Suzanne, for presenting on the Pier Wind project, along with

other current work and attending activities of the Port of Long Beach to support offshore wind.

I would also like to thank Matthew Trowbridge from Moffatt and Nichol for his port's presentation and Larry Oetker from the Port of Humboldt.

That wraps up our morning session presentations. We will now begin the public comment portion for the morning agenda.

For this portion of the agenda, I would like to invite Hilarie Anderson to provide instructions for public comment and help with -- folks with that.

MS. ANDERSON: Okay. Thank you so much, Paul.

So, hi, everyone. I'm Hilarie Anderson. I'm with the CEC STEP division. I'm going to be helping out with the public comment section today.

Today we have two public comment sections. Right now, we're going to be taking comments until 12:30 when we hit our lunchtime. And then at the end of the second session, we will complete our public comment period, and we will go all the way through until we're -- we

have no more public comments.

So we're going to start today. This is an opportunity for attendees to give their comments. Each person will have up to three minutes or less to speak. Comment times might be reduced to ensure that we're able to hear from everyone.

To make a comment, individuals on Zoom should click on the raise hand icon that looks like a raised palm at the bottom of your screen. For those of you that are calling in from the phone, please press "star nine," and that will raise your hand. And "star six" will allow you to mute -- unmute.

When you are called upon, I will open your line. Please make sure to unmute on your end once that happens. And when you're called upon, for the record, state and spell your name, give your affiliation, if any, and then begin your comment. We'll show a timer on the screen, and that will alert you to when your time is up. All comments will become part of the public record.

So I'll go in the order of how hands are raised. So please raise your hand if you have a

public comment that you would like to make at this time.

I'm not seeing any, so I'm going to give a few seconds. For anyone that has a public comment, again, that's the raise hand function. And if you're on the phone, that's "star nine" to raise your hand.

Okay. Great. Thank you, Nancy. Your line is open. You can unmute. Please state your name, and spell your name for the record. Give your affiliation, if any, and then begin your comment.

MS. KIRSHNER-RODRIGUEZ: Great. Thank you.

Nancy Kirshner-Rodriguez. And it's N-A-N-C-Y K-I-R-S-H-N-E-R hyphen Rodriguez, R-O-D-R-I-G-U-E-Z. And I'm with the Business Network for Offshore Wind. And we are glad to be in partnership with many of the presenters and many of the organizers of this session today.

And I would just say for the record that the Business Network is a national nonprofit with over 600 member companies, labor unions, research institutions, small businesses, environmental organizations, many of those that have a lot of

expertise and are building expertise in this area. And we are working aggressively on seeking out solutions for the many challenges that both California and the rest of the U.S. has regarding our ports' infrastructure.

It's been exciting to work and have a role in seeing the federal government fund some of the East Coast ports for their goals. And obviously, we hope that there will be federal support for West Coast's, and California, particularly, efforts in these coming months.

But we just want to state for the record, we have a ports and logistics working group, which I staff, and we are all going to need to work extremely collaboratively to identify creative financing solutions and build out our workforce. I know we're going to be talking about that as well later. But it's such a great opportunity for our state and for our nation.

And I just want to compliment you for today's session thus far, for -- all the presentations have provided a lot of excellent information, and we look forward to diving into the further goals and objectives and working to build out the supply chain and the ports. Thank

you.

MS. ANDERSON: Great. Thank you so much, Nancy.

Okay. Any other public comments? Remember, raise your hand to indicate that you want to make a public comment. And if you're on the phone, that's "star nine" to raise that hand. We'll give it just a little bit more time before we conclude the morning session's public comment section.

All right. Last call for raised hands and for comments. I'm seeing none.

Paul, I'm going to hand it back to you, and that will conclude our public comment section for the morning. We will have another one in the afternoon session at the end. Thank you.

MR. DEAVER: Great. Thanks, Hilarie.

Just a reminder, we're also accepting written comments, which will be due on June 9th. You can submit those to the docket. And with that, I will -- if we have -- I don't know if we have any closing remarks from commissioners.

All right. So, with that, thank you, everybody, for attending, and our participants and presenters.

I would like to close this morning session by thanking, again, Matthew Trowbridge from Moffatt and Nichol for presenting on their AB 525 port readiness plan, Larry Oetker from the Port of Humboldt for discussing and showing us current planning and activities at the Port of Humboldt, as well as Suzanne Plezia from the Port of Long Beach for presenting on the Pier Wind project and their planning activities.

There is another session this afternoon, and this includes presentations on workforce development and economic benefits, as well as on AB 525 workforce readiness plan.

After those two presentations, we're going to have a panel discussion on workforce development needs.

And with that, let's break for lunch. We will reconvene at 1:30. And just one more time, if you did not comment today and would like, we are accepting written comments through June 9th.

I'll see everybody back here at 1:30.

(Proceedings recessed to reconvene.)

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AFTERNOON SESSION

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MS. MACDONALD: Welcome back, everyone.

Real quick, I would like to respond to an earlier question from Schatz' Maia Cheli about the Moffatt and Nichol report and tribal consideration. I'll add that we're performing outreach to tribes for consult purposes in all aspects of the strategic plan in coordination with our own cultural resources staff and our partner agencies.

The strategic plan calls out for specific coordination with tribal and indigenous persons, fisheries, coastal resources, and Department of Defense, as well as other stakeholders.

Now, we'll dive into our afternoon session of this staff workshop on workforce development for offshore wind.

We'll have two presentations on workforce development and economic impacts from offshore wind, and there will be time for question and answers after the presentations.

Following the presentations and Q and A, there'll be a discussion panel on workforce development and training needs to support offshore wind. The panel discussion, moderated

by Ben Pogue from Catalyst Environmental, will also include potential economic benefits from developing floating offshore wind off the California coast.

There'll be time for public comment after the panel discussion. And before adjourning, we may hear -- have closing comments from our commissioner.

I'll now pass it to Paul to begin this afternoon session. Thank you.

Next slide.

MR. DEAVER: Thank you, Rachel.

Before we get to our afternoon presentations, I want to briefly remind everyone of the AB 525 workforce requirements.

So AB 525 requires the plan to improve waterfront facilities to support offshore wind, which is part of the strategic plan. It requires this waterfront facilities plan to include an analysis of the workforce development needs of the California offshore wind industry, including safety requirements, workforce skill training needs, and the need for new training curriculums.

It also requires that there be recommendations for workforce standards for

offshore wind energy facilities and associated infrastructure, including prevailing wage, skills and training needs, including apprenticeships and local and targeted hiring and equity.

Next slide, please.

I'm now going to hand it over to Ben Pogue from Catalyst Environmental. He is going to present Catalyst AB 525 Workforce Development and Economic Benefits Analysis.

Ben, please go ahead and turn on your camera. All right. Looks good. Take it away, Ben.

MR. POGUE: Thanks, Paul. That was a great tee up actually for where we're going to begin and venture to today in my presentation.

Hilarie, if you wouldn't mind pulling up the next slide. One more, please. There we go.

Okay. So good afternoon, everyone. My name is Ben Pogue. I am the Director of Natural Resource Management with Catalyst Environmental Solutions. It's a privilege to be here with you all today to discuss California's energy future. It's very exciting.

And tip of the hat to all the presentations this morning. Those were just

great. Those were very, very informative and excellent, concise presentations. So thank you all for presenting this morning.

So Catalyst has been supporting CEC in the development of the AB 525 strategic plan for almost a year, roughly since last summer. And as you will see in my next slide, our work has entailed a wide range of research and analysis.

Today, I'm going to hone in on two particular items.

One, I am going to give a very brief overview of our larger paper, which is going to be soon available either this afternoon or tomorrow, I would imagine. So this will be kind of an introduction to our larger body of work. The paper actually has the same cover as the intro slide here, so you'll know you're in the right place when you see it.

Secondly, I'm going to take a deeper dive into workforce development as it pertains to potential economic benefits for both the state and the regions that we're (sic.) going to experience seaport development.

I have about 10 slides. I'm going to try to get through it all in about 20 minutes, so

please bear with me. I feel like I'm going to blaze through all of this. This could easily been four or five presentations. So thank you for the understanding if I don't take a deeper dive into some more of the tangential, technical topics.

There will be a Q and A session as Paul mentioned after the following presentation by Xodus and BW. So please jot down your questions, and I'll be happy to answer them in the following couple of minutes.

Okay. Let's get into it. This is how we approach breaking down section 25991.3 of AB 525. This served as our analytical framework. And even though -- in just this little dense, little statement here, all of these little tasks came out of it.

So we broke it down into the sub-analysis, and we identified seaport siting and screening and investment, which you heard from this morning, workforce characterization and development needs, workforce occupational safety requirements, workforce training needs assessment and a gaps analysis, workforce standards and recommendations pertaining to safety, training,

hiring, and equity, stakeholder engagement with a focus on the labor unions and apprenticeship programs, and economic benefits analysis, and the supply chain policy analysis with recommendations for the state to consider.

So after identifying each supporting analysis, we further broke those down into key analytical questions, which helped frame and guide our research and analysis.

As you can see, this task list is fairly varied. And so a lot of our work is going to be somewhat of compilation of numerous technical tasks that all coalesce together at the end. And I'm going to be discussing that a little bit further. Let's see.

Next slide, please.

This is jumping right to the end. This is a snapshot from our executive summary. I'm showing this because it demonstrates a real clear concept of how we approached AB 525 here.

We started with our area of analysis. In this case, we took this little matrix from the workforce development needs section of the executive summary.

And then we have our AB 525 issue, an

analysis of workforce development needs of the California offshore wind energy industry, including occupational safety requirements, the need to require and use a skilled, trained workforce to perform our work.

So even in just these few sentences, out come these five or six key questions from each one of these. So this gave us a clear structure on how to approach everything. And the other part of this is that we put ourselves in CEC's shoes. And if we were going to be writing the strategic plan, how would we like to have all of this world of information packaged concisely so that we can have a direct answer to one -- each one of these key questions. But you'll see also a section reference guide in this table that will direct the reader to the more expanded and thorough analysis.

So this is kind of just the snapshot -- to jump to the end. We are hoping that this really helps not only CEC, but also other researchers and analysts kind of see how all of this fits together for complying with AB 525.

Okay. Let's get into the economic benefits analysis. The next couple of slides

feed into the benefits analysis. So while they may seem a little non sequitur, like any good Tarantino movie, you'll see how all this comes together in the end. So bear with me while I go through some of these topics here.

But our first step was to characterize the composition and types of workers that would be needed in this new offshore wind workforce. So we began with gaining an understanding of worker training -- worker and training needs as offered by some key stakeholders. And this was also an AB 525 mandate, but it directly helped inform the workforce needs assessment.

So we conducted a series of interviews with labor unions, training experts, apprenticeship programs, universities, developers, manufacturers, federal agencies. We wanted to kind of take a wider snapshot than what was required, especially with so much experience being conducted on the East Coast from the these groups. We wanted to really glean and capture that.

So we distilled -- we had about 25 question -- questionnaire that we issued to each interviewee before we talked to them, allowing

them to get some of their prep done for responses. But then we distilled down all this questionnaire into about six key questions that you'll see over here to the right on the slide.

In general, these seek to answer, how ready is California's workforce to meet the new demands posed by the offshore wind? What are the obstacles? What are some potential solutions or catalysts that could help for workforce development? And so that was really some of the more basic information that we were seeking from them.

And I don't have time to go into the full findings from the interviews, but a few pertinent highlights.

One, a common theme to the biggest obstacle was the need for a specific training standards and certifications. So something as simple as that, having a uniform and clearly communicated set of standards critical to the workforce development and training elements.

There is a significant need to build a long-term worker pipeline. This can be achieved through an apprenticeship recruitment program, starting at the high school level to let them

know of these career options, and also the adoption of a high row training program.

Three, lastly, most interviewees felt that already-trained workers would be attracted to this new industry. So there are going to be good-paying jobs come out of this new industry. And the take home from that was, leveraging both the existing workforce and training assets in the state to be able to scale up should be a priority in the strategy as well.

