Oregon
Tina Kotek, Governor

OREGON DEPARTMENT OF ENERGY

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AGENDA

Title: Transmission and Distribution (Pipes and Wires) Working Group – Oregon Energy Strategy

Date: August 14, 2024, 1 – 3 pm

Objectives:
The purpose of this Working Group is to:

- Understand foundational data sources that will inform the energy strategy and ask clarifying questions.
- Provide expertise and feedback on key assumptions related to transportation.
- Discuss "what if" questions and priorities for a scenario analysis that can help illuminate trade-offs of different clean energy pathways.
- Foster transparency in the Energy Strategy technical analysis through information sharing on the scope, data sources, and development process of the modeling tools.

Transmission and Distribution (Wires and Pipes) Working Group Members:

Amazon	Courtney Lee
BPA	Hannah Dondy-Kaplan
Cascade Natural Gas Corporation	Eric Wood
Climate Solutions	David Van't Hof
Community Renewable Energy Association	Mike McArthur
Coos Curry Electric Cooperative	Brent Bishoff
CUB	Claire Valentine-Fossum
Idaho Power	Marc Patterson
IBEW	Lennie Ellis and Chris Carpenter
LineVision	Eli Asher
McMinnville Power and Light	John Dietz
NewSun Energy	Jake Stephens
NIPPC	Sidney Villanueva
NW Natural	Mike McKenzie and Edward Thurman
NWEC	Fred Heutte
OEC	Nora Apter
OPUDA	Danelle Romain and Mike Freese
PacifiCorp	Scott Beyer
PGE	Shaun Foster, Gohar Shafiq, and Sarah Buchwalter
Renewable Northwest	Diane Brandt
TNC	Lauren Link
Umatilla Electric Cooperative	Alec Shebiel

Agenda

Topic	Who	Time
Welcome and Introductions	Jason Sierman, ODOE	5 min
Setting the Stage	Jason Sierman, ODOE	10 min
How transmission and distribution systems for the electric and natural gas systems are modeled and considered in the Oregon Energy Strategy reference scenario	Jeremy Hargreaves, Evolved Energy Research	25 min
Guided discussion on key reference scenario assumptions: • What are your thoughts/reactions to the starting point assumptions presented here? • At a high level, does the modeling methodology capture the costs and risks associated with transmission and distribution system infrastructure (pipes and wires) at a reasonably accurate level?	Jason Sierman, ODOE Rob Del Mar, ODOE Jeremy Hargreaves, Evolved Energy Research	35 min
Guided discussion on alternative scenarios/levers: • What are your transmission system concerns (pipes and wires) and how might they be reflected in a scenario analysis? • How challenging and complex will electricity transmission reconductoring and rebuild projects be within, or adjacent to, existing rights-of-way corridors? • Do historic cost trends associated with distribution system maintenance and upgrades provide a reasonable assumption of future costs?	Jason Sierman, ODOE Rob Del Mar, ODOE Jeremy Hargreaves, Evolved Energy Research	35 min
Wrap up and Next Steps	Jason Sierman, ODOE	10 min

Note: ODOE will open the floor for comments and questions from observers if time permits. Comments and questions can also be submitted to https://odoe.powerappsportals.us/en-US/energy-strategy/

