Oregon
Tina Kotek, Governor

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Meeting Summary

ODOE Oregon Energy Strategy Advisory Group Meeting #7; February 20, 2025

Attendees

Present Advisory Group members: Jason Heuser [joining as alternate for Aaron Orlowski], Andrea Kreiner, Charity Fain, Christine Golightly, Cory Scott, Elaine Prause, Fred Heutte, Ivy Quach, Jeff Hammarlund, Jennifer Bies, Joshua Basofin, Lauren Link [joining as alternate for Laura Tabor], Mary Moerlins, Patrick Ford Mills, Rakesh Aneja, Shannon Souza, Scott Simms, Timothy L. McMahan, Tucker Billman, Erin Childs

Oregon Department of Energy staff: Stacey Heuberger, Alan Zelenka, Anne Thrall-Nash, Edith Bayer, Jessica Reichers, Jillian DiMedio, Joni Slinger, Josh Price, Mary Kopriva, Michael Freels, Rob Del Mar.

Consultant team: Ben Duncan (Kearns & West), María Verano (Kearns & West), Gillian Garber-Yonts, Ruby Moore-Bloom (CETI), Jeremy Hargreaves (Evolved Energy Research)

Number of members of the public in attendance: 5

Welcome and Agenda Review

Ben Duncan (Kearns & West) opened the meeting and presented on WebEx functionality. Ben asked that attendees stay on mute and use the raise hand function and chat to participate. Edith Bayer, Oregon Department of Energy (ODOE), introduced herself and shared the following meeting objectives:

- Present modeling results with a focus on strategic takeaways for the policy discussions.
- Provide an opportunity to ask Jeremy Hargreaves, the lead modeler, questions.
- Understand the process for developing policy recommendations.
- Hear key issues and questions from Advisory Group members relating to policy discussions.
- Review focus of upcoming meetings.

Edith encouraged participants to ask questions throughout the meeting.

Ben reviewed the meeting agenda. Ben also shared the group agreements and requested that participants engage candidly but constructively. Additionally, Ben also requested that the chat function be used for questions but not dialogue.

Ben led the AG through roll-call for attendance.

January Meeting Summary Approval

Ben reiterated the process for formally approving meeting summaries, noting that the process will be a standing agenda item at future Advisory Group meetings. Participants were invited to share any requested edits to the January Meeting Summary. AG members raised no concerns and the January meeting summary was approved.

Framework for Policy Discussion

Edith provided a review of the elements of the Oregon Energy Strategy, explaining that the first element entails identifying pathways for meeting Oregon's energy needs and policies and that these pathways were modeled by ODOE's consultant, the Clean Energy Transition Institute (CETI) through a public engagement process in Phase 1. Edith explained that the Energy Strategy development is now in Phase 2 and focusing on policy discussions with Policy Working Groups (PWGs). Edith also explained that the Strategy development will culminate in a November 1 Report to the Governor and legislature that will include recommendations and a description of the Strategy's public engagement process. Edith added that ODOE has recently published three documents to provide detail on Phase 1 of the Strategy's development; a Technical Approach Document, outlining CETI's approach to energy pathways modeling and complementary analyses; a modeling sources and assumptions document; and an interim comment-response document that summarizes and responds to feedback received through Phase 1.

Edith walked through the planned Phase 2 policy discussion process, especially as planned for the PWGs, explaining that ODOE will frequently check in with the AG to review the PWG's progress. This PWG engagement process entails reviewing modeling findings on a given topic; examining where Oregon stands today in relation to those findings; reviewing policies, gaps, and barriers associated with the topic and modeling findings; drafting issue statements; investigating strategies to address the barriers identified; and, ultimately, proposing policy actions. Edith went over an example for this type of process.

Edith also described key considerations that, based on HB 3630 factors, should inform the selection of recommendations for the Energy Strategy.[1] Edith explained that the energy pathways modeling provides information on cost, land-use, and energy portfolio considerations, and also accounts for some technology feasibility, siting restrictions, and reliability constraints, but emphasized the Phase 2 policy discussions are needed to supplement and inform the directions indicated by the energy pathways analyses. Edith added that a mid-March release of complementary analyses in the form of an Energy Wallet analysis, air quality modeling, and geospatial mapping will support further examination of key considerations.

