

# FLOATING OFFSHORE WIND PUBLIC MEETING | APRIL 7, 2022

## Captured Virtual Meeting Chat



from Chris Harding to everyone: 9:35 AM

I know that FOSW is fairly new technology. So, from a project management point of view there will be a learning curve. Will we be able to hit the 2050 goals of an additional 17 GW.

from Adam Schultz to everyone: 9:37 AM

Hi Chris, thanks for the question. I think you might be referencing the slides we include from a consultant study whose modeling shows 20 GW of floating offshore wind deployed by 2050? Certainly, that's an ambitious build-out that's not at all certain. There are a lot of steps to get from here to there and the final resource mix that we'll need to optimally achieve our goals is not yet certain.

from Adam Schultz to everyone: 9:41 AM

askenergy@energy.oregon.gov

from Mike Graybill to everyone: 9:50 AM

The links on the slides are not active. Please post the links in the chat so viewers can access the links

from Adam Schultz to everyone: 9:52 AM

Hi Mike, the PDF of today's slides (with clickable links) are available online:

<https://www.oregon.gov/energy/energy-oregon/Documents/2022-04-05-ODOE-FOSW-Public-Meeting-PPT.pdf>

from STEFANIE STAVRAKAS to everyone: 9:52 AM

Looks like the state of Oregon has 50% by 2040?

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 9:54 AM

Hi Stefanie, yes, Oregon passed a law requiring a 50% renewable portfolio standard by 2040.

from Jess to everyone: 9:54 AM

Why is natural gas included as a renewable energy source on this graph?

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 9:54 AM

On top of the 50% Renewable Portfolio Standard, Oregon passes a law requiring 100% Clean Electricity by 2040 as well.

from Adam Schultz to everyone: 9:55 AM

Hi Jess, this graph (from the NW Power Council, to be clear, not from ODOE) shows their projection of new resource builds. It's not just showing renewables, even though that's what Jason is highlighting here.

from Alan Zelenka to everyone: 9:55 AM

Stephanie - and updated with HB 2021 to 100% Clean Energy by 2040

from Jess to everyone: 9:55 AM

ok, thank you Adam

from Kathy Moyd to everyone: 9:58 AM

Seasonal wind charts?

from Kathy Moyd to everyone: 9:59 AM

Also time of day.

from Adam Schultz to everyone: 10:00 AM

Hi Kathy, the visual at left on the previous slide, I believe, was showing annualized wind resource speeds. The visual at right represented an analysis of the coincidence or alignment of that wind resource with actual demand for electricity (which takes into account time of day and year).

from Adam Schultz to everyone: 10:02 AM

But certainly that offshore wind, like solar, contributes different amount at different times of day and year. The technical modeling shows that offshore wind's output is complementary to solar output, which is one reason it's beginning to show up in technical modeling looking at 100% clean energy by 2050.

from Ann Vileisis to everyone: 10:03 AM

Can you briefly explain --do projected reductions in future costs for FOSW-generated electricity account for the transmission costs? (or will this be covered later)

from Adam Schultz to everyone: 10:05 AM

Hi Ann, that's a great question. Transmission expansion is likely going to be required to achieve our climate policy objectives---whether that's to develop offshore wind, large scale solar, or simply to reinforce the ability to transfer power with other regions across the west. Transmission remains a major challenge in all cases. The cost projections that Jason referenced come from NREL, which is the data input used by the consultants in the study that Jason was discussing. I do not know the extent to which those costs included transmission.

from Mike Graybill to everyone: 10:07 AM

Tremendous scale of renewables indeed! 20 GW of FOSW! My understanding is that 3GW will require as many as 200, 15MW turbines. and that at 650' of water depth the mooring cables alone will require 700 miles of cable.

from Mike Graybill to everyone: 10:07 AM

I would just like to offer that we need to consider the tremendous scale of the fisheries to be impacted.

from Jess to everyone: 10:07 AM

What accountability mechanisms will be in place to ensure Tribal Consultation, strong labor standards, and protection for ecological and cultural resources alongside this development in the direction of 100% clean energy targets?

from Adam Schultz to everyone: 10:08 AM

Hi Mike, agreed. The development of all resources has the potential for adverse impacts. For example: solar development has a significant land use impact, hydropower has impacts on endangered salmon and steelhead, and offshore wind also has potential marine impacts. These impacts need to be balanced against the state's climate policy objectives and the need to develop clean energy resources to transition away from fossil fuels.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 10:11 AM

Thanks for the question, Jess. We covered some of the topics related to your question at our last meeting, including process requirements in federal permitting (which include federal government to government tribal consultation). Here is are the slides from the last meeting (we continue to welcome written comment on the portal on those topics too): <https://www.oregon.gov/energy/energy-oregon/Documents/2022-03-10-ODOE-FOSW-Public-Meeting-Presentation.pdf>

from Jess to everyone: 10:11 AM

Thanks, Ruchi

from Jess to everyone: 10:13 AM

To what degree is exploring the impacts of hydrogen a part of this study? Since that is increasingly being connected to future proposals

from Chris Harding to everyone: 10:13 AM

Will there be enough renewable energy to meet the reduction of coal by 2030? Will gas, which seems to be increasing as coal decreases, be used?

from Mike Graybill to everyone: 10:13 AM

We need to learn from the lessons/tradoffs our prior efforts wrought (e.g hydro dams kill fish) The scale of FOSW under discussion is even larger than the scale of the Hydro system. Is this study only going to consider how to make more electricity? will there be any consideration to options to use less energy?

from Adam Schultz to everyone: 10:15 AM

Hi Jess, FOSW and RH2 production are both emerging technologies. The analysis we have seen does not anticipate RH2 being co-located with FOSW for a variety of reasons, but rather for RH2 production to be located optimally on the electric transmission system in a place where it can access a cost-effective supply of low-cost, carbon-free energy. Note, however, that ODOE is currently also leading a very similar study to this one focused on renewable hydrogen. You can follow that effort here:

<https://www.oregon.gov/energy/energy-oregon/Pages/rh2.aspx>

from Chris Harding to everyone: 10:16 AM

There are attachments that can be affixed to the column to reduce resonance frequency.

from Adam Schultz to everyone: 10:16 AM

Hi Chris, the retiring coal units that you reference as predominantly used to serve the load of Oregon's investor-owned utilities. Those utilities are actively (and aggressively) procuring new renewable resources to replace those coal resources as they retire. This type of planning and procurement occurs with the oversight of the Oregon Public Utility Commission.

from Dave Fox to everyone: 10:17 AM

follow up question about the projected 20 GW of offshore wind by 2050: Would that 20 GW need to be developed off of Oregon, or is it the amount that could be developed anywhere off the West Coast and be available in the regional grid for Oregon's use.

from Adam Schultz to everyone: 10:19 AM

Hi Mike, as noted above, we recognize that all power generation resources have adverse impacts. There are no impact-free resources. As for energy efficiency, that remains the first priority in Oregon and the northwest for meeting future load growth. The technical studies that Jason has been referencing absolutely model future savings from energy efficiency. To achieve climate policy objectives however will likely require a significant increase in the size of the electric sector----as electrification of end-uses (for example: transportation) has been identified as the most cost-effective way to decarbonize the economy. This will, of course, require building out the electric power sector to serve these new loads.

from Max Yoklic to everyone: 10:21 AM

Recognizing the tremendous scale of new renewables necessary to meet 2040 CET, how will ODOE be considering and mitigating potential (and likely) failures in reaching that target related to FOSW? IE special consideration, expedited permitting, facilitating agency and utility cooperation, etc.

from Mike Graybill to everyone: 10:21 AM

Will ODOE consider how turbines in the marine environment interfere with navigation radar?

from Amy Jester, she/her HAF+WRCF to everyone: 10:21 AM

I'd also add that analysis on climate change potential impacts to marine ecology is also important for the broader community to understand

from Chris Harding to everyone: 10:26 AM

Is there any research that shows how the EMF will affect fish?

from Adam Schultz to everyone: 10:26 AM

Hi Chris, I believe that issue was raised and discussed at the first workshop in March.

from Chris Harding to everyone: 10:26 AM

THank you.

from Adam Schultz to everyone: 10:27 AM

And Max, to follow up on Ruchi's response - the scale of renewable development necessary (irrespective of resource type) is unprecedented in scale and pace of deployment. We are highlighting the challenges of this with our stakeholders, including with the Governor's Office and Legislature. We expect to address these issues more comprehensively in our upcoming 2022 Biennial Energy Report (due in Nov 2022).

from Doug H to everyone: 10:28 AM

I did not see wildlife impacts in any of the feedback topics. Is it included somewhere as a subcategory or is it missing?

from Adam Schultz to everyone: 10:29 AM

Hi Doug, wildlife impacts are a consideration as part of siting and permitting. Those issues were raised and discussed at the workshop in March.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 10:30 AM

Thanks Doug, agree with Adam's response. Also wanted to note that we continue to welcome written comments on siting and permitting where others have raised wildlife impacts as well.

from Mike Graybill to everyone: 10:30 AM

FOSW is the most resource intensive form of Wind energy using, for example, far more steel and copper than any of the other forms of wind energy. Will ODOE's analysis consider the relative carbon footprints associated with the production of the materials used to install and maintain the various renewable options?

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 10:30 AM

And here are the slides from the last meeting that covered siting and permitting:

<https://www.oregon.gov/energy/energy-oregon/Documents/2022-03-10-ODOE-FOSW-Public-Meeting-Presentation.pdf>

from Adam Schultz to everyone: 10:32 AM

Hi Mike, I have not seen research that demonstrates FOSW is the most resource intensive form of wind energy. Could you provide a source? These are very large structures, for sure, but they also generate a significant amount of annualized energy. So any resource inputs should be considered on a per unit of MWh energy output. This is another topic we plan to address, at a high level, in our upcoming 2022 Biennial Energy Report (due in Nov 2022).

from Troy Gagliano to everyone: 10:32 AM

Is it 50,500 MW installed or 17,399? The slide showed both numbers. Thank you.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 10:33 AM

More on the upcoming Biennial Energy Report here: <https://www.oregon.gov/energy/Data-and-Reports/Documents/2022-BER-Input-Handout.pdf>

from Alan Zelenka to everyone: 10:35 AM

Troy - the 17K was for 2021 only

from Jess to everyone: 10:40 AM

Can you say more about the significant economic benefits that may be available, and who they would be for?

from Julie Peacock to everyone: 10:40 AM

I know you mentioned that the LCOE does not include transmission, is it only reflective of the cost to manufacture and operate the turbines? And no costs like leasing/siting?

from Jess to everyone: 10:42 AM

Do you have data on what permanent jobs would be created by a OSW project of this scale?

from Max Yoklic to everyone: 10:42 AM

Thanks, Adam.

from Jess to everyone: 10:42 AM

(and how many?)

from Adam Schultz to everyone: 10:42 AM

I would also add that there are economic benefits in the form of the contribution these projects make to cost-effectively decarbonizing the energy sector to address the impacts of climate change. The types of jobs/economic development benefits that may accrue from building the projects themselves are in addition to that.

from Jess to everyone: 10:43 AM

That would be great, thank you Patrick

from Julie Peacock to everyone: 10:43 AM

Exactly my question, thank you!

from Jess to everyone: 10:44 AM

@Adam that is true, but it is so important that the economic benefits of this scale of development primarily benefit the local communities most impacted by the development

from Adam Schultz to everyone: 10:45 AM

Hi Jess, I will note however that the power grid is a regionally interconnected system. The decarbonization of that system is critically important to achieving our climate objectives and the benefits flow to all users of that system.

from Ashley Audycki to everyone: 10:47 AM

Patrick, can you share info about the study that was mentioned?

from Kate Will they/them to everyone: 10:47 AM

will these slides be made available after?

from Kate Will they/them to everyone: 10:47 AM

answered already - thanks!