Oregon Department of **ENERGY**

Oregon Energy Strategy
Transmission and Distribution Working Group

Jason Sierman &
Rob Del Mar

August 14, 2024

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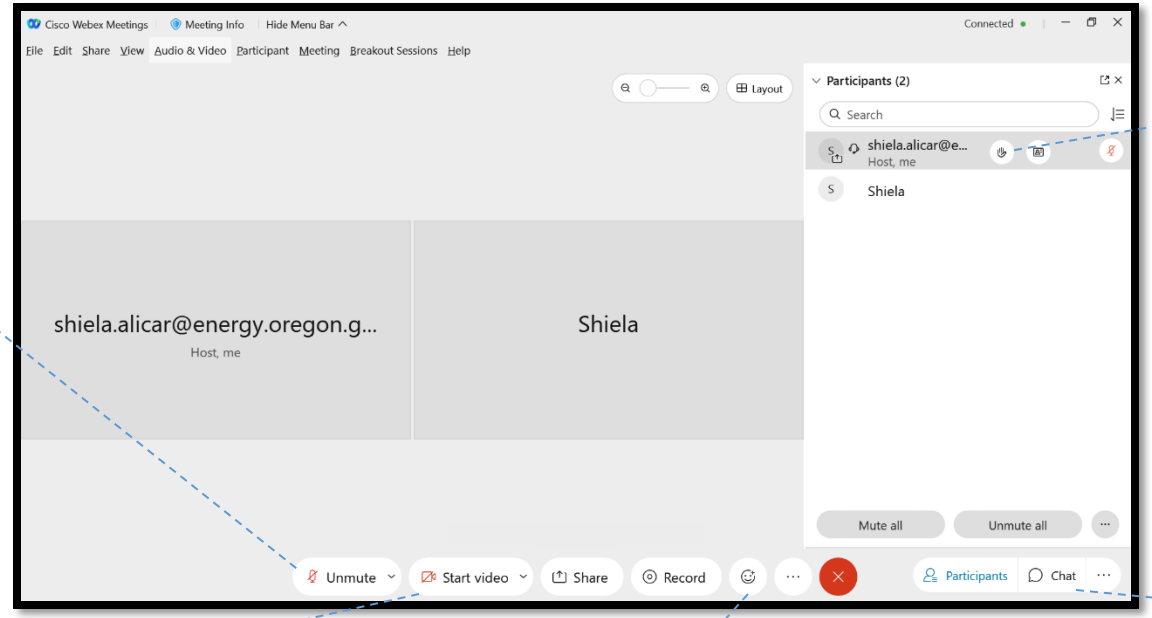
USING WEBEX



Audio Options

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Video Options

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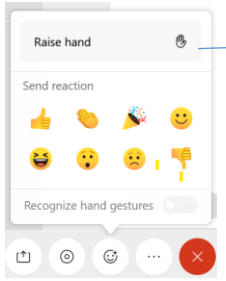
Reactions



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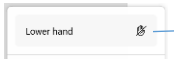

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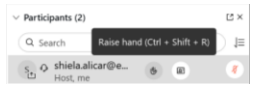
Second Raise Hand Option

You can also click on the hand next to your name in the Participant list to raise your hand.



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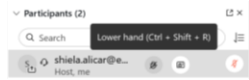
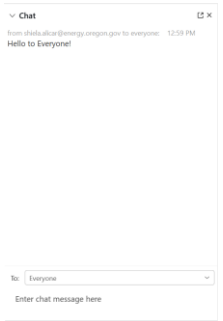
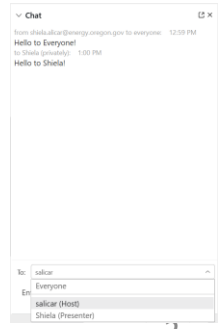


Chat



You can chat to Everyone in the meeting.

You can send a private message to the Host or Presenter (or all Panelists when there is a Panel).



Tech Support please chat with Abby Reeser

PURPOSE OF THIS WORKING GROUP

- Understand foundational data sources expected to inform starting point for analysis and ask clarifying questions.

- Provide expertise and feedback on key assumptions related to transmission and distribution systems (wires and pipes) out to 2050.

- Discuss “what if” questions to inform scenarios that can help understand trade-offs of different clean energy pathways.

Note: focus is on the modeling (Phase 1); discussion of policy recommendations (Phase 2) will take place in early 2025.

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AGENDA

1:00 – 1:05	Welcome and Introductions	Jason & Rob, ODOE
1:05 – 1:15	Setting the Stage	Jason & Rob, ODOE
1:15 – 1:40	How transmission and distribution systems are considered in the Oregon Energy Strategy reference scenario	Jeremy Hargreaves, Evolved Energy Research
1:40 – 2:15	Guided discussion on key reference scenario assumptions	Rob & Jason, ODOE Jeremy Hargreaves, Evolved Energy Research
2:15 – 2:50	Guided discussion on alternative scenarios/levers	
2:50 – 3:00	Wrap up and Next Steps	Rob & Jason, ODOE

Note: ODOE will open the floor for comments and questions from observers if time permits. Comments and questions can be submitted to: https://odoe.powerappsportals.us/en-US/energy-strategy/