Ben explained that Jeremy Hargreaves (Evolved Energy Research) would be presenting on modeling results and then opening for questions; Ben asked that AG members hold questions or post them in chat for the duration of the results presentation.

Evolved Modeling Presentation

Jeremy presented on the modeling design and results. Jeremy explained that the modeling answered seven key questions by examining the differences between a Reference and six Alternative Scenarios;

[1] These include cost, feasibility, land-use and natural resource impacts, energy burden and affordability, environmental justice, energy and community resilience, community benefits, and economic and employment effects.

additionally, three sensitivity questions were examined.[2] Jeremy described the modeling framework as assessing Oregon and regional energy demands today, projecting changes and growth in demand through 2050, and, based on assumptions and publicly available cost data and projections, finding the least-cost way to meet that demand, subject to Oregon energy, reliability, and decarbonization policies. Jeremy stated that the key Oregon energy policies examined are the Climate Protection Plan, HB 2021, and Executive Order 20-04.

Jeremy summarized key findings from the modeling. These include a finding that total energy demand would decrease over the study period, but that electricity demand would grow; this follows from the electrification of end-uses, especially in vehicles and buildings. Jeremy also explained that the model accounts for meeting a rapid, short-term increase in energy demand from data centers, consistent with NWPCC projects of technology load growth. Jeremy contextualized energy demand projections as showing, overall, decreased energy expenditures consistent with broader macroeconomic trends of productivity being decoupled from energy demand. Jeremy also described that, as projected, future Oregon energy demands in decarbonized scenarios would exhibit less price volatility than that observed in recent decades; this decrease in volatility would follow from decreased reliance on international fuels and fuel markets. However, Jeremy caveated that reliance on other materials, such as rare-earth minerals, could have a countervailing effect on Oregon energy cost volatility. Finally, Jeremy stated that Evolved is coordinating with BW Research to produce a jobs study on the modeled scenarios, due later this year.

Jeremy provided the key modeling findings on how the Reference Scenario, Alternative Scenarios, and sensitivities indicated cost- and portfolio-investment impacts that would vary from testing different assumptions and limitations. The Reference Scenario provides the least-cost pathway to meeting Oregon Energy needs. Scenarios that would delay energy efficiency and vehicle electrification exhibited particularly high costs relative to the Reference Scenario, with cumulative cost increases of $17 and $14 billion over the study period, respectively. The Vehicle Miles Traveled reduction sensitivity, which assessed the impact retaining flat per-capita light-duty vehicle VMT projections or reducing that figure by 20 percent, consistent with state policies, presented a cost difference of $22 billion, and the sensitivity that examined failing to implement the Advanced Clean Truck rules produced increased costs of $30 billion – the greatest difference indicated in the modeling.

Electricity generation

Jeremy explained that the more-ambitious, economy-wide decarbonization targets of EO 20-04 would drive the modeling to reduce energy-sector decarbonization further than HB 2021 alone would. Jeremy stated that this follows because the energy sector is more practicable to decarbonize than other major sources of carbon emissions, such as agriculture, and so must account for a relatively greater portion of decarbonization for Oregon to meet its decarbonization goals efficiently. Additionally, Jeremy explained that load growth outside of HB 2021-regulated territories would need to be provided for with additional clean energy supply in order to meet EO 20-04 targets. Jeremy presented modeling findings on projected Reference Scenario electricity generating capacity in Oregon West and Oregon East, based on these decarbonization goals, and the roles hydro, solar, wind, and enhanced geothermal energy play in the modeled results. The model also called for the construction of many small, <25 MW (and thus HB 2021-compliant) fuel-based generators; these generators would fill a system-reliability function. They

[2] These key questions and sensitivities are available in Evolved's presentation materials, at pp3 and 4, respectively.

are relatively inexpensive to construct, but their fuel would be expensive, and so they would only run in peak-demand or emergency circumstances.