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 10:48 AM

Thanks Kate, these slides (as well as slides and recordings of the previous meetings) are here:

<https://www.oregon.gov/energy/energy-oregon/Pages/fosw.aspx>

from Adam Schultz to everyone: 10:48 AM

And here's the direct link to the slides: <https://www.oregon.gov/energy/energy-oregon/Documents/2022-04-05-ODOE-FOSW-Public-Meeting-PPT.pdf>

from Bill Gorham to everyone: 10:50 AM

A more local comparison is the towers to the Golden Gate Bridge are 746 feet (227 meters)

from Patrick Duffy NREL to everyone: 10:50 AM

Domestic supply chain:

from Patrick Duffy NREL to everyone: 10:50 AM

<https://www.nrel.gov/docs/fy22osti/81602.pdf>

from Dawn Harfmann to everyone: 10:50 AM

This is a follow-up question from a general question that was brought up earlier: My understanding is that energy efficiency and conservation measures are generally incorporated into electricity sector models based on what is lowest cost. I'm wondering if you are aware of whether Oregon is looking at energy efficiency/conservation requirements beyond what is lowest cost (but could be desirable for environmental/other reasons)?

from Patrick Duffy NREL to everyone: 10:51 AM

summary of recent cost study funded by the Bureau of Ocean Energy Management:

<https://www.boem.gov/sites/default/files/documents/regions/pacific-ocs-region/environmental-science/PR-20-OWC-Fact-Sheet.pdf>

from Patrick Duffy NREL to everyone: 10:52 AM

Impacts of turbine and plant upsizing on cost: <https://www.nrel.gov/docs/fy21osti/78126.pdf>

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 10:53 AM

Information or perspectives that differ from common feedback?

Provide elaboration or emphasis?

Topics for future study or engagement?

New thoughts?

from Adam Schultz to everyone: 10:54 AM

Hi Dawn, energy efficiency is critical to achieving our climate objectives. ODOE has argued, for example, that the NW Power Council's regional analysis of the cost-effectiveness of energy efficiency needs to be expanded to include other benefits, such as the contribution to achieving carbon objectives, resilience, local jobs, etc. That said, even with significantly more energy efficiency than what's currently anticipated---the power sector is still going to need a significant build-out of renewables. Not only to electrify end-uses such as transportation, but also to replace retiring coal and gas units.

from Patrick Duffy NREL to everyone: 10:54 AM

one more publication on jobs and supply chain: <https://www.nrel.gov/docs/fy21osti/80031.pdf>

from Tim to everyone: 10:54 AM

Is there any reason 1300 meters would be an outer limit? Why can they not go further out?

from Patrick Duffy NREL to everyone: 10:55 AM

The Schatz Energy Research Center at Humboldt State University in California has a series of floating offshore wind studies: <https://schatzcenter.org/publications/>

from Adam Schultz to everyone: 10:55 AM

Hi Tim, others may have more details on this, but just to clarify that it's not 1300 meters from shore---but 1,300 meter water depths.

from Dawn Harfmann to everyone: 10:56 AM

Yes, definitely makes sense that we will need additional renewable infrastructure beyond conservation/efficiency. I wasn't aware of ODOE's stance on the NW Power Council's analysis - that's great, thanks very much!

from Amy Jester, she/her HAF+WRCF to everyone: 10:56 AM

This is related to transmission infrastructure, so perhaps not relevant here, but how will entanglement issues be dealt with? are we anticipating significant down periods where more complicated entanglement might occur? what are the regulatory/enforcement structures that will need to be in place to require lessees to immediately address such issues?

from Tim to everyone: 10:56 AM

Understood, but that is at about 710 fathoms. If you go further out you get outside of the fishing grounds entirely. Why would that not be under consideration? A win-win it would seem.

from Adam Schultz to everyone: 10:57 AM

Hi Dawn, if you're interested, you can read ODOE's comments to the Power Council here (energy efficiency comments are found on p. 5-7):  
<https://app.nwcouncil.org/uploads/2021plan/2322/2021%20Power%20Plan%20-%20ODOE%20Comments.pdf>

from Jan Hodder to everyone: 10:57 AM

How does the 1300m depth relate to the location of the subduction zone?

from Dawn Harfmann to everyone: 10:58 AM

Awesome, will definitely look at that - thanks!

from Ann Vileisis to everyone: 10:58 AM

I've been hearing people say that FOSW will actually make the OR Coast energy supply more resilient with natural disasters. I don't really understand that given the concerns speakers are raising about earthquakes and tsunamis.

from Kate Will they/them to everyone: 10:58 AM

Cyclic loading is definitely top of mind for geotechnical experts working for floating subsea structures!



from Adam Schultz to everyone: 10:58 AM

Hi Tim and Jan -- I will have to defer to Patrick (NREL) or my colleague Jason if they have additional feedback on those questions re: 1300m depths.

from Patrick Duffy NREL to everyone: 10:59 AM

@Tim the 1300 m water depth limit is likely the current maximum cost effective depth for floating offshore wind. I am not aware of any technical limitations that would prevent you from going deeper, but it would be expensive at this point in time

from Adam Schultz to everyone: 11:00 AM

Hi Ann, the resilience of the power sector is a complex issue. One example: many areas of the coast are currently served by transmission lines that pass through areas of the coast range that are susceptible to wildfires. In the event those lines go down, offshore wind resources could provide more resilient power to those communities.

from Tim to everyone: 11:00 AM

Thanks Patrick. I think, that being the case, we would need to really deep dive a cost benefit analysis on the potential loss of fishing industries. It may be worth the coast to go further out.. Thanks, though.

from Adam Schultz to everyone: 11:01 AM

And as to the earthquake - the Oregon Resilience Plan (published in 2013) finds that coastal areas of the state can expect to be without power for 6 to 12 months. My understanding is that the primary reason for that finding has to do with the time required to clear landslides and downed transmission lines over the coast range. Again, in this scenario, a disaster by any definition, having offshore wind resource available creates additional optionality for restoring power more quickly to the coast.