WORKING GROUP ROSTER

ORGANIZATION	NAME
Amazon	Courtney Lee
BPA	Hannah Dondy-Kaplan
Cascade Natural Gas Corporation	Eric Wood
Climate Solutions	David Van't Hof
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Umatilla Electric Cooperative	Alec Shebiel

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CLEAN ENERGY TRANSITION INSTITUTE TEAM

Project Management

- Overall Project Manager: Eileen V. Quigley, CETI
- Technical Project Manager: Ruby Moore-Bloom, CETI

Technical Modeling

- Technical Project Lead: Jeremy Hargreaves, Evolved
- Technical Advisors: Elaine Hart, Moment Energy Insights; Amy Wagner, Evolved
- Technical Project Support: Ryan Jones and Gabe Kwok, Evolved
- Health Impacts Lead: Jamil Farbes, Evolved

Equity Support

- Equity Advisor: Angela Long, Rockcress Consulting
- Equity Advisory & Data Analyst: Mariah Caballero, CETI

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INTRODUCTIONS

- Please share the following with the group **via chat**:
  - name
  - affiliation
  - geographic location you represent
  - (Ice Breaker Question): What is your favorite summer activity?

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Setting the Stage

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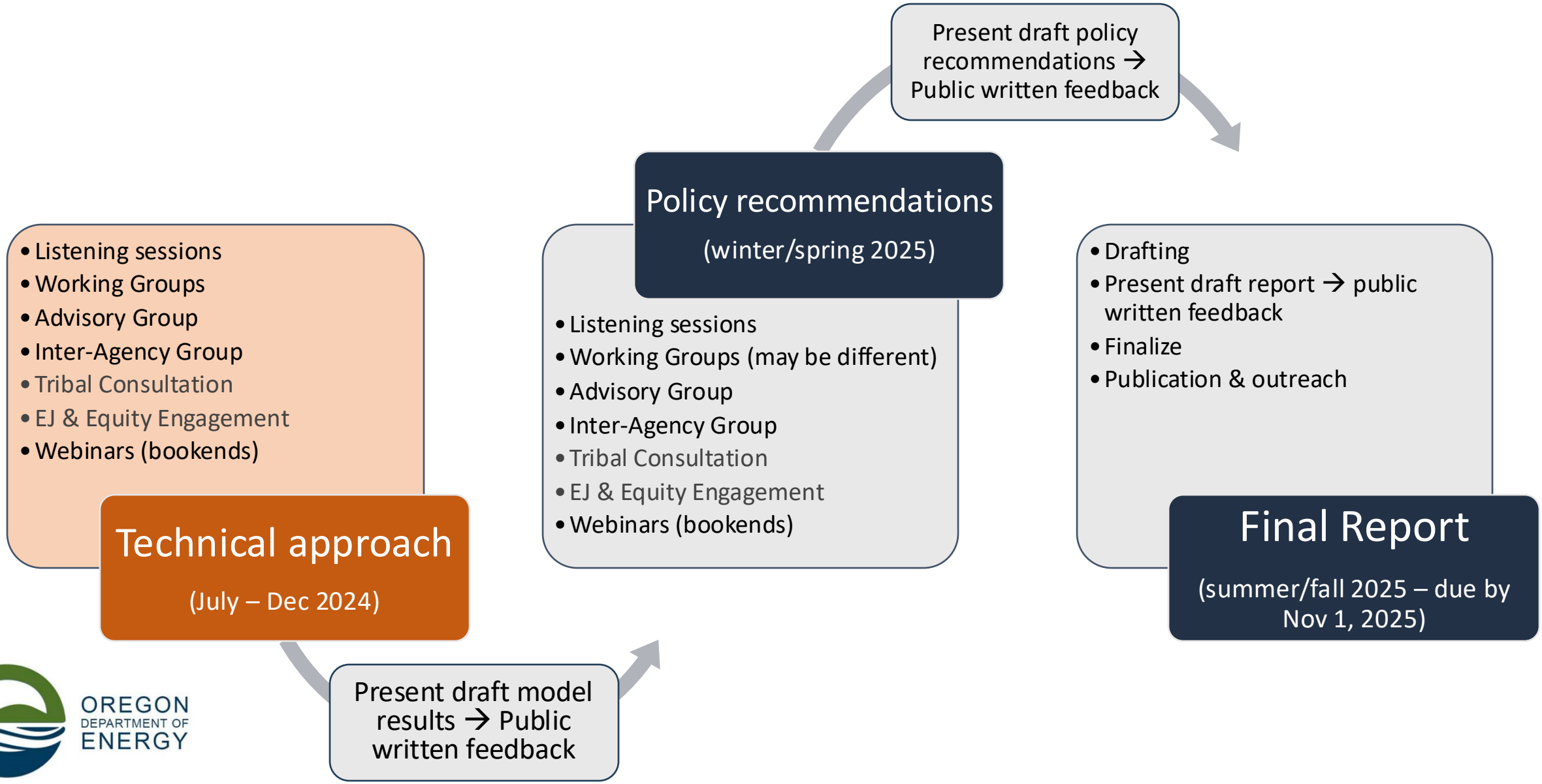
WHERE WE ARE IN THE PROCESS