All in all, this information fell directly into our characterization of workforce development and training needs, which I will discuss on the following slides here.

However, I would like to mention, as Paul was saying, I am moderating a panel of experts here at 3:00 o'clock. Please tune in because this will be very topical. These similar types of questions that we address through our interview process will be asked to the experts at 3:00. So there's my plug for the workshop interview panel at 3:00.

Next slide, please.

Okay. I'm getting into more of the technical approach to the economic benefits

assessment. So as released last August, we used CEC's draft goals of two to five gigawatts by 2030 and 25 gigawatts by 2045 as key benchmarks for forecasting workforce development needs over time. These goals essentially reflect a maximum build scenario of the wind energy areas identified by NREL as you see in this figure here to the side.

For the 2030 goal, the upper bound of five gigawatts assumes the full build out of Morro Bay Wind Energy Area or WEA or a combination of a partial build out of Morro Bay WEA and Humboldt WEA.

The lower bound of two gigawatts reflects an understanding by the state that achieving a 2030 online date for any proposed offshore wind project will take significant mobilization of resources, effort, and timely infrastructure investments.

The 2045 goal reflects the maximum install capacity of the Humboldt WEA, the Morro Bay WEA, the Diablo Canyon call area, and as -- and also two additional areas with high wind speeds in Northern California. You can see that it was shaded in pink in the map to the right

there.

BOEM modeled this scenario and derived a technical feasible capacity of up to 21.8 gigawatts of potential generation. While notably aspirational at 25 gigawatts, CEC relied on this 21.8 gigawatt estimate as a reference metric in establishing the 2045 goal and recognizes that the information supports the feasibility of at least 20 gigawatts by 2045.

So some key projections here. Three existing economic studies that we relied heavily on for our work have essentially modeled a maximum build scenario to generate a workforce profile. So we thought these were excellent studies to begin with. We did not want to recreate the wheel. So we picked up kind of where they left off. The NREL study, the Guidehouse study, and the AGP study, which was actually performed by BVG, great little outfit, these studies helped us bound the number and types of workers needed for the 2030 and 2045 workforce.

So the chart here provides a conceptual growth pattern for installed capacity for each of the studies as compared to the CEC goals. As

noted, while we seek to estimate potential economic benefits on the CEC goals of a max build scenario, our findings could be considered conservative, as none of the studies approach 25 gigawatts by 2045.

Yet given their approach to a max build scenario, their various approaches in bounding the number and types of workers is directly applicable to our work and also provides some breadth in considering workforce development needs here.

So, as you can see in the table and in the table to the side here, NREL's estimates generally serve as the upper bound for workers, with over 8,000 by 2030 and nearly 18,000 by 2045. So there's our snapshot for numbers of workers on a bounding level.

Next slide, please.

Once we established bounding ranges for the number of workers, we broke down what type of workers would be needed. So this is referred to as occupational skills mapping. There are some great graphics in our report as -- such as this one, which is a snapshot of the 2030 workforce by number of workers per phase, supply chain

construction and O and M, the top 10 occupations or skills needed for that phase, and then radar graphics along the top that show the proportion of that phase's workforce per occupational sector.

The graphic -- the radar graphic to the right in the corner there shows the overlay of the three phases, to kind of give you a master graphic presentation. And there are no huge surprises here, frankly. Work tends -- you know, the types of workers tend to skew towards technicians and trades and construction of an assembly, which is kind of to be expected.

But there are a few take-home messages from this graphic, the first one being that over two-thirds of the workforce are expected to be in the supply chain, with a heavy skew towards technicians and tradespeople. While it is intuitive to think of workers on open water constructing enormous turbines and towers, the economic meat and potatoes for workforce development will be in the supply chain. And this is a theme we heard touched on this morning as well, and I was glad to hear that. So here we are continuing that string of thought.

And two, technicians and trades occupations will be in demand as expected, as will new construction and assembly workers. However, and as experienced on the East Coast, administrative and clerical positions will also see increased demand over time as operations and maintenance phases increase.

So a kind of across the board demand here for new workers, with the expectation, of course, within these particular sectors, some -- more skewing towards technicians and trades, construction and assembly, and administrative and clerical.

Okay. So now we have the number of workers from the slide above, and now we have the types of workers from this breakdown. And this information is going to directly feed into our economic benefits model, which I'll get to here in another slide or so.

All right. Let's keep going.

I'm going to read every word on this slide. I'm just -- I apologize for how busy this one is. But I wanted to demonstrate the concept -- supply chain will play a huge and critical role in this workforce development.

A key note is that beyond the actual workforce development is the economy of scale critical to building momentum for this new industry.

As more manufacturers, fabricators, suppliers, and service providers locate to California, the cost of offshore wind will decrease over time. In economic terms, this is referred to as a falling levelized cost of energy or LCOE. And the more transportation and logistics cost are reduced via companies locating in California, the more LCOE will drop from savings passed on to the developers. So, in other words, the more supply chain entities -- as more supply chain entities establish in California, the cheaper offshore wind will become over time. The East Coast and elsewhere abroad has realized this trend.

So what we did was an empirical review of policy levers that other states have used to incentivize and institute policies that helps capture more of the meat and potatoes economic benefits via the supply chain. Ultimately, the table on the left became somewhat of our master policy menu. And then we broke down California

into materials production and fabrication, component manufacturing, and supply chain workforce development, specifically for the State of California. And then we started cherry-picking the policies that we believe would best maximize benefits for California, while also attracting critical supply entities to the state.

So this was a thorough case study review. This all culminated into a set of recommendations of lessons learned from what we saw as the most successful supply chain strategies elsewhere in the East Coast and abroad.

One side note, a theme -- an interesting theme that kind of arose out of this work. Whereas the East coast has to compete with one another to attract supply chain entities, California is not necessarily in that position. And while the state is not known as an industrial powerhouse, with most manufacturing occurring in the tech and chemical sectors, the state has a real opportunity to put in place targeted and strategic economic policies that can attract the key manufacturers in the short-term to help launch the industry, but also more expansive policies that will help other supply chain

entities down the road to help California establish long haul. So that is supply chain.

And let's get into the economic modeling now, as all this feeds into it. I would like to start with a shout out to my teaming partner on this project, which was Greene Economics. Top flight economics outfit if you're ever looking for one. So thank you, Gretchen, Jeri, and Bea for all your hard work on this.

To estimate economic benefits, we used an economic input-output model called IMPLAN. And as observed in this graphic, the model relies on a series of inputs which we determine, which, in this case, are workforce development, seaport development, and a training center development. And the input goes into what is considered a black box algorithm and yields estimates for economic activity, jobs, labor income, which is paycheck income, and fiscal revenues -- tax revenues.

As provided in this graphic, IMPLAN attempts to account and capture all the linkages and multipliers inherent to economic activity by providing a direct and indirect and induced impacts. So you can see in our little circles

here -- this is intended to kind of give you the impression of how IMPLAN approaches potential economic benefits, direct, indirect, and induced. And I framed up the inputs. No. Yeah. Okay.

Direct impacts reflect the money generated through construction and operations of offshore wind projects. Indirect reflects the components, goods, materials, and services needed to develop them. And induced accounts for secondary effects of -- or economic ripples created by an action. The classic example for an induced effect, to help you get your mind around it, is a worker gets a paycheck, comes home, and goes and buys groceries and gas and anything else, which creates a flow of money throughout an economy.

And so IMPLAN attempts to capture all those linkages and all that economic activity in the model.

I framed up the inputs for workforce development above, with characterizing both the number and type of workers that will be needed. We applied salary information and BLS SOC codes to determine overall values for those inputs. I did not discuss about seaport development and the

training center as you heard from this morning on seaport development from Moffatt and Nichol and others.

So we used $124 million estimate created by Moffatt and Nichol for the Humboldt marine terminal to bound seaport development as an input. We saw that as a three-year outlay for the model, as that would take a couple years to get the port up to readiness.

But we did not look at a multi-port strategy. I will say that. Our work began a little bit earlier than being ready to do a kind of expanded port terminal assessment. So we just stuck with the Humboldt area. As we knew that money was already flowing there, it seemed like a good case study.

As for the larger study, we also performed a training needs assessment -- this is in our larger document -- which assessed the need for a hands-on training center and also a new curriculum. I've touched on curriculum briefly in the interview summaries. But we found the New York's training center to be -- which is in development now, is a $20 million investment on a public-private partnership level that was

probably most reflective of what we considered would be necessary for the state.

We assumed this training center would be a hands-on laboratory likely sited near the port where the manufacturing is happening, so that these workers can actually get skills and training with the exact equipment that they will be constructing and using.

So that was our other input there for a training center, $20 million over two years. So we did a few variations on the model. We did two different geographies. We did the entire State of California and the four county area surrounding the Humboldt marine terminal, which included Humboldt, Del Norte, Mendocino, and Trinity Counties.

We took this approach because it seems this was a very successful model on the East Coast, harnessing an entire region's economic capacity to create a local supply chain and logistics hubs for offshore wind support. Some of these are happening at the project level back east. But, again, those states are typically trying to compete with each other in some instances, and California is a little bit in a

unique position where it doesn't necessarily have to throw itself into competition against other states right away. So there we have our two study areas.

And lastly, we also included a toggle for policy and without policy. This reflects the opportunity California has to institute supply chain policies. This was an adjustment in IMPLAN for local content share. And it offers a comparison of the benefits of what would happen if the state did essentially nothing, which is the standard IMPLAN toggles, versus what it would look like if they put into place ambitious, beneficial economic policies to capture some of that supply chain benefit.

Okay. So that is our modeling framework. I hope it helps make clear why I was discussing some of these slides up above and how they all feed together now.

So, if you can, please give me the next slide, and let's get into some results.

All right. So here's a snapshot. This is an output table from the IMPLAN model. Our document is chocked full of these kinds of things. So if you're looking for more granular

findings, please access that. This table here is presented for a near-term in 2025 that will provide somewhat of a relative economic baseline, and also the long-term forecast for 2045, which shows the full benefits at maturity. So we wanted to give both comparisons of, what would this look like immediately and in the near -- in the long future?

The figures provided here are annual estimates in 2022 dollars, and they are not a cumulative rollup of prior years' benefits. So the numbers you see for 2045 are for 2045. They are not the additive cumulative rollup for years prior. And so, yes, you could see how these annual benefits would also be recurring, you know, year after year. So please keep that in mind when considering these numbers.

These also include all induced, direct, and indirect impact. So this is a full rollup for all the findings.

Okay. So we found that the state can secure almost upward of 20-percent more annual benefits if they institute beneficial supply chain strategies, for economic activity, jobs and labor income in particular. For fiscal revenue,

we saw that it wasn't quite 20-percent, but, nonetheless, still added a benefit there.

Even without any beneficial supply chain strategies, the state can expect to secure upwards of $5.8 billion forecasted for economic activity. That is a measure of GDP. Fourteen thousand new jobs, 1.3 billion in labor income, and over 385 million in new fiscal revenues. So just hugely significant economic statistics.

Next slide, please.

So we also ran the model for the Humboldt region, the three counties surrounding Humboldt County. This gives us an understanding of how workforce development and seaport development would impact those prospective seaport areas. We see these areas serving as somewhat of an offshore wind hub for manufacturing, logistics, and shipping, which was pretty framed this morning.

So, as you can see, we found that this area would realize an enormous increase in economic activity and that the supply chain policies would even further benefit the study area more than a statewide, so -- providing almost nearly 33 more -- 33-percent more benefits

for specifically this region.

This is a really interesting finding. Whereas no one -- or people would think that statewide policies would have a larger benefit over the course of a larger geography, not in this case. These policies would even have a greater and more potent impact on a regional level, especially for those areas that are expecting to have seaport development or redevelopment or improvement on any level.