from Ann Vileisis to everyone: 11:02 AM

Thanks Adam.

from Mike Graybill to everyone: 11:02 AM

FOSW at this scale will require extension of the transmission grid into the ocean. Who will or who should build this new addition to the transmission system and who will approve and oversee the operation of this addition to the transmission system?

from Amira Streeter to everyone: 11:02 AM

Thank you very much for including me in this webinar. I have to leave for the day, but greatly appreciative of the expertise on this topic.

from Adam Schultz to everyone: 11:03 AM

If interested, Chapter 6 of the Oregon Resilience Plan addresses potential impacts from a Cascadia Earthquake to Oregon's energy systems: [https://www.oregon.gov/oem/documents/oregon\\_resilience\\_plan\\_final.pdf](https://www.oregon.gov/oem/documents/oregon_resilience_plan_final.pdf)

from Patrick Duffy NREL to everyone: 11:03 AM

@Tim increasing or improving fishing access within offshore wind arrays is a hot topic- and something we are actively working on analyzing for fixed-bottom wind farms for the New York State Energy Research and Development Agency (NYSERDA)

from Jan Hodder to everyone: 11:03 AM

If the Cascadia event happens why would we expect the infrastructure of offshore wind to survive to continue to supply power to the coast?

from Adam Schultz to everyone: 11:04 AM

Hi Mike -- questions of cost allocation for significant new transmission builds are a complex regulatory topic. That would be an issue to be sorted out by regulators of the utility (or utilities) procuring power from offshore wind projects.

from Patrick Duffy NREL to everyone: 11:05 AM

I have to sign off, but will respond to additional questions after the call

from Shaun Foster - PGE to everyone: 11:06 AM

Agree with Adam, cost allocation is a complicated topic that spans both federal and state jurisdictional issues.

from Adam Schultz to everyone: 11:07 AM

Hi Jan, my understanding is that the greatest risk from a Cascadia Earthquake/tsunami would likely be to the onshore components associated with offshore wind----the onshore cable, substation, transmission, etc. Repairing that equipment following the event would be no small task, but the same goes for restoring the onshore bulk transmission system over the Coast Range.

from Dave Fox to everyone: 11:10 AM

Cascadia earthquakes also cause major subsea landslides on the continental slope. I imagine that these could impact anchoring systems and subsea cables if they are located on a landslide.

from Shaun Foster - PGE to everyone: 11:11 AM

Travis, what kind of studies were done? were they economic dispatch studies or reliability studies contemplating NERC/WECC reliability obligations?

from Kathy Moyd to everyone: 11:15 AM

Can you put the link to PNNL 2021 study in chat?

from Ashley Audycki to everyone: 11:17 AM

For this modeling, can you share more on the locations chosen for OSW? It looks more centralized while the BOEM call areas are more Southern Oregon Coast

from Adam Schultz to everyone: 11:20 AM

Hi Kathy, the PNNL 2021 study, along with all the others that we reviewed as part of this process, can be found within the draft Literature Review that ODOE has put together as part of this process:

<https://www.oregon.gov/energy/Data-and-Reports/Documents/2022-DRAFT-FOSW-Lit-Review.pdf>

from Troy Gagliano to everyone: 11:24 AM

Travis, on your slide 53, are you saying the total load on the OR coast is 1GW or is that just around the south coast area? Thanks

from Jess to everyone: 11:26 AM

How can we ensure that communities where the most OSW development is happening will actually benefit from and receive that energy generation to improve South Coast energy resiliency? (rather than being entirely sold to broader grid and/or California grid)

from Kathy Moyd to everyone: 11:26 AM

I found references in the Literature to a 2020 Report, not a 2021.

from Mike Graybill to everyone: 11:28 AM

Earthquakes are one factor and perhaps the only consideration needed when evaluating transmission system vulnerability connecting the coast to interior sources. At the coast, vulnerability factors from earthquakes and tsunamis must be considered. Vulnerability of the shore based infrastructure needed to operate and maintain FOSW should be considered when evaluating how FOSW might mitigate vulnerability of the east to west transmission system.

from Travis Douville to everyone: 11:32 AM

Hi Shaun, these were production cost and unit commitment studies. Reliability studies still need to be completed by researchers and (hopefully) others.

from Mike Graybill to everyone: 11:33 AM

Yesterday a Dutch offshore wind turbine came apart and triggered a no sail zone for vessels transiting in the area. will the evaluation of risk and vulnerability consider how unintentional failures of a FOSW plant might compromise the power supply and other economic activities?

from Delia Kelly ODFW to everyone: 11:36 AM

can you provide links to the POET study and Severy et al 2020 referenced in slide 55?

from Jess to everyone: 11:37 AM

Very helpful thanks Travis and Ruchi

from Delia Kelly ODFW to everyone: 11:39 AM

nevermind, thanks for providing your references in the ppt

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 11:41 AM

Great, thank Delia!

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 11:43 AM

@Kathy - is the 2021 PNNL study that you were asking about on the references slides from Travis on 57 or 58?

from Mike Graybill to everyone: 11:43 AM

While it is reasonable for a state to adopt renewable energy goals in the absence of a coherent federal policy, a state my state strategy is difficult for me to understand given that all power sources are tied together via a shared transmission system. Renewable Power produced in Oregon is exported to other states and power produced in other states is used in Oregon. How will the accounting associated with individual state's renewable energy target be accomplished? For example could BPA choose to redirect the High voltage transmission line between the Dalles and LA over to the coast? How does the power produced in Oregon that is exported to other states factor into the calculation of Oregon's renewable energy goals?

from Travis Douville to everyone: 11:44 AM

Hi Kathy, the 2021 Energies article is a publication of the same 2020 work, but in a peer-reviewed journal. Does that help?