Land-Use

Jeremy presented on the modeling's use of the Nature Conservancy's Power of Place – West study. The modeling restricted against siting development on PoP-West Levels 1, 2, and 3 territories; those statutorily or administratively protected, or lands with otherwise high conservation values. Jeremy also presented on the amount of land that would be needed to provide for the projected expansion in the electricity system, with those figures calculated based on NREL assumptions of the land-area intensity needed for wind and solar buildout on a per-gigawatt basis [78sq mi/GW and 7sq mi/GW, respectively]. Jeremy explained that scenarios that halved the potential for clean electricity generation in Oregon and that barred the development of <25 MW clean gas resources led to a 31 percent reduction and 15 percent increase in projected land use for new developments, respectively.

Transmission

Jeremy stated that the modeling found a need for increased electricity transmission between Oregon West, Oregon East, and other western states in all scenarios. Jeremy described the energy pathways modeling of transmission as a linear zonal pipe flow model with less granularity than short-term transmission planning. Findings from the scenarios indicated that building less clean gas capacity in Oregon West would necessitate further transmission buildout, as would limiting demand-response technology adoption.

Low-carbon fuels

Jeremy explained that the modeling found a 70 percent reduction in fuels consumption from 2024 to 2050, with clean fuels demand rising relative to fossil fuel demand in the same study period. Jeremy explained that clean fuel use would likely be economical and needed for the hardest to decarbonize sectors such as aviation and industry. Jeremy also explained that clean fuels would include biogas, bio liquids, e-fuels, hydrogen, ammonia, and geothermal steam. The modeling found high clean fuel use in aviation and high vehicle electrification for light-, medium-, and heavy-duty vehicles, largely from the Advanced Clean Cars II regulation. The modeling also called for increased biogas reliance to replace natural gas reliance in residential and commercial sectors. Jeremy also presented on results showing very little fuel use for new, <25 plants that would be built by the model; this fuel use comes from electrolysis hydrogen, which is expensive to produce but serves an important reliability role. Jeremy presented on a couple example days, showing how geothermal and clean-fuel resources could respond to variances in clean electricity generation availability from hydro, wind, and solar.

Transportation

Jeremy went over the key findings from the transportation modeling results, including that transportation accounts for the largest decrease in energy demand or largest increase in efficiency modeled. Overall, the modeling predicts a 27 percent decrease in transportation energy demand, with 20 percent of that coming from light-duty vehicles and seven percent from HDVs. Adopting electric vehicles early, including medium- and heavy-duty vehicles, produces large cost savings and is important because of vehicle stock rollover times of 15-20 years. EVs do account for increased electricity loads in the modeled scenarios but can also benefit the grid by managing when they are charged and when they can serve as a storage resource to the grid. Jeremy also highlighted that VMT reductions play a large role in the modeling, but that public investments that may be needed to support VMT reductions were not modeled.

Buildings

Jeremy went over the key findings from the buildings sector modeling results. The modeling showed efficiency and cost savings improvements from increased heat pump installations. The model also examined a high DER alternative scenario that would lead to decreases in grid-scale solar buildout, especially in Oregon East. This, together with increased participation in flexible resource management, reduced energy generation and transmission requirements in this alternative.

Energy Modeling Conclusions

Jeremy presented on the key conclusions from the energy pathways modeling; that:

- Electrification and energy efficiency are key to reducing the size of the overall energy "pie" and to cost containment;
- Fuels play a strategic role in the transition, with a shift toward clean fuel alternatives toward 2050;
- All scenarios indicate a need to build infrastructure in Oregon; and
- Tech loads are the biggest driver of electricity demand growth but are also uncertain in when and where they could emerge.

Break

Modeling QnA

Ben Duncan moderated a question-and-answer forum on the modeling.

Question: Can you talk about the modeling of costs to maintain and or upgrade distribution networks for both electricity and gas? What's the approximate value of the costs used for this modeling?