And so you can see kind of a center of gravity here that we are envisioning for these seaports serving as hubs. And, you know, for this region specifically, offshore wind will become a dominant economic driver, I mean, providing 5.1 to $6.8 billion annually in economic activity. This is an enormous amount of spending and investment translated into economic activity, jobs, and paychecks, and tax revenues. But in summary, offshore wind could fundamentally change this region's economy by 2045.

Next slide, please.

Okay. So this is a breakdown. I wanted to show the difference between direct impacts, indirect impacts, and induced here.

We can see that the direct impacts constitute over 50-percent of the overall benefits, but there's also the presence of a strong multiplier or ripple effect resulting from this new direct economic driver in California. Those are seen in the gold and the gray.

These economic opportunities are somewhat rare. It's not every day that a state is positioned to create a whole new industry. And so that is kind of the take-home message from this graphic is that while we are expecting direct benefits on a large level, 1.5 billion in 2030 -- in 2045 -- 3.7 billion by 2045, you cannot discount the linkages and multiplier effect that this industry will have in a far-reaching way into other sectors, other types of positions, and everything else. And so a large ripple will be dropped here in the water.

All right. Let's close it out.

One more slide, please.

I wanted to leave you with a small parting gift here. In developing our assessment with CEC, we compiled a thorough bank of offshore wind references that focus on workforce and seaport development. All of our references

include live links. And so I'm hoping that this is a researcher's best friend. Hopefully, it saves you time in hunting around for key sources. And then it also, you know, helps kind of substantiate a lot of the findings that we were including in our paper as well. And so -- yes, I hope -- I just wanted to make sure that all other analyst, consultants, researchers, everybody else out there was aware that this existed. So to save you some time in googling, it's all in one place in about a 10-page document at the end of our report.

Okay. Last slide, please.

Thank you very much. I would gladly answer any questions that you may have, and I appreciate your time this morning and your efforts in planning California's offshore wind future.

MR. DEAVER: All right. Thank you, Ben, for that -- your presentation. And just a reminder, we are going to have time for questions and answers after the next presentation.

So next, I would like to hand it over to Brooklyn Fox from Xodus and Josh Williams from BW Research. They're going to present on their AB

525 workforce readiness plan.

Josh and Brooklyn, please go ahead and turn on your cameras, which I see. I will hand it over to you two.

MS. FOX: Thank you, Paul. Hi, everybody. My name is Brooklyn Fox, and I am with Xodus.

So Xodus, the company I work for, it is a global offshore energy consultancy. Our renewables division are leaders in offshore wind energy. We have actually supported the development in some of the earliest floating offshore wind projects globally. So from early site development to industry development, we offer strategic advisory to both public and private sector clients. And we did this work joined with BW. And I'll have Josh give a little intro on BW as well.

MR. WILLIAMS: Great. Thanks, Brooklyn. Brooklyn and I are going to try to tag team this. So we'll see how well that goes.

Yeah, BW Research is a full-service research consulting firm, really focusing on, you know, economic and market research. And our area really has been doing a lot of work at looking at

and modeling both, you know, how the transition to decarbonized economy is affecting the world of work, with a fair bit of work specifically in offshore wind and the wind industry. So I'll -- with that, I'll turn it back to Brooklyn.

MS. FOX: Thanks, Josh. Yeah, so you just saw a presentation on workforce and economic benefits. I just want to highlight the fact that this presentation is different. You know, we really looked at the workforce development needs as it pertains to port upgrades and supporting the offshore wind industry.

We worked with Moffatt and Nichol -- we were subcontracted by Moffatt and Nichol to produce these results directly with their port upgrade results. So you'll see how our work is closely aligned with each other.

Next slide, please.

So I'll just quickly run through what we'll be talking about today. We're going to give you a brief snippet into all of the work that we've done thus far. So, you know, we'll give you a brief overview of the methodology. And then this work was conducted in three phases.

So, first, we looked at the workforce

demand for just -- for not only the offshore wind industry but port upgrades as well, as outlined by the port upgrades in the port readiness plan from Moffatt and Nichol.

And then we looked at the workforce capability assessment. So what exists in California, right? What does the workforce landscape look like? What does the training landscape look like? And this included executive interviews of developers, labor unions, and other training institutions.

And then from phase one and two, we went on to a gap analysis and really overlaying this regionally and seeing where the gaps exist.

And through all of this work, we were able to make recommendations.

Next slide.

So starting with the methodology --

You can continue.

So for the port upgrades, we used IMPLAN, an input-output modeling tool. And this is really good for industries that are, you know, standardized and known. So we did this for the port upgrades. And the port activities were grouped into four regions, so the North Coast,

Bay Area, Central Coast, and Southern California.

So these inputs, again, I'll keep reiterating, came from the results of the port readiness plan from Moffatt and Nichol. So they provided the port locations, the investment, the timing and duration of construction, and then what these ports could actually be used for.

Next slide.

And here is a nice, you know, snippet of the construction years for each of these ports and what these ports are capable of being used for. And this is what went into our input-output model.

Next slide.

For the workforce needs assessment for offshore wind, here we did a bottoms up (sic.) approach. So we identified, you know, the roles, the number of workers, the education requirements, the qualifications needed in the workforce -- directly required in the development, manufacturing, installations, and operations and maintenance of commercial scale floating offshore wind projects.

So we considered 17 individual projects that would need to be installed to meet the 25

gigawatts by 2045 goal that the State of California has.

For each of these projects, we also considered the development timeline, so when that specific workforce will be needed. So table one shows the installed capacity to be considered, and table two shows the years relative to that installed capacity that the workforce was considered.

So I want to highlight that the workforce considered in this study is the workforce required at the endpoint in the supply chain. So, for example, we wouldn't consider the workforce that created the -- you know, supplied the raw materials. We're just considering the workforce at that manufacturing facility.

And we considered three different scenarios to reflect varying levels of local content. So there was a baseline, a medium, and a high scenario considered.

Next slide, please.

We continued this work and looked at the workforce needed regionally. So here you can see -- figure two shows how we identified these ports in different regions, the North, Bay, Central,

and South. And based on the input from the AB 525 port readiness plan, different ports had different, let's say, capabilities, and they could supply different areas for offshore wind. And so we grouped those into the different regions as seen in table three, and we really analyzed the workforce in those regions in this way.

Next slide, please.

MR. WILLIAMS: Okay. After the team really looked at the workforce, you know, demand, the second phase was really assessing where a workforce supply is. And so looking at the -- kind of the workforce capability or the number of workers that are available -- kind of, any industries and the occupations related to both, kind of, port upgrades and the offshore wind work.

So we identified the relevant industries and the occupations using NAICS codes and SOC codes, and then really looked at, okay, so, you know, what is the baseline, or what's the employment in those industries now? And then what we expect them to be, you know, moving forward, based on kind of a -- you know, the BLS'

assumption around baseline economic demand, you know, in 2030, and really look at it in each of the four regions, given the difference -- you know, the scenarios in the first.

So we also then conducted executive interviews with relevant stakeholders, including the -- you know, project developers, training centers, unions, community colleges, maritime academies to not only look at, you know, okay, what is the, kind of, supply of the workforce, but what is the capabilities for training and education in each of these -- in each of these four regions.

And in the final phase of the study, we really did a gap analysis, and we looked at -- we kind of overlaid kind of the demand for workers and the current, kind of, supply of workers. We looked at -- really at two ways. We looked at it in terms of both the port upgrades and the offshore wind jobs for the port upgrades. We did it for year 2030, which is really, based on our scenario, kind of the high point of port upgrade employment. And then we looked at it, you know, in the offshore wind jobs for 2030 and 2040, 2040 being the -- kind of the highest year for

employment under the highest scenario. So -- and then we looked at -- you know, we looked, how big are those gaps? How big are they by, you know, occupational category? How big are they by sub-region or region within California? So those were the -- kind of the methodological underpinnings.

Let's go to the next slide.

MS. FOX: Right. And I'll start with, yes, the workforce needs assessment.

So what we have here, I'm looking in the left, is the workforce demand for an offshore wind as it relates to the baseline and the high scenario.

So in the baseline scenario, we consider, you know, no investment in major component manufacturing. So this is the workforce that just like, you know, logically needed to be there, right? So the staging and integration will need a workforce to support those ports and the operations and maintenance port, and then -- as well as, you know, project development facilities or project development supply could really come from any region. So we kept that in the baseline scenario as there are no necessary

investments in extra facilities to support that.

And in the high scenario, this is really our, like, theoretical maximum scenario, where we say there's three staging and integration ports, two blades, a nacelle, a tower, multiple foundation sites. So everything essentially could be supplied -- all of the major components supplied in California.

And, you know, what we -- you see from these results is the need for a significant California manufacturing workforce is really driven by the presence of these manufacturing facilities. And the manufacturing workforce is denoted in the green and the blue bars as the wind turbine supply and balance of plant supply.

Another important thing to know is that the most robust opportunity for California workforce is in the O and M phase because there will be, as Moffatt and Nichol had identified earlier, you know, several operations and maintenance bases that will be required to develop the amount of projects that will need to be developed through 2045.

So yeah, I just wanted to highlight those important key findings of ours and, you know,

also just recognize that in 2030s when we really start to see the -- you know, a bit of that increase in workforce needed in these manufacturing components, staging and integration, and -- you know, we have time to develop that workforce. It's still 2023. So we -- let's take our time and plan this out accordingly and strategically.

Next slide, please.

So now here are results when we took, you know, the port capabilities in each region, and then we mapped out what those workforce needs would be based on what they're capable of. So I just want to highlight, this isn't cumulative, you know. So when looking at the Bay Area in Southern California, this manufacturing workforce is, you know, not mutually exclusive. So if some of the wind turbine supply ends up in the Bay Area, then you may not necessarily need these facilities in Southern California. But it just gives a good picture if all of the regions were to be fully developed, you know, what these regions -- the maximum, you know, potential would be in these regions.

And I just really want to highlight that

the North Coast and Central Coast have this long-term operations and maintenance opportunity. And the Bay Area and Southern California are -- you know, they're very sensitive to the attraction of manufacturing facilities, so, again, with the blue and the green being the manufacturing workforce.

If we don't attract that manufacturing workforce, you know, we're needing somewhere around -- in the Bay area, you know, around 500 workers, compared to -- with the manufacturing of, you know, almost -- between 1,500 and 2,000. So I just wanted to highlight that in our findings as well.

Next slide.

So the workforce demand for port upgrade specifically. So these results are showing if all of the ports were to be realized and upgraded as identified in the port readiness plan. So, you know, these are -- this will be a -- you know, a massive, large -- a massive-sized workforce required. And, you know, with that workforce dropping off in 2030, as most of those ports will be completed by around year 2030, you know, there is a potential opportunity for that

workforce to then transition and start supporting the offshore wind industry as well.

Next slide.

And then looking at this regionally as well, so where these workforce numbers are to be -- where these port upgrades would be located, where this workforce would come from. You know, this is directly related to the investment size in these port upgrades.

So with large investments in Southern California, we're seeing, you know, a pretty sizable workforce required to achieve these port upgrades in over a pretty long period of time as well. And yeah, just to highlight that, on a previous slide, you know, we mentioned that over 70-percent of this workforce is really in the construction. So we're really going to have to recruit quickly, you know, a construction workforce to realize these port upgrades.

Next slide.

And I'll let Josh take this away.

MR. WILLIAMS: Okay. Thanks, Brooklyn.

So what we're looking at -- what you're looking at here is the phase twos then -- you know, if what Brooklyn was just showing you was

the -- what the demand for workers are going to be, the second phase really looked at what is the -- what is the supply of the workforce in each of these regions, each of these sub-regions that -- you know, where the port upgrades, and then the offshore wind work will be happening.

And so for the supply, we looked at -- you know, we identified kind of the -- kind of the six major occupational categories. And you can see the total number of current employment in each of these occupational categories by the Bay Area, you know, North Coast, Central Coast, Southern California.

You know, I mean, what this tells us from a workforce perspective is that, you know, in the Bay Area in Southern California, you have, you know, relatively large numbers of workers in these occupations that are going to be impacted by this work -- by the work that Brooklyn was just talking about. And you can see that the numbers are considerably lower in the North Coast, in the Central Coast, meaning that, you know, in the Bay Area and in Southern California, your strategies are really going to be around transitioning and developing workers that are

already in kind of comparable occupations and getting in.