from Chris Harding to everyone: 11:45 AM

As for Direct Air Capture (DAC), Dr. Sudhir Joshi, University of California at Berkeley showed that more carbon dioxide is produced than removed because the renewable energy used for DAC could be used to replace fossil fuels on the grid.

from Chris Harding to everyone: 11:45 AM

Joshi, Sudhir, PhD, Berkeley School of Chemical Engineering Product Development Professor. Converting Carbon Dioxide (CO2) To Useful Products? Direct Air Capture? Is it actually CO2 negative? URL: <https://drive.google.com/file/d/1jTNArcw2VLFYyXqtZQJad9kRBOXNXY7F/view?usp=sharing>

from Adam Schultz to everyone: 11:47 AM

Hi Mike, regional collaboration and coordination is critically important in the power sector. It's happening now and efforts to increase regional coordination in the PNW and the west more broadly have been accelerating. As for how power produced in Oregon but is exported to other states plays into our renewable energy goals - I'll refer you to the state's Electricity Resource Mix which has a lot of information on this topic: <https://www.oregon.gov/energy/energy-oregon/pages/electricity-mix-in-oregon.aspx>

from Mike Graybill to everyone: 11:48 AM

Thanks Travis!

from Travis Douville to everyone: 11:50 AM

Great question Mike. The federal-state interaction is crucial for offshore wind in particular.

from Kathy Moyd to everyone: 11:50 AM

My comment regarding Direct Air Capture was if it turned out to be difficult to transport all the electricity that could be generated, some could be used for local hydrogen and direct air capture. So the DAC would be CO2 negative.

from Tim to everyone: 11:52 AM

I would like people to keep in mind that there are currently multiple active fisheries off the Oregon coast that are bringing in hundreds of millions of dollars to the state economy each year. The siting of these structures, if

not done properly and with collaboration with the fishermen and fishing industries, threatens to cripple these fisheries. Currently, even within the state, we seem to be an afterthought.

from Amy Jester, she/her HAF+WRCF to everyone: 11:53 AM

lunch break now, then head into transmission

from Ashley Audycki to everyone: 11:53 AM

lunch break

from Joshua Basofin to everyone: 11:53 AM

lunch break now, skip break

from STEFANIE STAVRAKAS to everyone: 11:53 AM

lunch break now would be great

from Ashley Audycki to everyone: 11:53 AM

\*now

from Adam Schultz to everyone: 11:54 AM

Hi Tim, a quick response on your question about fisheries - that issue has been considered extensively by BOEM as part of their process, which includes state agencies like Oregon Dept of Fish and Wildlife and DLCD. This was also a big topic of discussion at the workshop in March.

from Amy Jester, she/her HAF+WRCF to everyone: 11:54 AM

thank you!

from Mike Graybill to everyone: 11:55 AM

Carbon sequestration from coastal ecosystems such as oyster reefs and tidal marsh habitats are being demonstrated to be among the highest per unit area sequestration sources of any on earth. These habitats have been severely compromised by historic uses and activities. Will the costs associated with FOSW ever be balanced against the cost of investing in sequestration services provided through restoration of degraded habitats known to have high sequestration value?

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 12:25 PM

@Tim - adding to Adam's comment, wanted to make sure you had the link to the slides from our last meeting, which covered the siting and permitting topic and included some great comments from ODFW. Here are the slides and we continue to welcome written feedback on siting & permitting through the comment portal. <https://www.oregon.gov/energy/energy-oregon/Documents/2022-03-10-ODOE-FOSW-Public-Meeting-Presentation.pdf>

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 12:26 PM

Thanks @Mike, wanted to make sure you knew that the Oregon Global Warming Commission has been working on a natural and working lands proposal related to sequestration.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 12:26 PM

Here's a blog post about it: <https://energyinfo.oregon.gov/blog/2021/9/27/oregon-global-warming-commission-proposes-new-state-goals-for-carbon-sequestration>

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 12:27 PM

I think that its focused on land-based sequestration, but would be good feedback for the commission to consider coastal ecosystems too.

from STEFANIE STAVRAKAS to everyone: 12:30 PM

I have no sound. Can everyone else hear?

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 12:31 PM

Thanks Stefanie, I can hear but it broke up a bit.

from STEFANIE STAVRAKAS to everyone: 12:31 PM

resolved

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 12:31 PM

great!

from Julie Peacock to everyone: 12:32 PM

Hi Marty, was there a contingency analysis included in your projections of transmission availability?

from Shaun Foster - PGE to everyone: 12:32 PM

Similar question for Marty, were these PCM study runs versus reliability? Using WECC ADS cases?

from NWPP-RTA to everyone: 12:34 PM

Marty, will you please explain more about the change in assumptions that were made to the transmission system itself. Did you increase the ratings of the transmission lines? If so, will you please help us understand the new ratings that were used as well as any reliability considerations?

from Kathy Moyd to everyone: 12:36 PM

Have you redone the analysis using only the three BOEM call areas?

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 12:38 PM

FYI - LCOE = levelized cost of energy, or levelized cost of electricity, is a measure of the average net present cost of electricity generation for a generating plant over its lifetime. It is used for planning and to compare different methods of electricity generation on a consistent basis.

from Amanda Gladics to everyone: 12:40 PM

For clarification - is this curtailment under the circumstance that all 2.6 GW goes into a single connection point?

from Shaun Foster - PGE to everyone: 12:41 PM

California interest will still likely face a bottleneck at the interties given they are fully subscribed.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 12:43 PM

FYI for background if you're not familiar was curtailment: curtailment as a reduction in the output of a generator from what it could

otherwise produce given available resources (e.g., wind or sunlight), typically on an involuntary basis. Curtailments can result when operators or utilities require wind and solar generators to reduce output to minimize transmission congestion or otherwise manage the system or achieve the optimal mix of resources.

from Amy Jester, she/her HAF+WRCF to everyone: 12:44 PM

strengthening coastal energy infrastructure and resilience is critical; how might we move forward in a way that will ensure local infrastructure investment, rather than solely focusing on transmission for export away from coastal communities?