> *Response: The model did not model distribution in a direct, nodal way; instead, it relied on historical costs from EIA specific to Oregon. This historical cost proxy is broken into a capacity component and an energy component and so the modeling accounts for differences in peak loads as they pertain to distribution costs. This approach was used for both electricity and gas distribution costs. These costs are significant and can be shared specifically later; historically, about 50 percent of all costs are attributed to transmission and distribution infrastructure.*

Question: What assumptions were made about the clean energy demands, electricity and fuels from California and Washington? How did that regional demand impact energy import availability for Oregon end-uses?

> *Response: Other states' energy demand needs and decarbonization policies are included in the modeling. They compete for resources with Oregon in the modeling.*

Question: Were potential climate change impacts to river levels related to droughts accounted for in longer term hydroelectric generation projections?

> *Response: Yes; the modeling is adopting new NWPCC projections on climate impacts to hydroelectric generation to model low, medium, and high scenarios with ramping energy constraints.*

Question: Can the modeling explore the implications of the expansion of the Coos Bay Pacific Coast Intermodal Port on fuels for maritime and rail?

Response: That project was not factored specifically into the model; the model relies on historic demand for aviation and rail fuels and projected growth in these based on EIA data. Historically, the amount of fuel demand from Oregon is low relative to Washington and California. Would guess that more activity would lead to more ammonia demand as a shipping fuel.

Question: Can you address the implied cost of capacity in the Reference Scenario, where new clean gas turbines are allowed, in comparison to Alternative Six's reliance on alternative resources? Doing so would be useful to understand the tradeoffs of that scenario.

Response: Would be difficult to calculate; the factors that would replace clean gas generation include transmission, storage, and new generation options that are complex.

Question: What is the typical size of clean turbines you are considering for flexible generation?

Response: 25 megawatts or less.

Question: Regarding the No ACT sensitivity and delayed transmission electrification alternative, did Evolved model a linear or a proportional delay? We are seeing potentially significant policy and regulatory shifts from the new federal administration, which could mean that in the next five to ten years those slow down. This is especially important because of potential EPA GHG Phase 1 rules.

Response: The No ACT sensitivity could be seen to reflect potential effects of new federal policy as it reflects a slow-down in near-term action. However, regional policies in states near Oregon may offer other approaches.

Question: Is home EV charging modeled; is it included in the residential sector? How?

Response: Yes; it was modeled within the transportation sector.

Question: Did the model select no offshore wind? Why? How does California development fit in? How much certainty is there around OSW costs?

Response: Cost factors, based on NREL data; PoP-West siting restrictions; and 25 GW of projected California OSW development led to OSW not being selected for Oregon development. The California OSW would be interconnected with the California system but could also be interconnected into Oregon; the barrier to further development is that the 25 GW of California wind constructed would not need to be supplemented by resources with a similar resource shape. Concern as to certainty on whether this capacity would be built in California is valid and OSW may become more viable further into the future.

Question: What fuels are included in "clean gas?" Does it include anthropogenic methane?

Response: A few clean fuels are included as clean gas; biomass fuels, anaerobic digestion fuels, methanation of hydrogen from pyrolysis and biogasification, methanation of hydrogen from electrolysis. Hydrogen can also be injected into natural gas pipelines up to seven percent by energy or twenty percent by volume.

Comment: The Strategy should account for shifting federal policy, especially reduced interest in OSW development, market differences between California and Oregon, as well as fisheries impacts, should be considered.

Comment: Concerned about federal workforce capacity, especially at BPA, to expand transmission.

> *Response: ODOE appreciates the input. The modeling may also be valuable as some of the scenarios explored factors that may be associated with the changing federal policy landscape, such as restricting transmission expansion. Additionally, the modeling targets Oregon energy policies and goals, and so changes in federal policy may affect the pathways as modeled less than the policies or steps Oregon would need to take to follow these pathways.*

Question: With respect to the new clean gas resources, what do we know about the jurisdiction of EFSC on trust lands? In other words, Oregon certificate limitations on SMR and turbines applicable to tribal trust lands. Is it's my understanding that there's a little over a gigawatt in tribally developed resources planned for Washington State to meet their database needs.