In the North Coast, the Central Coast, you're going to have to find new workers to really move into these occupations. Just the workforce isn't probably large enough. And we see that kind of verified in the gap analysis. So this is kind of your number of total workers.

Let's look at the next slide.

The next slide really looks at that -- you know, kind of concentration of workforce. And what that means is, you know, in each of these regions, how concentrated is work? You know, for example, the Bay area has a really high concentration of professional service occupations. In Southern California, we have a high concentration of production occupations. You know, any number above 1.0 is above kind of the average for industry or occupational kind of employment.

You can see that North Coast and, you know -- and to a lesser degree, the Central Coast tends to not only have lower numbers in total workforce, but their concentration in these kind of key occupations is a little bit lower as well.

You could see in the North Coast, the -- you know, the concentration of production occupations are almost half of the state average at about 0.52.

So, again, we looked at the research and also looked at kind of demographic profiles, educational attainment and kind of, you know, a lot of these factors that describe the kind -- the current workforce supply in each of these regions.

We also -- we looked at kind of average commute times in each of these sub-regions to really pull from the areas that were examined.

Next slide.

So in the final -- in the third phase, we -- you know, it's the gap analysis we did. We did two things. We looked at -- and on the right, you see table five, which is really looking at kind of the demand or the gap. So we looked at the current supply over -- you know, we used a baseline economic number. We used the BLS 2030 estimate for employment in each of these occupations.

And you can see in the North Coast that the increase in workers is more than 100-percent

greater than what it is under the baseline forecast, you know, provided by the BLS for -- you know, for that region and those occupations.

And, you know, the challenge in the North Coast really is you will require an upskilling of the current workforce, but you're also going to need a sizeable increase in the total size of, you know, the -- of the working age population that would -- you know, could do this infrastructure upgrades and work in the offshore wind industry.

In the North Coast, there's a lot -- you know, the gap analysis also includes really kind of detailed information. We know that, you know, the largest demand of construction labors of our four regions will be in the North Coast. And pretty much all of the occupations in offshore wind and port upgrades have a considerable jump from kind of the baseline reference to -- you know, to our scenarios for workforce demand in both port upgrades and offshore wind.

The Bay Area has a sizeable working population to draw from. And it's really about, you know, transitioning workers who are in comparable industries and occupations to -- you

know, getting them to work in the port upgrades and offshore wind. And there's, you know, a stronger kind of training programs and resources that are already available in the Bay Area, but, particularly, in the next slide, in Southern California.

So we did this gap analysis in each of the four regions. Central Coast also -- and the gap to the right -- now you're looking at the -- this is for offshore wind activity, you know, on the table to the right. And it's looking at, you know, the Central Coast.

And you can see that there are -- that a lot of these occupations, these are largely in -- these are -- operation and maintenance positions are expecting an over 100-percent increase, you know, out of, I think, you know, seven of the -- of the 10 occupations that were identified in this table.

You can also see that Southern California also has kind of specific needs. You know, welders are an area of -- there's going to be a big jump. But Southern California also has the largest -- in terms of the training and educational resources, is the most well-resourced

for offshore wind as well.

Okay. Let's jump to the next slide.

And I turn it back over to you, Brooklyn.

MS. FOX: Take this away, yeah. So, you know, after doing all of this work and looking at this gap -- the gap analysis, we really saw the workforce development in three stages.

So, first, it's going to be very important to prepare the workforce to design and build the required infrastructure. So we need to get that workforce ready to, you know, construct the transmission upgrades and the port upgrades, these very important infrastructure that's required in order to make, you know, California successfully build out their offshore wind industry, especially with local content.

And then, you know, the next phase would be to attract that local manufacturing to the State of California, and then develop the manufacturing workforce, because timing is really important in training your workforce. And we want to make sure that if we're training the workforce, then we have the workfare. So first attract the manufacturing, and then train that workforce.

And then the third phase or the third stage is really to build up those long-term O and M capabilities, specifically in the North and Central, while also building out, you know, project development capabilities. As we saw, this was a really great opportunity for the State of California to be prepared for as well.

Yeah, just to highlight again, what Josh said is that the workforce development will be needed, you know, most immediately in the North Coast and, you know, could pose a significant challenge combined with some larger challenges in the area in the North Coast.

But yeah, so this was just kind of a summary of what we found. And now we can go into some recommendations on the next slide.

So our recommendations were developed around five themes.

And the first recommendation -- and it's really about the planning, coordinating, and also permitting of projects smoothly for the State of California.

The second recommendation is really about building out pipeline of workers needed in California.

The third recommendation is really around transitioning and upskilling the existing workforce in California.

And then the fourth one is around, you know, ensuring all entities are on the same page and that we're working collaboratively, because this will be really -- this will be required in this industry. It's a complex industry.

And then recommendation five is really around maximizing opportunities and incentivizing California to be the global leaders in the floating offshore wind industry and, you know, having innovative ideas, technologies, and then preparing suppliers and the workforce to react to the industry changes.

So we can go to the next slide where we dive a little bit deeper into these recommendations.

So the first recommendation, while I -- you know, we've heard the -- from feedback, you know, this would be very -- this could be a challenging recommendation, right, to identify a primary state agency for California's offshore wind industry. But, you know, we're talking about, you know, very massive billions and

billions of dollars of infrastructure projects that are pretty complex, and they really need to be organized. And in order to ensure that there are not redundant efforts in the work that we're doing, it'll be really important that we do have some sort of a centralized body that's helping to lead and organize these efforts, whether it be, you know, state-led supply chain and workforce development programs.

We could use these to leverage funds for DEI and offshore wind workforce programs. And this is really learning from the East Coast. We talk about not having to reinvent the wheel, and we see on the East coast like MassCEC and NYSERDA having this kind of centralized body. And it's been really helpful in developing the offshore wind industry on the East Coast.

And then I'll have Josh do the next few recommendations.

MR. WILLIAMS: I think one of the things we also found is the need to really -- one of the challenges is the workforce challenges -- you know, California is, you know, a big state, the fourth largest economy in the world if it was its own country.

The challenge with that is that the workforce needs and investments are very different in what you're seeing in the North Coast versus, say, Southern California, right? You know, the North Coast has specific needs for -- I mean, they're going to need workforce housing at some level, just given the -- kind of the size of the workforce that will be needed, given the -- kind of the current workforce population. Whereas in Southern California, your needs are really more about kind of transitioning current workers and maybe even transitioning some of those workers that are seeing, you know, less opportunity in industries that are declining.

So developing and aligning, kind of, these regional workforce needs and, kind of, port investment strategies with each of the regions is important. And we think of -- you know, there's -- there needs to be some shared programs and resources that expand the pipeline, you know, particularly in some certain occupations. And then we think there needs to be, kind of, you know, coordinating of the transmission upgrades, you know, not just with, you know, offshore wind, but with the other renewable energy and

decarbonization, you know, technologies that are -- that are part of the larger, you know, climate plans.

We also then, you know, looked at kind of developing shared training programs and the need to look at, you know, programs particularly around, you know, for electricians, for project managers and construction supervisors that allow them to take their -- you know, their current industry and occupational expertise and really transition over to, kind of, port upgrades and offshore wind work.

These are occupations that are going to have a -- you know, a large demand, and you're going to want to develop, you know, training -- shared, kind of, training tools that allow people to transition quickly into these industries. And then also connect that with the -- you know, the educational pathways in the high schools, the community colleges, even middle schools.

Next slide.

You know, another thing that we think is really important is kind of early engagement with unions, education and workforce entities, planning entities. We think there's

opportunities for -- you know, a need to bring these -- you know, these different workforce and education and training institutions together and really connect them with the planning entities and the scenarios that they're looking at for these different workforce needs and also even connected to the larger, kind of, decarbonization effort and the workforce needs there as well.

There is -- you know, if you look at the data, you do see some volatility or some, you know, increases in areas, decrease in others. How do you help people transition and move from, you know, declining industries and occupations to increasing ones, particularly given all the -- you know, the expected change in transition?

I'll turn it back over to Brooklyn.

MS. FOX: And close it out with our last recommendation. So this one invests in research and innovation for offshore wind industry through, you know, innovating the technology, the manufacturing, the way that we're staging and integrating the used components.

So this is really important for a few things. You know, one, it will, you know, as I mentioned before, really incentivize California

to be global leaders in this industry and come up with innovative solutions. And, secondly, in order to develop the workforce, we do need to have some standardization around the approaches.

So, you know, expansion and development in the floating offshore wind industry is going to keep happening. And so it's a topic that definitely needs to receive money and be monitored so that both the suppliers and the workforce can just be prepared to react quickly to these changes and upskill the workforce as needed, as we may be changing the approaches in manufacturing and the -- yeah, just the creation of these projects.

So I think that really kind of closes out our recommendations, and that really ties it all together.

If you go to the next slide.

Yeah. So thank you for joining us. We are both very excited to be presenting the work that we've done -- both of our teams have done and with Moffatt and Nichol. So I think we can now hand it back over to the CEC.

MR. DEAVER: All right. Thank you, Brooklyn, and thank you, Josh, for presenting on

your workforce readiness plan, and then talking about some of the challenges and strategies.

We're now going to open it up for questions and answers on these presentations.

So for this part of the agenda, I would like to invite Hilarie Anderson to provide instructions for the Q and A portion.

I hand it over to you, Hilarie.

MS. ANDERSON: Great. Thanks, Paul. We're now moving to question and answers, and this is going to be based off of what we heard this afternoon.

So thank you, Ben, for turning on your video in case you have any questions for you.

So we're going to be utilizing the raised hand feature. So when you're in the Zoom, we're going to have you click the raise hand icon -- it looks like an open palm at the bottom of your screen -- and utilize that so that we can -- it'll indicate that you want to make a -- to answer -- ask a question.

And just a reminder for -- if you have comments, please hold them until the public comment period that we'll be doing at the end.

And then if you are calling in on the

phone, hit "star nine." That will raise your hand. And then "star six" to unmute.

So once I see that you have your hand raised, I'll ask you to state your name, any affiliation if you have any, and then ask your question.

So right now, I just see Adam Stern.

So, Adam, you should be able to unmute on your end.

MR. STERN: Yes, thank you. Adam Stern with Offshore Wind California. Great presentation from Xodus about the job side of this.

I'm curious whether you did your own modeling of the jobs, or did you rely on other studies in recent years that have tried to estimate how many jobs would come from this industry.

MS. FOX: Hi, Adam. Thanks for the question. Yeah, so we did take kind of a few different approaches to that. So we created our own model, and this came from not only, you know, just our experts' knowledge of the industry having worked in -- you know, directly in these projects, but also doing some outreach to

different OEMs and different suppliers to understand the workforce numbers.

And the reason we did do this approach is because we thought it was very important to understand the number of people actually needed to be trained as it relates to the offshore wind industry. And that's why we looked at those in the endpoint of the supply chain.

MR. STERN: Thank you.

MS. ANDERSON: Okay. Thank you, Adam.

Okay. Do we have any other questions? Commissioner Gallardo, please go ahead and ask your question.

COMMISSIONER GALLARDO: (Speaking Spanish). Good afternoon. This is Commissioner Noemi Gallardo.

Brooklyn, Josh, Ben, you did a fantastic job. Thank you so much for sharing your insight with us. I am the newest commissioner. I don't oversee offshore wind, but I'm just fascinated by it and really looking forward to -- you know, the impacts that it can make.

Ben, this is more of a comment for you. I really appreciated how you emphasized that, you know, potentially this is a fundamental change to

our economy by 2045. You know, right now we're the fourth largest economy in the world, and maybe that's going to move us up, and it's significant.

And then also your emphasis on how we're creating a whole new industry and how usually that doesn't happen, and, you know, that's a huge opportunity for Californians, and then, you know, potentially others.