from Jan Hodder to everyone: 12:47 PM

If the OSW is only in the current call areas how would they link to the Toledo and Newport etc. sub stations?

from Mike Woods @ Baird to everyone: 12:48 PM

Thanks for an interesting meeting on floating OSW. I need to duck out for a conflicting event. Hopefully some of us will interact in the future on wind ports, navigation studies, floated in concrete breakwater segments, construction vessel collision force calculations, or mooring or other advances coastal engineering numerical modeling or design. --Mike Woods @ Baird, which is involved in east coast wind projects

from Adam Schultz to everyone: 12:48 PM

Hi Amy, both will need to occur to support the deployment of offshore wind at-scale off Oregon's coast. The power grid is a regionally interconnected system that achieves optimal outcomes for all users by being able to share power flows across wide geographic areas. In addition, coastal power loads are relatively small, so there will be times when offshore wind is generating significantly more power at a given moment than coastal loads demand.

from Shannon to everyone: 12:50 PM

Given the fresh water scarcity of the Southern coast (Bandon on down to California), desalinization could also be considered as a potential dismissable load to consume curtailment periods in future assessments.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 12:50 PM

Thanks Adam. Amy, building on Adam's comment, there would be local infrastructure investment that could result in nonenergy benefits as well (we covered topics related to potential jobs and port investment during the last meeting but welcome continued written input on those topics too).

from Adam Schultz to everyone: 12:50 PM

Hi Jan, there are a variety of options for how theoretical offshore wind fields might ultimately interconnect to the bulk power system onshore. Presumably, developers will seek to build projects in areas with the best wind resource and proximity to onshore points of transmission interconnection. But there could be circumstances where offshore cabling could be run parallel to shore until reaching an optimal point of interconnection onshore. But again, there are a lot of variations to how this might ultimately work.

from Mike Graybill to everyone: 12:51 PM

Who will be responsible for the design and construction of the high voltage transmission system (cables and substations) that will need to be built to connect the FOSW plant to the grid? Will that be the responsibility of the wind farm lease holders or will an organization like BPA be tasked with constructing and operating that portion of the transmission system? What is FERC's role in approving the design and construction of an offshore transmission system vs BOEM's role?

from Chris Harding to everyone: 12:52 PM

MIT Club of Northern California has a webinar coming up on Long Duration Energy Storage. April 20 at 5 pm. It is 19 dollars for public.

from Amanda Gladics to everyone: 12:52 PM

Can you comment on how your findings might change considering the more realistic scenario (under the current BOEM call area process) that power would be injected into just the Fairview & Wendson substations? I realize it would just be speculation, but would be helpful to hear your insights.

from Shaun Foster - PGE to everyone: 12:52 PM

Agree with Adam. There are pros and cons to a single large point of interconnection, especially as you look at it from reliability and reserves lenses

from Kathy Moyd to everyone: 12:53 PM

Desalinization would probably be needed for the hydrogen generation.

from shannon souza to everyone: 12:55 PM

Hydrogen has many direct and indirect applications that would not necessitate piping it through the coast range - such as direct use by maritime, long haul, rail and air transport at the coast and export via maritime and rail for energy and at uses.

from shannon souza to everyone: 12:56 PM

Desal would not be necessary for electrolysis located at coos bay (north spit) and reedsport / gardener - both of which have ample, sustainable fresh water supplies.

from Amanda Gladics to everyone: 12:59 PM

That is helpful, thank you.

from Mike Graybill to everyone: 1:01 PM

BOEM and others have identified much more wind potential than 3GW. In all other locations where OSW has been developed once a comfortable return on investment has been demonstrated a proliferation of additional offshore generating capacity soon follows (e.g. Dogger bank phases 1,2&3) Given that the wind potential for Southern Oregon call areas has been characterized being on the order of 17MW, the work in this presentation indicates the almost certain requirement to upgrade or simply replace the existing cross coastal transmission link to accommodate offshore generation beyond the 3MW under discussion. Will PNEL or NREL consider build out potential production levels on the order of 17-20MW that has been identified?



from Kathy Moyd to everyone: 1:02 PM

Thanks, Shannon.

from Harvey. Schowe to everyone: 1:04 PM

Has lithium batteries or other type battery technology been developed for storage of large amounts of power?

from Shaun Foster - PGE to everyone: 1:04 PM

I'm happy to answer any questions

from Adam Schultz to everyone: 1:04 PM

Hi Mike - the proposal that Jason is just now starting to discuss gets to some of that. We have recently submitted a request to NorthernGrid (whose members include BPA, PacifiCorp, and other large transmission providers) to evaluate the transmission upgrades required to accommodate as much as 10 GW of offshore wind.

from Adam Schultz to everyone: 1:06 PM

This is not to suggest that there is a goal or support for 10 GW of offshore wind, but rather to begin gathering better data to understand the cost implications (and potential benefits - such as the expectation of transmission to deliver offshore wind freeing up existing transmission that flows E-to-W) of developing offshore wind at-scale.

from Mike Graybill to everyone: 1:08 PM

It looks like the offshore wind "hot spot" straddles the CAISO and Northern Grid service areas. Given the location of prospective FOSW development, will these two regional operators coordinate planning efforts?

from Adam Schultz to everyone: 1:08 PM

Hi Harvey - grid-connected lithium batteries are just beginning to show up on the grid at large scale. California's grid operator, for example, expects to have ~ 3,000 MW of grid-connected batteries on its system this summer. That's up from ~1,000 MW last year, and essentially zero MW the year before that. There's an expectation in California of battery penetrations increasing substantially in the years ahead.

from Adam Schultz to everyone: 1:10 PM

Hi Mike - Jason is touching on some of this OR-CA collaboration now.

from Jan Hodder to everyone: 1:10 PM

Are there transmission lines in N CA that make more sense to take the OSW energy from the current Oregon call areas?