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SCOPE OF THE ENERGY STRATEGY

In identifying pathways to meeting the state's energy policy objectives, the state energy strategy must take into account, at a minimum:

- State Energy demand and trends
- Energy resources and tech choices considering costs, EE, feasibility & availability
- Existing & potential incentives to support EE
- Energy generation, transmission, distribution infrastructure
- Emerging tech & investment opportunities
- Environmental justice
- Community benefits
- Land use considerations
- Energy burden & affordability
- Econ and employment impacts
- Energy security and impacts of broader markets
- Energy resilience
- Community energy resilience

ENERGY POLICY OBJECTIVES

Economy-wide

- EO 20-04
- 80% GHG reduction by 2050

Electricity (IOUs*)

- HB 2021
- 100% clean by 2040

*HB 2021 applies to the large IOUs, PacifiCorp and Portland General Electric Company, as well as to electricity service suppliers.

Natural gas, liquid fuels, propane

- Climate Protection Program
- 90% GHG reduction by 2050

Policies driving and shaping compliance pathways:
Clean Fuels Program, Advanced Clean Cars II, Advanced Clean Trucks, Building Codes, Appliance Standards, and many more….

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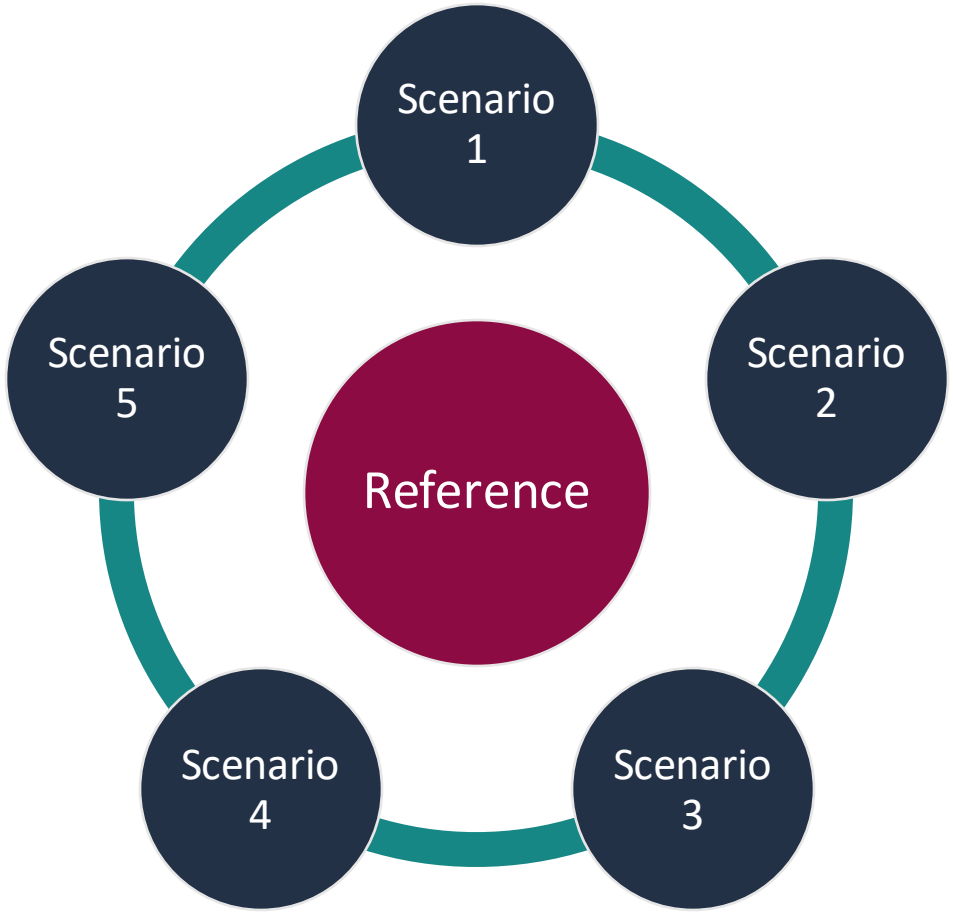
MODELING INPUTS FOCUS