And then I also appreciate, you know, the emphasis you made on the multiplier effect and how, you know, those ripples will also create other types of opportunities that aren't directly related, you know, to offshore wind, but will be -- you know, will be created. And then Brooklyn and Josh -- or Ben, sorry, did you have a response? I just wanted to uplift --

MR. POGUE: No, I appreciate it. You're on it. Even in a $3.7 trillion economy, this is significant. And so -- and like I mentioned in my presentation and you just did, it's fairly rare that these opportunities come around to create an entire new industry. So thank you very much, Commissioner. I appreciate that.

COMMISSIONER GALLARDO: Absolutely. I

think -- you know, that's part of why I am fascinated by what's going on here.

And then, Brooklyn and Josh, I also appreciated your emphasis on all the needs. And it stood out to me when you said that there's about seven out of 10 occupations that will require 100-percent growth, if I understood correctly, to be able to meet the needs that we're creating here. Yeah, that's kind of -- you know, it's exciting, and then it's kind of scary.

And I'm curious if there are any best practices from either the East Coast, you know, in the United States or our European partners who are, you know, doing this work that we can learn from. I know you had the recommendations. I'm just curious if there, you know, are any similar situations in those scenarios that we can learn from and, specifically, best practices?

MR. WILLIAMS: Brooklyn, you want me to jump into this?

MS. FOX: Yeah, you can jump into this one.

MR. WILLIAMS: Thanks, Commissioner. Great question. I will say, offshore wind is one of the areas where the East Coast is, you know, a

little bit of ahead of California, largely because, you know, the difference between, kind of, anchored technology versus floating. So, you know, I think both New York and Massachusetts and even New Jersey, you know, have some examples of kind of training programs that have allowed people to get in and move quickly and kind of learn. And I think those probably are the -- you know, are best examples of kind of some of the offshore wind training programs that have gone quickly.

But you're right. I mean, you remember those numbers correctly. In places like the North Coast, it's a -- more than 100-percent increase in those occupations. So we will need to look at, you know, kind of, concentrated training platforms and, you know, developing pipelines that move faster than maybe we typically like or are used to. So yeah, and I think, you know, New York, Massachusetts, New Jersey, I think, probably all provide the best kind of models for that type of concentrated employment activity, or I should say training activity.

COMMISSIONER GALLARDO: Excellent. Thank

you.

And, Brooklyn, I don't know if you want to also add on, but I did notice in the slide -- I think the section that you were talking about at the beginning about having a primary agency that's helping centralize all these things that we got to talk about, right? It mentioned in there, I think, DEI efforts, and so I was curious --

MS. FOX: Uh-huh.

COMMISSIONER GALLARDO: -- if you could expand on that.

MS. FOX: Yeah, definitely. So yeah, one thing I want to say also is, you know, we're learning from the East Coast, but it is still early days for the offshore wind industry in general. So we'll be continuing to monitor and learn from what the East Coast is doing in terms of building up their workforce, right, to deliver these projects as we see them get delivered.

And in terms of DEI efforts, you know, one thing I really applaud Massachusetts for doing is -- the MassCEC. They have targeted, like, internship programs. They have targeted workforce grants as it relates to, like, DEI

initiatives. And, you know, they gave out -- I don't know how much it was in funding, but it was a project I also had worked under where -- funded through MassCEC.

I went to different universities and high schools and just talked to them about the awareness of offshore wind. And these were really targeted groups. So they were -- targeted the underrepresented communities. And I think that that's something that the West Coast can replicate and, I think, works really well.

COMMISSIONER GALLARDO: Excellent. Thank you. And just to make sure we're clear, DEI is referring to diversity, equity, and inclusion?

MS. FOX: Yes. Yes.

COMMISSIONER GALLARDO: All right. Well, thank you so much --

MS. FOX: Yeah, thank you.

COMMISSIONER GALLARDO: -- for responding. I appreciate all of you, again, joining us and, you know, educating us further on, you know, all these exciting efforts happening.

Hilarie, I'll turn it back to you.

MS. ANDERSON: Thanks, Commissioner

Gallardo.

Okay. It looks like we have another question from Nancy.

Nancy, you should be able to unmute yourself. Go ahead and state your name and affiliation again.

MS. KIRSHNER-RODRIGUEZ: Great. Thank you.

MS. ANDERSON: Thanks.

MS. KIRSHNER-RODRIGUEZ: Nancy Kirshner-Rodriguez with the Business Network for Offshore Wind, and, of course, this is the area of our focus. And I guess one question I have is, did you also do a lot of analysis of the sort of more built-out European industry and -- as well as taking a look at the efforts that the East Coast, which, while in its infancy in many respects, is so much more mature than the West Coast due to the many years of, you know, development stops and starts that we are now finally seeing a build out on. But I'm wondering about the -- whether you also took a look at different ways that the Europeans have been building out their industry.

MR. WILLIAMS: I don't want to speak for everybody, but we did look at some of the

workforce needs and growth patterns in Denmark, in the UK, in Amsterdam. Those are probably the three best examples that we looked at, really on a -- just an anecdotal case-by-case study. We didn't really, you know, build models around them. BW has done a lot -- a fair bit of the workforce work in --

MS. KIRSHNER-RODRIGUEZ: Yes.

MR. WILLIAMS: -- New York, in Massachusetts, in, you know, a lot of those states. So yeah --

MS. KIRSHNER-RODRIGUEZ: Yeah.

MR. WILLIAMS: -- we looked at those as well.

MS. FOX: I can answer for us as well. And so in terms of our model, like, you know, we validated our model against, you know, existing facilities and projects. And in terms of our recommendations, you know we do work closely with our team in the UK as well.

MS. KIRSHNER-RODRIGUEZ: Yeah.

MS. FOX: So I think taking this, like, collaborative approach is definitely something that we got from, you know, over the UK, overseas. So I think in general, our

recommendations always have -- are inherently modeled a bit by, you know, what the UK is doing, because our industry development team is always looking closely globally what's working for offshore wind.

MR. POGUE: Yeah. And I'll just conclude here too, Nancy. Thanks for the question. We looked at abroad primarily for supply chain and workforce standards and seeing how they have done it and the successful models that they have used to train their workforce and capture some of the economic benefits from these projects. And so no models -- and as Josh was mentioning, we didn't do anything original like that, but we did do a thorough case study review and kind of cherry-picked the lessons learned, the pitfalls, the critical issues, things like that from those other areas.

MS. KIRSHNER-RODRIGUEZ: Great. And just to comment further, I'm not sure if -- I know that Xodus was involved, I'm not sure about the other organizations here, but we just completed our second workforce summit in collaboration with our international partnering forum, and I want to -- I will make sure that I get the information

gleaned from that to all of you as we all look forward for the West Coast workings and next steps, because I think there's definitely some good synergies there.

MS. FOX: Thank you for your question, Nancy.

MS. ANDERSON: Yes, thank you very much, Nancy.

I'm not seeing other hands, so I'm going to ask for the -- this is your last call if you have a question for these panelists. Great. We have a hand. It looks like Thalia Kruger. Hopefully, I pronounced that right.

I'm going to open up your line. State your name, any affiliation, and then ask your question.

MS. KRUGER: Yeah. This is Thalia Kruger with Principle Power. Thank you very much. This is a very thorough report. Just -- I have a question, because I have been looking into the World Bank. Probably you have seen the report from the World Bank for emerging markets. And in the World Bank, the data that it is about -- for job creation mentions the full-time employment -- yeah, it's a full-time equivalent, I'm sorry.

Full-time equivalent. So I don't know if you have seen the data -- whenever you were doing your calculations, if you have seen or have the data about the full-time equivalent of the jobs creation.

MR. POGUE: I can say from our analysis, FTEs are the standard for calculating numbers of jobs and things like that. I have not -- I did not use the World Bank metrics for those calculations on this. A lot of that is inherent to the IMPLAN model and things like that. So no, sorry, Thalia, I didn't use the World Bank information on our analysis.

MS. KRUGER: Okay. Thank you.

MS. FOX: I can reiterate on that as well, that, you know, our results, you know, for -- to analyze the workforce needs for the offshore wind upgrades, we used a bottom-up approach, where this is looking at the actual number of individuals required that -- you know, that need to be trained in that endpoint. So it's not going to give you the same results as the FTE values would. So yeah, we didn't use FTEs in our study.

MS. KRUGER: Thank you.

MS. ANDERSON: Thank you. Thank you, Thalia, for your question.

Now, we're going to go on to our next one. It's Mike Okoniewski.

I have opened your line. If you can unmute yourself. State your name, affiliation --

MR. OKONIEWSKI: Mike Okoniewski, West Coast Pelagic Conservation Group. And I guess one question I -- maybe I missed it in the discussion. I had to leave for a little bit. But the question is, who is managing the assembly plant or operations, or what entity takes responsibility for that?

MS. FOX: I'm sorry, can you repeat in terms of, like, what -- could you clarify a bit what you mean by what entity?

MR. OKONIEWSKI: Which organization will run, manage the assembly of the machinery? Not the manufacturing but the assembly.

MS. FOX: I think, you know, this is still early to -- like, to know who would be running and operating. This, we -- you know, we have outlined some ports that would be good options as outlined in the Moffatt and Nichol study. And so we know the locations, but we

don't know yet who would be operating or running those. I think it's still a bit early to understand that.

MR. OKONIEWSKI: So yet to be determined then.

MS. FOX: Uh-huh.

MR. OKONIEWSKI: Thank you.

MS. ANDERSON: Okay. Thank you, Mike. This is going to be our last call for hand raise -- to raise your hand for -- to ask a question for this question and answer section. Okay. I am seeing no hands raised. Still none. Okay.

So I'm going to pass that over to Paul because I think we are moving on to a break.

MR. DEAVER: All right. Thanks, everyone. This wraps up our question and answer period for the afternoon, for these presentations. Before we get into the afternoon panel discussion, we're going to take a break, and we will reconvene right at 3:00 o'clock. So that's about 15 minutes. So we'll see everybody back here at 3:00 for the workforce panel discussions. Thank you.

(Proceedings recessed briefly.)

MR. DEAVER: Welcome back, everyone.

We're now going to get into the panel discussion in the afternoon on workforce development. And I'm going to hand it over to Ben Pogue from Catalyst to introduce the panel participants, and then start the discussion.

Can Ben and the other participants please turn on their cameras? All right.

Take it away, Ben.

MR. POGUE: Thanks, Paul. Hi, everyone. Ben Pogue with Catalyst Environmental Solutions, again. I am going to be your moderator for this afternoon's panel on workforce development and training.

What we've done is convene a few experts in this field, some who are actively living this in California, some who offer lessons from the east and elsewhere from other industries.

So I have six primers today for discussion topics. If we have any time left over, I was thinking maybe we could do a raised hand feature with the audience, if anybody else has any questions for the panel. But we're set for about an hour here.

And our format is, I will read the primer, and the panel will just take it away. I

will likely pick a person to start us off on each question. But otherwise, this is going to be kind of a free for all from -- for our panelists, and I'm hoping that they have a lively conversation here.

So, with that, I would like to go ahead and introduce our experts.

Jeff, I have you -- I see you first. If you wouldn't mind, go ahead and introduce yourself, and give us a quick overview.

MR. ANDREINI: Sure. Not a problem, Ben. Thank you.

And thank you to everybody for letting me have the opportunity to be a part of the panel here this afternoon.

My name is Jeff Andreini, Vice President of Crowley Wind Services. I've been with Crowley for 45 years this August, started up the wind division in January of 2020. We are a leading supply chain provider for both construction, installation, and operations and maintenance, getting started with our first work here in the month of May moving a substation out of the Gulf of Mexico to off Rhode Island for the South Fork Project, to be followed up by a couple of other

kind of barge jobs, one in June, and then another one for the transportation of the WTGs for Southport. That will take place later in the fourth quarter of this year. And excited to be here, both with you, Ben, and the rest of the panelists.

MR. POGUE: Thanks, Jeff. I appreciate you making the time, especially while you're away.