> *Response: This would be a policy question. The restriction against SMRs was applied throughout Oregon in the model.*

Question: Can you speak to the use of ammonia versus methanol for maritime fuels, given that Washington has concluded that methanol will be the primary clean fuel for their three primary shipping routes? Can you also discuss energy import methods for different fuel types as transmission via pipeline, truck, or other means?

> *Response: Methanol is a viable resource as shipping fuel but contains carbon; it would be convenient to get rid of the carbon atom, and ammonia avoids a need for carbon. Refined fuels would mostly be shipped by truck but liquid or drop-in fuels may take advantage of extant pipeline infrastructure. The model is allowed to build ammonia pipelines, but instead the model tends to produce ammonia locally rather than building transportation infrastructure. One exception is that, in Alternative 6, more electrolysis hydrogen is built by the model, along with transmission infrastructure.*

Question: Does the modeling account for transmission maintenance costs? How reliable is historical data, given the need for new and new types of development?

> *Response: Yes, based on NREL ATB data. There is some uncertainty in this data, as T&D costs can vary from one utility to the next. However, planning for T&D growth can help alleviate this uncertainty and drive down costs.*

Question: Can you also remind us about exogenous versus endogenous inputs for the end-use transportation fleet, and specifically how the model was allowed to optimize across battery, FCEV, and clean fuels drivetrains?

> *Response: The exogenous inputs for transportation included the sales shares of different technologies in the future, so whether vehicles were BEV, FCEV, or ICE was specified as inputs based on ACT, 100% ZEV sales by 2040 etc. Endogenous to the model was how to provide those fleets with energy, i.e. does the fuel come from fossil or clean sources? What kind of clean sources? What are the investments in clean fuels supply chains? If the vehicle is electric, how is the electric sector built out to provide that electricity?*

Conversation Roundtable

Edith reviewed language from the AG charter directed towards the AG's role in reviewing policy discussions and working towards recommendations. Edith explained that ODOE would be looking to AG

members to provide their perspectives on the ongoing policy discussions. Edith also reviewed the upcoming schedule through late May, explaining that ODOE would be engaging in intensive engagement with the AG, PWGs, and interagency steering group to draft recommendations to be released for public feedback in June. Edith explained that the next, March 20 meeting will be focused on updating the AG with PWG discussions and issues where there are differing perspectives.

Edith invited AG members to, in a roundtable format, speak to what they are most excited and worried about regarding the Energy Strategy and policy discussions.

Comment: Interested in development of solar and incentivizing and utilizing large rooftops in Oregon versus farmland. Excited for that discussion but concerned as to where it will happen.

Comment: Concerned that least-cost solutions will leave disadvantaged communities behind and concerned about federal policy landscape. Excited to no longer delay or postpone energy transition.

Comment: Excited about level-setting provided by the modeling, especially regarding technologies. Concerned about blurriness around modeling and about contention regarding Oregon policies in HB 2021 and E.O. 20-04. Also interested in ensuring that local community needs are elevated along with abstract decarbonization goals.

Comment: Excited about overall Energy Strategy, coordination, and analysis of pathways. Worried regarding least-cost focus and hopes that policies focus on demand-side resources and resilience for smaller communities.

Comment: Impressed with modeling work and transparency; insofar as the AG member is interested in providing historical context to support the Energy Strategy, is looking forward to policy discussions. Noticed that they're no longer included in the energy efficiency working group and concerned about transportation generally as an area of uncertainty. Based on their own experience, is interested in examining policies to support VMT reductions, such as zoning to support pedestrian-friendly cities. Expressed interest in supporting the TE working group.

Comment: Excited about the quality of the Energy Strategy work and transparency, communications around the Strategy. Excited about work around energy efficiency and distributed resources. Worried about distractions that could detract from implementing the work, such as distractions regarding federal policy.