from Ann Vileisis to everyone: 1:12 PM

Can you please help us to understand the more local transmission infrastructure upgrades--how many substations might there be on the coast to lead into the coastal line? Need for upgrades on coastal line?

from Adam Schultz to everyone: 1:12 PM

Hi Jan - More analysis is required, but the coastal areas of Northern California are actually more remote (from the perspective of the bulk transmission grid) than areas of Southern Oregon. For example, Oregon's coastal areas (such as the substations mentioned here recently) connect via 230 kV lines over the Coast Range, whereas areas in Northern California traverse more challenging terrain with 115 kV lines.

from Adam Schultz to everyone: 1:14 PM

Hi Ann, we hope to get better information on the need for coastal transmission upgrades and hope that the request submitted to NorthernGrid will help provide useful data on this issue.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 1:16 PM

ODOE Regional Transmission Operator study and report: <https://www.oregon.gov/energy/energy-oregon/Pages/RTO.aspx>

from Mike Graybill to everyone: 1:17 PM

Will organizations proposing to produce offshore electricity be required to identify entities to purchase the power to be produced before being authorized to build the new sources they plan to add to the transmission system?

from Janét Moore she/her to everyone: 1:18 PM

Undersea transmission line configuration should take into account concerns about EMF impacts from cables along the shoreline. Will undersea transmission lines be monitored periodically to make sure that EMF shielding is working?

from Adam Schultz to everyone: 1:19 PM

Hi Mike - it is extremely unlikely that any developer would seriously pursue developing (eg, starting construction) an offshore wind project with a contract to deliver the power to an off-taker. This typically occurs as a result of utility planning identifying a need, issuing an RFP, selecting a project, and execution of a long-term power purchase agreement.

from Adam Schultz to everyone: 1:19 PM

correction: that should read "without a contract"

from Janét Moore she/her to everyone: 1:21 PM

Adam, we've seen billion dollar projects pursued without any buyers confirmed in the S. Coast before.

from Adam Schultz to everyone: 1:22 PM

Hi Janet, there are many steps to the project development process, and developers must assume some level of risk to begin initiation of that process - siting, permitting, design work, etc. But typically, a large power project will not commence construction without an executed long-term power contract to sell the output.

from Chris Harding to everyone: 1:24 PM

I am not a power person. I think in more terms of material and energy balances. I think of electricity as water flow through a pipe. The pipe can only handle so much. Still, does the future, 10-15 year transmission analysis take in consideration of the potential flow out to electric vehicles, heat pumps, etc.

from Jan Hodder to everyone: 1:24 PM

Thanks Adam for the reality of the timing of all of this. Has the recent IPCC report outlining how fast we need to transition away from FF made any difference in ODOE's focus for implementing renewable solutions for OR?

from Adam Schultz to everyone: 1:24 PM

I will note that a power project, for what it's worth, is quite a bit different from say, the once proposed Jordan Cove LNG export project. In that instance, the project conceived intended to sell into a global commodity market, not a highly regulated electricity market (which would be the case with offshore wind delivered to the grid).

from Mike Graybill to everyone: 1:25 PM

Is there any tangible or policy nexus between building new increasingly large sources of renewable power and the need to retire fossil energy sources? Should FOSW be added to the regional transmission network how could we determine if the new power is simply fueling the overall consumption of energy or is actually achieving the goal of decarbonization?

from Adam Schultz to everyone: 1:25 PM

Hi Jan - as we highlighted at the start of this meeting, the scale and pace of renewable development necessary to achieve our climate goals is staggering. We plan to address this issue more comprehensively in the 2022 Biennial Energy Report due out later this fall.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 1:27 PM

Thanks Adam. And thanks for the question Jan, agree that we are looking forward to covering that more in the Biennial Energy Report (<https://www.oregon.gov/energy/Data-and-Reports/Documents/2022-BER-Input-Handout.pdf>) but will also add that we looking to legislative direction and requirements for 50% renewables by 2040 and 100% clean electricity by 2040.

from Adam Schultz to everyone: 1:27 PM

Hi Chris, utilities and grid planners absolutely take into account forecasts of future demand growth - driven by economic growth, population changes, and certainly in the years ahead from the electrification of end-uses like transportation. Many technical studies looking at deep decarbonization of the economy by 2050 suggest anywhere from a +50% to +90% increase in total demand for electricity by 2050 compared to what we see today. This is after taking into account energy efficiency. The modeling suggests that significant new transmission builds will help Oregon, the region, and the country, frankly, to achieve this in the most cost-effective manner.

from Adam Schultz to everyone: 1:29 PM

Hi Mike - yes, individual utilities (along with their regulators, such as the Oregon PUC in the case of investor-owned utilities) continually plan for the future in a manner that takes into account retiring power plants, proposed new power projects, savings from efficiency, and expectations of increases in demand. These are ongoing, iterative processes that are increasingly driven by the state's carbon and clean energy policy objectives.

from Janét Moore she/her to everyone: 1:30 PM

I'm sure FOSW is viable, especially give the need in CA. I was just making a point about experiences on the S. Coast. I am hoping for a comment from someone about my question on whether or not EMF impacts to marine life from undersea cables will be monitored periodically/regularly in order to detect if EMF shielding fails over time.

from Adam Schultz to everyone: 1:30 PM

Hi Janet - the question about EMFs was raised and addressed at the March meeting.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 1:31 PM

Thanks Janet and Adam, yes it was discussed during the topic of siting and permitting, but we continue to invite written feedback on that topic if you would like to add through the comment portal Janet.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 1:31 PM

Also for reference here are the slides from the last meeting that covered the siting and permitting topic: <https://www.oregon.gov/energy/energy-oregon/Documents/2022-03-10-ODOE-FOSW-Public-Meeting-Presentation.pdf>

from NWPP-RTA to everyone: 1:32 PM

When you say, "Transmission solutions should be scaled", are you suggesting that transmission projects should be sized larger than their current need? And if so, how would you propose getting stakeholder "buy-in"?