How about Scott Lewis? Could you go next, please?

MR. LEWIS: Yeah. Thank you, Ben.

My name's Scott Lewis. I have been a carpenter now for 37 years. I've been training members in Northern California for over 26 years. Carpenters really look forward to this opportunity to build communities and relationships in the North Coast. We're looking to expand our training and our efforts in the community for economic development in a positive manner and building that local workforce.

So being the executive director for NorCal Carpenters Training is that collaborative working with the contractors, working with the union, working with the community-based

organizations. And we look forward to this whole venture, and we're excited for the new opportunities in Northern California.

MR. POGUE: Great. Thank you, Scott.

Let's go to Robert next.

MR. COLLIER: Hi, I'm Rob Collier. I'm External Relations Director of Floventis Energy, which is developing the CADEMO offshore wind project. It's a demonstration project in state waters off of Vandenberg Space Force Base. We expect to be in the water operations late 2027, which is about five or so years prior to the big federal projects.

We have partnered with key unions, the state building trades, and the IBEW 1245 in a high road training partnership grant, a three-year grant from the State Workforce Development Board to develop a cooperative, collaborative project for workforce training and supply chain analysis and really high road benefits maximization for our project, modeling our project for the rest of the -- at least early stage offshore wind projects going forward.

And I would be glad to talk about, as we go forward in this conversation, the lessons

learned that we have -- that we've developed from this very pragmatic empirical process. It's a very hands-on project because this is a real project that we are developing. And so I hope we are -- our lessons certainly are relevant to ourselves and to the rest of the industry.

MR. POGUE: Awesome. Thank you, Rob.

Mr. Adair.

MR. ADAIR: Hi, Ben.

My name is Scott Adair. I'm the Director of Economic Development for the County of Humboldt in California. We're one of the two communities of the West Coast which have been approved by Bureau of Ocean Energy Management for offshore wind development. As such, we are a stakeholder who is very much living and -- I would say and sometimes even dreaming offshore wind in our community right now.

We work very closely with Jeff and other partners. We're very excited about offshore wind development and the port development that will precede it. Our agency is responsible for providing support and staffing services to the county's Workforce Development Board, as well as administering the county's comprehensive economic

development strategy, local and regional workforce development plans, and our elected officials' board strategic framework for developing prosperity in the region.

MR. POGUE: Excellent. Thank you, Scott.

And, Jeremy, last but not least.

MR. STEFEK: Yeah. Good afternoon, everyone. My name is Jeremy Stefek. I'm a Workforce Researcher at the National Renewable Energy Laboratory or NREL. We're one of the Department of Energy's national laboratories. Within my role at NREL, I lead a lot of our wind energy workforce analysis activities.

So, recently, we published kind of a national assessment of the demand gaps, and then the opportunities to reach the Biden administration's goals of 30 gigawatts of offshore wind by 2030.

I also support a -- kind of a workforce assessment for a national-level supply chain and also reach those targets.

Yeah, so, glad to be here today and offer a little bit more of a national-level perspective in the conversation.

MR. POGUE: Fantastic. Thank you,

Jeremy.

And thank you all for participating in our panel this afternoon.

As you can see, we have tried to pick experts from different types of the industry that offer different perspectives. And so this should be a great little conversation that we have. So let's go ahead and get right into it.

The first primer we have here is called, Lessons from the East Coast. What can California learn?

According to the U.S. DOE, falling offshore wind prices, state-level commitments, and an unprecedented expansion into new leasing areas drove the U.S. offshore wind pipeline to grow 13.5-percent in 2022, with 40,000 megawatts now in various stages of development. While California is in a different position, not having to compete with lots of other states to develop supply chain capacity or training capacity, what are the one or two key lessons from the East Coast on building an offshore wind workforce that California can apply to be prepared to meet the impending demand for skilled labor, especially in the trades and technical occupations?

Jeremy, since I introduced you last, my friend, how about you tee us up here and go first. I'm wondering if you even wrote that little summary there.

MR. STEFEK: Maybe a couple of pieces of it. So I think, for me, one of the key lessons that we're learning from the East Coast is, like, how important partnerships and collaborations are to really having a complete pathway for workforce development.

So, for me, that complete pathway looks like industry talking with labor unions or community colleges and really sharing what skills are needed, how many workers are needed, when those workers are needed. So really having these, like, open, transparent dialogues between industry and, you know, the training providers.

But then that also includes collaborations and partnerships between states or -- like a state like California and actually those education institutions and those labor unions and those industry. So state -- states can play this really important role of collaborating but also providing funding and incentives to really set up training programs,

should be providing curriculum facilities to actually meet these goals.

So I think, for me, you know, partnerships and collaboration across the full, you know, pathway from students all the way to those students getting a job is key.

And then the one thing I would add is -- from like a -- more of the skilled labor standpoint, you know, I think California has a much longer right of way than the East Coast does to have -- to be supporting tradespeople.

So I just want to stress the importance of getting into high schools, middle schools right now, and really being -- and inspiring those students to want to enter these skilled trade roles, because, I think, like, looking across the nation, there is a critical gap for tradespeople across the board. So it's not uniquely a California problem, but it's a national problem. And just getting those students interested and excited about a career opportunity in the trades.

MR. POGUE: I don't necessarily -- Robert, if you want to go ahead and jump in -- guys, just go ahead and --

MR. COLLIER: Yeah.

MR. POGUE: -- chime right in.

MR. COLLIER: Yeah, let me jump in and say one thing. There's a lot of talk, deserved, about training programs, community colleges, et cetera, but really the bulk of training comes from apprenticeships and pre-apprenticeships, and those come from project labor agreements with the labor unions.

The main tool for worker training is apprenticeships that come through labor agreements. And those have to start -- as one developer who's finished our project labor agreement, we signed a PLA with the unions. It took us two years to negotiate.

It is no small thing to negotiate a PLA. It's complicated on all sides. You're negotiating between the unions and the company. Each side is negotiating with themselves as well. In order to sign a PLA, you really have to understand the supply chain, you know, what -- where all the pieces of the PLA will actually impact real jobs in -- for -- and real contractors in the project.

So I think the cart is the training

programs in community colleges and such. The horse is the PLA. And I really want to emphasize how important it is to get started on that sooner than later, because it will take a while. Companies will take up -- will legitimately have concerns about how it will affect their risk, or in-house lawyers will have significant concerns. It's going to take a long time.

So start sooner than later, because only once you can sign that, then you can start designing the apprenticeship programs -- well, the application of the existing apprenticeship programs, figuring out what new ones have to be created, and pre-apprenticeship programs, which are the best solution for equity and inclusion, for diversifying your workforce, pre-apprenticeships.

California's apprenticeship system and its pre-apprenticeships are very well developed. They're, you know, a road that has been trodden for a long time, and -- but you need to get started on that whole process of negotiating the labor contract first. It's not going to be easy.

MR. ADAIR: I can add, Ben. If I were to add to what Robert just said there, as a

Californian in a community where offshore wind is developing, who traveled back east, we're certainly first watching all of the documentaries. So we know what not to do and what to do correctly.

I joke at that, but really, we have the luxury, as a state who has come to this process and to this industry behind the East Coast, of learning from some of the mistakes but also from some of the successes that have occurred along the East Coast seaboard and where other offshore wind projects have been developing.

One thing that we have learned in our communications and our conversations with communities -- while, yes, to Robert's point, being proactively engaged and engaged early is key, so is not rushing the process or, for the sake of showing results to the community, moving more quickly than perhaps the community and the stakeholders are prepared to move.

When a project of this size hits a community, there is always an impetus for having to act very quickly and having action immediately. But, you know, as we've learned working with some of our own stakeholders on the

ground, working with companies like Crowley who are coming into our community to develop our port, we do also want to do it right, and we want to make sure that we're taking it in sequence and at a level of speed where we are doing things correctly.

MR. ANDREINI: Ben, I'll -- I'm going to be the -- I'm going to be the contrarian here. I'm not sure that we have figured it out yet on the East Coast, quite honestly. And in -- just knowing what I know about what Scott and his team is doing -- and the way they're going about it, I think, is in a correct fashion and format.

There's a lot of folks who run around and think that they're going to make money off of, you know, training people or educating people. And it leads us into a lot of different paths, quite frankly, that creates a tremendous amount of confusion, and that's what we want to avoid in the State of California. There's going to be enough challenges just trying to figure out how to get a labor force in Eureka, as an example, in a state that is that large and has, you know, certain economic challenges that it's going to have to overcome as well.

I would say one of the things that we need to do, and I hear a lot more about it now, and I'm thankful for that, is there's got to be a tremendous amount of outreach. And the outreach has to come to grade levels beginning at around sixth grade, because if you listen to -- you know, folks like Robert just mentioned when his project is going to be up and running -- some of the other projects just in the State of California. That's your audience. Those are the folks that you've got to get excited about the opportunity.

And a lot of you have heard me say this before. It's not just mariners, and it's not just technicians. It's got to be folks who are going to be on the ground in the sciences, in the math, in the information technology, because that's really what's going to drive forward this industry, okay, autonomous vessels. It's not about mariners. The utilization of drones in order to do your operations and your maintenance and repair. Those are the people that we need to look for and get excited about what's in front of them. You know, really as I've said to Scott before, you know, a generational change in

opportunity for everybody in this conference and their families and their families' families.

MR. LEWIS: I would like to key in too, Ben. Thank you.

I think a major lesson learned, which has already been articulated twice here, is those relationships in the local community -- in building that community is -- without those relationships and without the ability to build a workforce locally, it would be challenging.

You know, other lessons learned which benefit us over here on the West Coast is being they've gone through the curriculum, they've built training standards, the working over or near water and getting these nationally and internationally recognized and approved through the America's lead certification specialist.

So we have that developed, and we're ready, you know. And part of the training of the project managers and the project engineers for this new -- I'm not going to say it's new work. We're familiar with the wind turbines. It's just going to be new putting them out in the water on these floating platforms. Otherwise, we have the workforce -- we've got the curriculum now. So

those lessons learned on the East Coast of going through the approval process and getting the building blocks set for the carpenter and the pile driver and the millwright and the type of work that's going to be done in a maritime fashion, the underwater construction, the rebuilding of the port, and all the dock infrastructure that needs to be out there, as well as the manufacturing building is crucial. And it's only going to be able to be done, especially in the North Coast, with the local community in building those relationships.

MR. POGUE: Thanks, guys. That was awesome. I would like to kind of have a dovetail question on top of that. One of our next primers here fits fairly well to continue this conversation.

I call this one, Staffing the Gateways to the Future. How Prepared are Local Seaport Workforces?

So ports are posed to serve as hubs for offshore wind development, including key component manufacturing, assembly, laydown storage, quayside transportation. This will create a large localized demand for skilled

workers as construction ramps up. Are ports ready to meet this challenge? And how can the municipalities where these ports are located help prepare to meet the increased demand for local human capital?

And so maybe, Jeff, you had a -- you were kind of going down this path a little bit on one of your responses there. Do you want to start us off on this one?

MR. ANDREINI: Yeah. I would love to hear Scott's thoughts on this as well. You know, I -- Eureka is challenged. There's no doubt about it. The populace that's there and what's going to be required to be able to support the lift that Larry talked about earlier today is significant. And then on top of that -- and I think there was some discussion earlier about, you know, the housing issues that are relevant also in the area that need to be addressed as well. And then you have other infrastructure issues with respect to, you know, roadways. It's -- it is a huge, huge undertaking.

And, again, I go back to what Scott said. You know, it is going to be about how we all partner together in order to make this a reality.

So that has to be, you know, folks like Crowley working together with Scott's team, working together with Cal Poly, with the College of the Redwoods, with the developers to come up with what is it going to take in order to build out this port that we've been tasked to do in order to meet the challenges that are in front of us, not just for California, I would argue. Potentially for Oregon as well.