Comment: Echoes support for the modeling process, happy to see hydrogen reflected in the decision-making process and in transportation particularly. However, concerned that certainty around some emerging technologies isn't adequately reflected and wants to ensure that the Strategy accounts for the bookends and range of potentials from emerging technologies. Thinks its beneficial to observe and listen to what the model indicates as efficient solutions.

Comment: Impressed with process so far and CETI's modeling; interested in the recommendations phase and going to legislature with support for actionable directives. Thinks the approach proposed is good. Wants to ensure that the Strategy works for all parts of the state. Finally, thinks its key to consider uncertainty around electricity load demands in the modeling, even beyond data and tech load growth. Thinks the Strategy should highlight the range of different demand possibilities in the state and present a safe path forward and where and how the path forward could be adjusted to account for demand changes.

Comment: Looking forward to the Strategy Report and the response to it by the Governor's office and legislature. Hopes Energy Strategy conversations will be ongoing and reflect new developments to Oregon's energy context. Concerned about policy impacts to Oregon taxpayers and affordability in Oregon. Expressed appreciation for the process and ongoing discussions involved with Energy Strategy engagement.

Comment: Excited about articulating the trade-offs between different opportunities facing Oregon to inform public decision-making. Concern of reach exceeding grasp and balancing competing objectives in the Strategy and Oregon policy.

Comment: Echoes positives heard here and impressed with the process and modeling thus far. Concerned with the urgency to reduce emissions drastically and quickly amidst a complex and competitive environment. Would be worried that important Oregon Energy Strategy work would get stuck because prioritization becomes a challenge.

Comment: Echoes appreciation for modeling work and expressed excitement for the upcoming policy work and framework Edith presented on the path forward. Concerned around understanding of long lead-time resources and how to account for various factors and uncertainties around those resources. Also concerned around load growth, electricity sector pressures, and uncertainty and granularity of issues in those areas.

Comment: Excited to see PoP-West used in the Strategy and how it informs incentivizing low-impact options like reconductoring and co-locating resources. Concerned around federal policies and OSW and how OSW was reflected in the modeling and the dating of PoP-West offshore layers.

Comment: Excited about policy generally and exploration of low-carbon fuels; worried about federal policy and uncertainty.

Comment: Echoes appreciation for modeling work and excitement for forthcoming policy work. Concerned about federal funding available to support recommendations.

Comment: Adds appreciation for model; states that all models are wrong but some are useful. States that the CETI modeling provides a good, holistic baseline to support the Energy Strategy. Excited, as a bold goal, that the Strategy can serve as a reference and benchmark for other state and federal strategies and policies. As a worry, concerned about lack of federal support, especially for transportation electrification. States that vehicle electrification is a global policy and so relationships with European markets and policies, for instance, are important. Adds that consistency and stability are important to transportation, so reliable planning and policies for the next ten and 20 years are vital.

Comment: Echoes appreciation for research and modeling so far and balance of perspectives in the Oregon Strategy development thus far. Echoes earlier comment that Strategy should serve all of Oregon. Expresses concern for the time needed to undertake energy modeling and ongoing uncertainties, especially regarding federal and BPA workforces. Wants to retain focus on being agile in the short-term to respond to changing circumstances.

Comment: Echoes appreciation for modeling and Strategy development work so far; concerned about permitting difficulties but excited about Energy Strategy opportunities. Appreciates the clarity in the modeling and mapping of transmission constraints from Oregon East to West. Concerned regarding

political courage to take appropriate action consistent with needs highlighted by the Energy Strategy, especially based on economic concerns.

Meeting closing and next steps.

Ben and Edith expressed appreciation for all AG members' input and discussions around controversial topics. Edith highlighted value of adopting a problem-solving mindset and clarity of vision around differing perspectives regarding the strategy. Edith explains that the March 20th call will focus on reporting back PWG work and that complementary analyses results will be forthcoming. Ben expressed his appreciation for Advisory Group members and adjourned the meeting.