from Delia Kelly ODFW to everyone: 1:33 PM

can you provide a link to the east coast report/study about transmission options - one cable for each project or less cables supporting multiple wind farms - on slide 82

from Janét Moore she/her to everyone: 1:34 PM

Adam, I raised it at the March meeting but it was never addressed. I was directed to a BOEM study, but there has been no discussion as to whether undersea cable configuration will try to minimize EMF impacts and if EMF will be monitored periodically. I will submit my question in the portal. Thank you.

from Marty Schwarz to everyone: 1:34 PM

Hi Everyone,

from Marty Schwarz to everyone: 1:35 PM

Hi Everyone, I have to jump now. But please feel follow up with any transmission and OSW grid integration questions via email (Marty.Schwarz@nrel.gov). Thanks so much!

from shannon souza to everyone: 1:39 PM

For Harvey or others interested "kicking the tires" on the design aspects of all of this - please consider joining Oregon Coast Energy Alliance Network (OCEAN) list serve. We've been curating webinars and advocacy around this topic for the last 2 years and would love to hear your thoughts...Oregonenergyalliance.org

from Mike Graybill to everyone: 1:39 PM

I missed the definition of IRP

from Jason Eisdorfer to everyone: 1:39 PM

Hi Rose, How might OSW show up in the utilities' HB 2021 compliance plans?

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 1:40 PM

Thanks Mike, it refers to Integrated Resource Planning that investor owned utilities (PGE and Pacificorp and Idaho Power) must conduct through the Oregon PUC

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 1:41 PM

A bit more from the Oregon Public Utility Commission website: Oregon was one of the first states to require utilities to file integrated resource plans (IRPs). The IRP presents a utility's current plan to meet the future energy and capacity needs of its customers through a "least-cost, least-risk" combination of energy generation and demand reduction. The plan includes estimates of those future energy needs, analysis of the resources available to meet those needs, and the activities required to secure those resources. What began thirty years ago as a simple report by each utility has grown into a large, stakeholder-driven process that results in a comprehensive and strategic document that drives utility investments, programs, and activities.

wind turbines in the cloudsThe PUC reviews and decides whether to "acknowledge" the plan, although acknowledgement does not constitute pre-approval of any proposed resource acquisitions.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 1:41 PM

<https://www.oregon.gov/puc/utilities/Pages/Energy-Planning.aspx#:~:text=Oregon%20was%20one%20of%20the%20first%20states%20to,least-risk%E2%80%9D%20combination%20of%20energy%20generation%20and%20demand%20reduction.>

from Kim Herb to everyone: 1:43 PM

Hi Jason - we have not yet determined how OSW will show up in the implementation of HB 2021. Docket UM 2225 is where implementation is being worked out, and it includes a track on Analytical Improvements, which is where we be revisiting such things as decarbonization planning and resource options and actions.

from Jess to everyone: 1:44 PM

What is the potential for working with consumer-owned utilities in the offshore wind process?

from Jess to everyone: 1:45 PM

many communities on the South Coast are serviced by rural electric cooperatives

from Adam Schultz to everyone: 1:48 PM

Hi Jess, that's a question best directed at Coos-Curry Electric Cooperative and the City of Bandon Utility, both of whom serve customers on the south coast. As you are probably aware, both purchase almost all (and may be all, I'd have to check) of their power from the Bonneville Power Administration.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 1:49 PM

FYI Map of Oregon electric utilities - <https://www.oregon.gov/energy/energy-oregon/Documents/Map-of-Oregon-Utilities.pdf>

from Mike Graybill to everyone: 1:49 PM

I hope particular attention will be given to the distinction between a renewable energy project designed as an economic development/jobs program vs a renewable energy project that is designed to decarbonize our energy supply. FOSW might be a fantastic economic development opportunity for a few sectors but its extreme cost and long lead time makes it a less impactful decarbonization solution than other options.

from Ruchi Sadhir she/her - OR Dept of Energy to everyone: 1:51 PM

Also, Jess, you can find the electricity resource mix for each utility in Oregon here:

<https://www.oregon.gov/energy/energy-oregon/pages/electricity-mix-in-oregon.aspx> (including Coose Curry Electric Coop and City of Bandon Municipal Utility)

from Adam Schultz to everyone: 1:51 PM

Hi Mike, the primary objectives of state policy (such as EO 20-04 and HB 2021) are on decarbonization of the power sector. Which resources can best achieve those objectives will be surfaced through technical analysis, and utility planning processes. As shown previously, newer modeling suggests offshore wind could be a valuable contributing resource to achieving the state's decarbonization policy objectives.

from Chris Harding to everyone: 1:52 PM

Great job you all!

from Mike Graybill to everyone: 1:53 PM

Thanks to all the presenters and team members this has been a very informative discussion!

from Kathy Moyd to everyone: 1:53 PM

Thanks for being so responsive to questions and comments.

from Shannon to everyone: 1:55 PM

Central Lincoln PUD is also relevant re: service in proposed BOEM call areas.

from Jan Hodder to everyone: 1:56 PM

Thanks for a really well run meeting that provided much good information.

from Bill Gorham to everyone: 1:56 PM

Well done, excellent set of presentations and discussions. How can we get a copy of the chat?

from Ranfis he/him to everyone: 1:56 PM

Would be helpful to dig deeper on job creation (wage, benefits, etc) per sector (construction, utility, manufacturing) , career pathways and strategies to address potential impacts to other sectors (wages, benefits in seafood).

from Ann Vileisis to everyone: 1:57 PM

Thanks all --really appreciate the opportunity to learn from presentations and dialogue.

from Chris Harding to everyone: 2:00 PM

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from Julie Peacock to everyone: 2:00 PM

Thanks!

from Chris Harding to everyone: 2:00 PM

Thank you!

from Dawn Harfmann to everyone: 2:00 PM

Thank you all!

from Kathy Moyd to everyone: 2:00 PM

Special thanks to Ruchi for her handling of the chat and raised hands.

from Ann Vileisis to everyone: 2:00 PM

can we get info from the chat?