And I think we've got some good structure in place, but we still have a long ways to go to begin engagement with all of those folks that I just mentioned. And then you have to think about, you know, with Scott's group, you know, bringing in unionized labor. There's a large non-unionized component that exists up in the city as well. And then you've got to take into the diversity side and how you're going to bring aboard the Native American tribes that have a tremendous influence on what goes on in that community. And we have to make them, you know, a part of the solution as well.

MR. COLLIER: I think all those -- I think all those points are good, but we have to draw a clear, bright line between the North

Coast, Humboldt, which, as Jeff pointed out, you know, they have nothing now, basically, workforce facilities, nothing, and the Central Coast and South Coast, the Bay Area and the L.A. Long Beach area. Those port complexes have a completely capable, huge workforce in terms of building and -- building and construction trades, in terms of -- the marine trades, in terms of the longshore and stevedore workers.

Basically, I would say no training needs to be done. Don't be thinking about that for those areas. Think, again, rather, in terms of getting the labor agreements started, in place, and start figuring out where these projects are going to be built, because we all assume that the platforms are going to be built in California. Well, they'll be built in California if the facilities are there. But, you know, East Asia is a very competitive resource for construction -- for ship building, intensely competitive.

So don't be assuming that platforms will be built in California. They should be. For our project, they will be. But that's not a given. The final turbine integration will have to be at a California port. The turbine manufacturing

will not be anywhere in California, at least for our project and for the initial federal offshore wind projects. They'll be back east or in Europe.

So focusing, we have to figure out where and how the platforms are going to be constructed and make sure that those facilities are available so that jobs can be created here -- that the green jobs are created in California and not in East Asia.

MR. LEWIS: One thing -- we do have work to do on the port. So in the Humboldt Bay Harbor, which has a great waterway, they've got deep water. We know where the manufacturing plant is going to be put up and the assembly, but we do have a lot of work to do with that. And we don't have a skills gap for this work that needs to be done, both with our pile drivers in order to do the dock repair, as well as the additional docks that are needed and the manufacturing buildings that need to be constructed in order to begin.

I believe this needs to be a high priority. I agree a lot with what Robert said. We need to get some language in there to make

sure that we are prepared. But as for the workforce, we don't have a gap with the carpenters. We've got over 37,000 members in Northern California alone.

MR. ADAIR: One thing that -- a topic which has been of interest to us and something that we have been studying in collaboration and in partnership with our university and also our state and federal level workforce agencies and partners is the issue of labor -- natural labor attrition. And this is something which is a nationwide issue. It's not a state issue or even a north or southern or Central California issue. We have simply more workers aging out of the workforce over the next two to three decades than we do new workers aging into the workforce.

Moreover, there is -- been, and a lot of efforts have been put forth to change this, but there has been a historical pattern of some of the younger individuals who are aging into the workforce of having less interest in the trades and older workers within the workforce who are, you know, staying on in construction positions who are expressing less desire or willingness to continue to work on projects which are strenuous.

So as we look at the workforce problem as a whole, we know that there are a lot of good answers out there in terms of, you know, understanding the types of classifications that are going to need to be filled and the skills and the aptitudes which will be needed and necessary to perform the work, but we're also just frankly thinking about bodies. And there may be bodies now -- on the ground now, but this is a 30-year project, if not longer, a multi-generational project as Jeff indicated. And so we're often thinking, you know, to ourselves, not about the starting workforce necessarily, but the sustaining workforce, so that we have, over the next 30, 40 years, the number of individuals that we need in the trades who can perform those jobs and those duties.

MR. POGUE: Thanks, guys. That was a great roundup.

All right. We're clipping right along here. We've got two down. Let's see if we can do two more, and then maybe open it up for some comments.

Shifting gears a little bit. Building a Common Understanding, Workforce Training

Standards.

NREL or Jeremy identified one of the most significant gaps in workforce development is creating a consensus on safety training standards. Safety training standards affect all aspects of the to be offshore wind workforce, including ports and staging, maritime construction, operations and maintenance, et cetera. Filling this gap is paramount to workforce higher ability and requires input from developers, training entities, colleges, labor unions, vessel operators, et cetera. How should California go about establishing workforce standards? And, part two, once consensus is established on standards, how can those standards best be communicated to the trainers themselves?

MR. STEFEK: Well, I'm in training. I'll take this one on first. We have training standards, and they're established training standards. You've got the Global Wind Organisation that has established, you know, global standards for what needs to be done when working over or near water.

I don't think the wheel needs to be recreated. I think some standards may need to be

adjusted for California Code. But we're ready. We're there. The training has been established. The specific training standards that are going to apply to a maritime carpenter or a power driver or a millwright is going to be essential, such as lifeboat training, survival crafts. We're going to have our lifesaving equipment, advanced first aid, CPR. Most of all, you've got the rescue training. You know, when working over or near water or even with the maintenance of the facilities is -- there's got to always be rescue plans in place.

So this is going to be specific trainings for the offshore, as well as the CFR Code of 1926, Section 106, which is the federal OSHA standards of working over or near water. You're also going to have fire safety, fire prevention, firefighting, because when you have a fire on a vessel, this is a very dangerous atmosphere that those individuals will be placed in. And being prepared for it ahead of time is going to be crucial. There's also sea survival, as well as a training for project managers and project engineers specifically working in this area, which we've already began on this training.

We've already developed a partnership with the Hupa tribe, which has an active memorandum of understanding. We're already developing a workforce, bringing in those indigenous people into the workforce. And their first placement is going to be on the infrastructure work, what's -- needs to be done in the city, what's going to be done in the town, the roads, as well as the improvement on the port.

So let's not recreate training. Let's go with what the industry standards are and deliver quality training.

MR. COLLIER: Yeah. Jeff, do you see any real gaps? I mean, Scott just said basically that all these protocols exist either out of the state or -- U.S. Crowley have a obviously robust and well-developed set of, you know, safety training and all other marine training standards. Do you see any real gaps, or are they -- all the programs already there?

MR. ANDREINI: I have to say I disagree with Scott. They're not already there.

And to be perfectly honest, you want to go back and talk about education for technicians.

There are some work that is being bid out today that's not even done in the United States. So how do we get to that point and identify what the proper training and education is supposed to be for individuals, for example, who might be doing something like nearshore cable laying and horizontal directional drilling that they've never done before. Maybe they've done it for submarine cable, but they've not done it for offshore wind.

So if we're talking about things like, yeah, putting together infrastructure to build out port, maritime standards as it pertains to being on board (indiscernible), sure. But who has set up the standards yet for having three blades, two tower sections, and one nacelle get alongside a wind turbine installation vessel in, I don't know, three or four foot seas with 25 knots of wind blowing up head, and you've got workers who are going to be responsible on the barge to lift all that equipment? Who set that?

MR. STEFEK: And just building upon that too, I think it's a bit difficult to have people speak in a common language too, right? It's -- when you're an industry and you're going into a

labor union, you can't just say, "I need welders." You have to know the certifications. You have to know the type of welding that you need to be done. I think what we're finding is all these groups are speaking different languages when they're talking to each other, and so it's really hard to come to that standardized consensus, because no one is taking on that role to really, like, look across all the occupations from skilled trades all the way up to engineering and actually say, what education, what experience, what certifications do you need?

And so it's -- I -- at least in the East Coast context, I think there has been a real struggle to get different groups to really know what is needed and when it's needed. Like I don't think that's -- I mean, that's still an ongoing something that people are working through.

MR. ANDREINI: Jeremy, I would absolutely agree with you with respect to -- there's so many different facets of offshore wind and what needs to occur. I think we've only scratched the surface as of yet.

MR. COLLIER: One of the tricky topics is

the issue of the supply chain. Which parts of the supply chain will be, in fact, provided by U.S. contractors? So Jeff mentioned cable laying. There are no U.S. flagged cabling boats on the West Coast or any -- it's my understanding -- anywhere in the country that will also meet Tier 4 emission standards for California.

So where are those boats going to come from? Probably going to come from abroad. It is allowed by the Jones Act to bring in foreign boats for that purpose. The foreign boats come with foreign crews. Now, for example, our PLA calls for 50-percent of the crews -- construction-related crews on any foreign boat to be U.S. crewed, California crewed, a member of California labor unions.

But that's not the most technical parts of those boats' workforces. So when you're talking about, you know, training and safety, you know, which jobs are you really -- do you really need to train for? Which jobs, is it feasible, will be based in California? That's an open question.

MR. ANDREINI: And I guess the -- building on, Robert, what you just said, and

you're talking about vessels, and we talk about electrification of ports. Understand that the CARB standards that are set here for the State of California are going to require Tier 4 engines on every vessel. So we start talking about anchor handling vessels that may be powered by, let's just say, green hydrogen or ammonia, things that don't exist today. That's going to, again, require a certain amount of safety standards, and then also training on how to operate those types of (indiscernible), which -- I mean, I guess Ben, you know, brings into a whole other dynamic, I think, which is an opportunity, quite frankly, when you think about, you know, the engineering and the design that's going to need to happen in order to build up those types of vessels or semi-submersibles or whatever it's going to be, as Robert said, to meet the supply chain needs of not just California, but the entire West Coast.

So I see it as an opportunity, but, again, I go back to, how do we bring, you know, the folks together? We need to talk about that and begin to build it. And then more importantly, how do you fund it? Because at the end of the day, it's all going to cost some --

MR. ADAIR: You know, as Robert has mentioned a few times, talked about project labor agreements and has shared what those community worker agreements can do to help prepare and bolster a workforce, you know, we have been engaged in discussions with our own harbor district and with some of our local stakeholders, some preliminary discussions around what priority hire would look like in our community for these projects.

But this also comes back to, again, an issue of infrastructure. We can have all of the, you know, right agreements in place, and I think that we do need to have those agreements in place, but if we don't have -- and, again, this is more of a Northern California issue than it is a Southern California issue. But if we don't have the ability to house those workers or to provide them with medical care or ensure that they have enough access to critical services such as childcare, then, you know, we're really putting the worker in a bad position regardless of what types of protections a project labor agreement might offer in terms of availability and wages and benefits for a project.

It was said earlier that there has been a great deal of work done with the tribes to help them become more engaged in and participate in the opportunities around port and wind development. And this is extremely important, as is remembering that most of the tribes are actually very geographically disadvantaged when it comes to accessibility to the port project.

For our community -- Humboldt County is the size of Rhode Island, and a tribal community -- a tribal individual could be an hour or more drive away from the project, and that can create an entirely different set of burdens on that worker, as opposed to someone who might live within 10 minutes of the project site. So we're -- you know, there's so many angles to this, from, you know, the curriculum and the training, the development piece, to just physically having enough bodies and workers to do the work, to the agreements that need to be in place to protect those workers. But if we can't house them or feed them or take care of their families, they'll look for projects in other areas where that infrastructure exists.

MR. POGUE: Yeah. That was a great

point. Thank you, Scott.

I would like to go ahead and throw another question here on a related topic. A Rising Tide lifts all Boats, Equitable Hiring Practices.

So offshore wind is likely to serve as a new economic driver for California. This creates an opportunity to integrate disadvantaged and underserved populations into the strategic plan to provide a long-term opportunity for good paying jobs. What policies or strategies can the state enact to institute equitable hiring, or maybe offer an example from a similar program that you all have had experience with?

MR. COLLIER: Let me just repeat myself. The best way of diversifying your workforce is through a pre-apprenticeship that feeds into an apprenticeship program. That is derived from a project labor agreement. So all that is connected. To try to put the cart before the horse and start designing hiring programs or training programs before you have the fundamental architecture built is, I think, counterproductive.

As Jeff said, there's lots of people out

there designing, you know, workforce training programs that are not directly yet connected to jobs. You know, apprenticeships train people for real jobs. They're not for hypothetical jobs. They're for real jobs. You don't get into an apprenticeship program if there isn't a job waiting for you at the end of the line. You're paid during the apprenticeship program.

So that is the best way of getting equity. It's proved statistically. Innumerable studies have been made, including by my former employer, the UC Berkeley Labor Center, proving that pre-apprenticeship programs and apprenticeship programs when -- especially when worked into a community workforce agreement or a community benefits agreement, that's -- they're the best drivers of equity and of diversifying the industry.

MR. LEWIS: I would like to share a couple of policies and strategies that we use here in Northern California, first off, our collective bargaining unit is our employers and union will work collaboratively to improve the recruitment and the retention and viable work opportunities for women, minorities, and

protected class.

Also, this is -- comes with committees that can be formed in order to ensure practical steps are being taken towards the diversity and the inclusion.

On top of this, we have an all-women pre-apprentice program that we operate out of our apprenticeship program. And this is to help create more diversity and opportunities for women in the non-traditional work environment.

And then to take it one step higher is NorCal Carpenters Training was awarded $2 million for the ERiCA Grant, and this is to provide childcare assistant (sic.), making the trades more accessible for people that are in that stage of their life where childcare is very expensive. And being able to offer up to 5,000 per pre-apprentice and up to 10,000 per apprentice each year in order to offset those costs that they -- that could prevent them from taking that job that's an hour away is -- gives a little bit more opportunity in order to build that equity and that inclusion. Everybody has a right to be working in this trade.

MR. STEFEK: And I would jump in too.

MR. POGUE: Go ahead, Jeremy. I was going to call on you there.

MR. STEFEK: Yeah, no, and I was just going to say, I think we -- you have to be really intentional too with the pre-apprenticeship program and really be trying to look for and engage with marginalized communities in a respectable and community-focused fashion.

And also, you know, going back to the, you know, middle school and high school students, really looking at schools that maybe have historically underrepresented students and getting those involved in these pre-apprenticeship programs early. I use the example at IPF this past year. We did like this partnership between KidWind and the Baltimore Public Schools and the trade programs with the Baltimore Public School System and had, you know a group of students come out that were predominantly African American or Black, and they all had some type of weld -- or in some type of welding program. They had the opportunity to walk around the IPF trade floor and to see the sheer magnitude of the opportunity with the offshore wind industry, and none of students had

ever heard of offshore wind before. And so it's -- you know, those are like the types of opportunities that allow, you know, these students to gain awareness, hopefully go back to their families and also talk about offshore wind and the opportunities in the community.

So just using that as an example of -- you know, I think we really -- create apprenticeship programs, absolutely agree. They are a great mechanism, but it's also making sure they're going into the right communities that really do need the support and can help us create that more diverse workforce.

And just a second point. I wanted to kind of introduce, I think -- it's also important to, you know, have these goals and have these targets, but also -- to increase diversity. But also, it's important to think about the tracking and accountability of those goals. And so just as we are stating the goals, just looking forward, and how are those reporting mechanisms in place to help show that the industry is moving towards more diverse -- diversity?

MR. POGUE: Okay. We've got about 10, 12 minutes left here. I would like for the

attendees, the die-hards that have stuck around until 3:45 here, to have the opportunity to reward them with asking questions directly to you all.

And so, Hilarie, I'm hoping you can help us moderate this a little bit.

MS. ANDERSON: Of course.

MR. POGUE: Thank you very much.

For those that are interested in asking a question, I believe the same protocol. Please raise your hand, and then Hilarie will call on you.

MS. ANDERSON: And we already have one hand.

Thalia, you should be able to unmute yourself. Please state your name, ask your question.

MS. KRUGER: Yes. Thank you very much. My name is Thalia Kruger, and I'm with Principle Power. I know most of the panelists. Thank you very much for an insightful and very honest discussion. I have a couple of comments, and, at the same time, I would like to have your feedback on my comments.

The first thing is, as per the

conversation, what I think and (indiscernible) Jeffrey in terms of being certain of where we -- what is the baseline for the workforce, where we are. So I hear two different aspects or two different opinions, from Scott saying that the workforce is there and from Jeff saying that we're not there. I would say that that is one of the problems that I have noticed is that we don't have still a baseline saying where we really are. And as for our -- the experience that we have with -- in other locations, in Europe, for example, I think that we -- there's still a lot to do.

My second comment is in relation to what we have to do. And whenever I'm hearing, for example, Jeremy saying about reaching out to the high school students, we need to think more on a timeline and when we need this workforce to be ready. And the workforce to be ready -- for the workforce to be ready, we need to start with elementary school kids. Whenever we tackle high school kids, it's already a little bit too late because the rest of the probable workforce have already decided to do something else because they were not exposed to this massive industry --

exciting, massive industry. My experience in the mentoring and outreach that I have done, it shows that you are effective whenever you start very early in the game.

So your comments in terms of where we have a centralized -- or a measure of where we are in terms of the workforce training and preparation, and second will be your comments in terms of when we really need to start reaching out -- making this outreach.

And a third thing is about the mechanism to measure the diversity, equity, and inclusion that we are all aiming for. We have a lot of different stakeholders, a lot of different people that we need to reach out. And how we are going to be measuring, and that's one of the things that for me is concerning, where we are in terms of that precisely diverse workforce. Thank you.

MR. POGUE: Thanks, Thalia. That was a lot, so we have to unpack some of that. I understand your comment on kind of developing an understanding of where the experts see the workforce currently. And I guess -- suppose what is the plan for enacting this workforce? I know there's some chicken in the egg with projects

being planned and things like that before some people will, you know, start going into training programs for those kind of practices.

Any of our panelists have a response or want to chime in here?

MR. ADAIR: I can just add something quickly to Thalia's point about the youth and education. Part of that starts in the home and educating parents and also socializing and normalizing the efforts and the work in schools. We had -- our agency had the opportunity to present to a high school group on offshore wind development. And there was a very vast array and diversity of opinions on wind development, in general, and a lot of misinformation. And you realize that these are -- you know, there may be one or two diamonds in the rough who are doing research on their own at age 15 about offshore wind, but, for the most part, they're repeating conversations they're hearing at the dinner table. And so educating that network around the youth is very important.

MR. ANDREINI: Miscommunication and misinformation. That's what I see the most, especially right now with what we're doing up in

California. So I agree with everything that Scott says as well.

MR. POGUE: Okay, Hilarie. Maybe we have time for one more if an attendee has one last question to wrap us up, maybe.

MS. ANDERSON: Sure. If anyone else has a question, go ahead and raise your hand. That is going to be, for those of you calling in, "Star nine" to raise your hand. "Star six" will unmute yourself. Everyone else in Zoom, the raised hand button is at the bottom of your screen. It looks like an open palm.

And I am not seeing anyone. So last call for questions for this panel.

Okay, Ben. I'm going to turn that back to you.

MR. POGUE: I'm taking that as a compliment that we've got it all figured out here. And so I'm glad that was incredibly informative, and we answered all the questions.

But nonetheless, I want to thank each one of our panelists. Thank you very much for your time, your preparation for this. That was a great discussion. A lot of that drills down into these very key issues that are playing out right

now. And so I want to thank you all.

Paul, do you want to take it back over to wrap it up here?

MS. MACDONALD: Hi, it's Rachel. I'll actually --

Put on the next slide, please. Thank you.

Again, thank you, Ben, for moderating and to all our panelists as well. That was a fantastic panel. I learned a lot, couldn't stop writing.

Before we get into public comments, I'm going to share some future workshop dates, including this Thursday's Assessing Transmission Upgrades and Investments, next week's Identifying Suitable Sea Space and Assessing Impacts, and the Permitting Roadmap. These are staff workshops. They're remote attendance via Zoom.

We think the information and feedback from today's and future workshops will help us, the CEC, in developing the offshore wind strategic plan. And we'll move forward now with public comment -- the public comment period of our agenda.

Next slide.

MS. ANDERSON: Thank you so much.

MS. MACDONALD: Okay. Hilarie.

MS. ANDERSON: Thanks, Rachel.

We're going to go to our public comment period. So thank you, everyone. So far, this has been a great discussion.

So, again, I'm Hilarie Anderson. I'm from the CEC STEP division, and I'm helping out with the public comment section. This is an opportunity for all attendees to give their comments. Each person will have up to three minutes or less to speak. Comment times may be reduced to ensure that we're able to hear from everyone.

In order to make a comment, individuals on Zoom should click on the raise hand icon. For those calling in by phone, that's "star nine" to raise your hand and "star six" to unmute.

When you're called upon, I'll open your line. Please make sure you unmute on your end.

For the record, we're going to ask you to state and spell your name, give your affiliation, if any, and then begin your comment.

We'll show a timer on the screen, and we'll alert you when your time is up.

All comments will become part of the public record. And I will go in order of how I see hands raised.

So with that, we'll go -- I'm looking for any raised hands to open our comment period. Great. We have Adam.

Adam, your line is unmuted. Please state and spell your name for the record. Give your affiliation, if any.

MR. STERN: Yes, it's Adam Stern, S-T-E-R-N, with Offshore Wind California. I just wanted to thank and congratulate all the staff and the panelists who presented or participated in the panel. I think there's a level of depth that you've shared over this day, both on the port situation as well as workforce development and given some content that we haven't seen before. And I think it really reflects the vision that's contained in AB 525, to map out what California needs to do to realize the promise of offshore wind.

And I want to particularly point to the port description and laying out the likely schedule, the requirements, and then on the workforce development seen in a granular level

that -- as -- again, is new to at least my observation of this field, really what it's going to take for California to deliver on the opportunity that we have.

So congrats to everyone. I look forward to watching the upcoming workshops and participating in them as it's appropriate. And I just want to, again, thanks to the whole -- thanks to the whole CEC team for organizing this and bringing new content and information to all of us who are following this field.

MS. ANDERSON: Thank you so much for your comment, Adam. Okay. And I'll go ahead and wait for another (indiscernible). Any other raised hands for any comment? Okay. And I'm seeing none. So I'm going to call for last call -- for public comment before we close and move forward. Okay. Still seeing none.

So I'm going to say thank you, everyone, for your public comments today. As a reminder, we're accepting written comments, which are due June 9th at -- by 5:00 p.m. That information is on this slide. You can also find it on the website for this at -- for this right here. It's on the screen as well.

And then our public comment period is concluded, and I'll pass it back to Rachel.

MS. MACDONALD: Thank you, Hilarie. Before we adjourn, let me ask if our commissioner is online and would like to make closing remarks.

COMMISSIONER GALLARDO: Hi, Rachel. I'm still here. So I'll make some quick remarks since I know I'm standing between us getting to our families and dinner and relaxing after a really robust day of information.

So huge thank you to the staff who put this together. Looking forward to the next workshop. And thank you to our panelists. I didn't get to engage with each one of you, but Matt, Larry, Suzanne, Ben, Brooklyn, Josh, Scott, Jeremy, Jeff, Robert, I really appreciate all that you had to share with us and look forward to getting to know you better as we move forward in these processes.

And finally, you know, as we heard, I think the biggest theme was the opportunity that we've got here and how transformational it can be for each of us and our state and have ripple effects, you know, across the country. And I am really hopeful that the next generation will get

those opportunities as we were just -- had, you know, been discussing in our final discussion here about youth and the opportunity for even elementary school students to benefit from learning what offshore wind is, and then potentially having careers. So I think that's a positive note to end on, and I'll leave it there. Thank you, again, and have a wonderful rest of your evening.

MS. MACDONALD: Thank you, Commissioner Gallardo.

I would like to echo Commissioner Gallardo's sentiment. And I would like to close today's workshop by expressing our appreciation.

Thank you to our offshore wind team and energy division -- energy group and the Siting, Transmission, and Environmental Protection Division team for all of the hard work in organizing this workshop.

Thank you also to State Lands Commission for the contract management of the Moffatt and Nichol study, as well as (indiscernible) business contract management with the Catalyst work.

Lastly, big thank you to our workshop attendees. Thank you for joining us today. And

we look forward to your continued engagement and participation as we move forward with our development of the strategic plan.

We are adjourned.

(Proceedings concluded.)

CERTIFICATE OF REPORTER

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 6th day of July, 2023.

ELISE HICKS, IAPRT

CERT**2176

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I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were transcribed by me, a certified transcriber and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

MARTHA L. NELSON, CERT**367

May 23, 2023