Reference: Combination of a set of reasonable assumptions demonstrating alignment with state energy goals to 2050

Scenarios: Test alternative pathways to uncover differences and trade-offs compared with the reference pathway *(e.g., **What if** there is more or less transmission? **What if** heat pump or electric vehicle adoption is slower than expected?)*

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How Energy Transmission & Distribution Systems are considered in the Oregon Energy Strategy reference scenario

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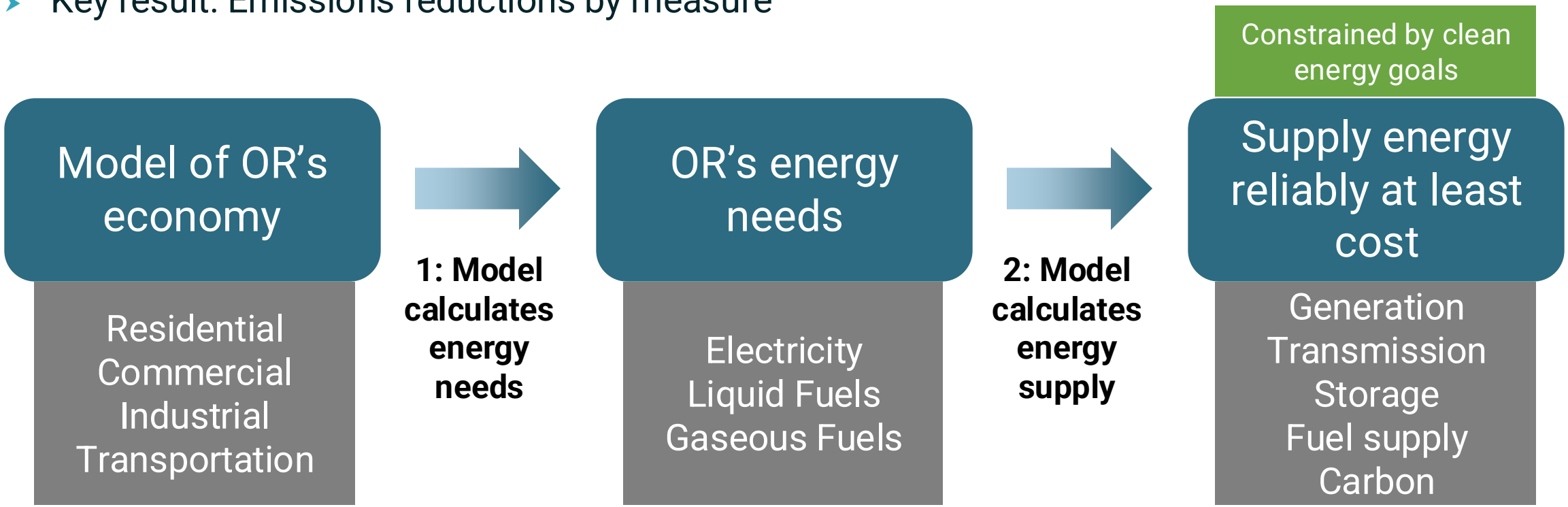
Oregon Energy Strategy Technical Consulting

High Level Description of Modeling Approach

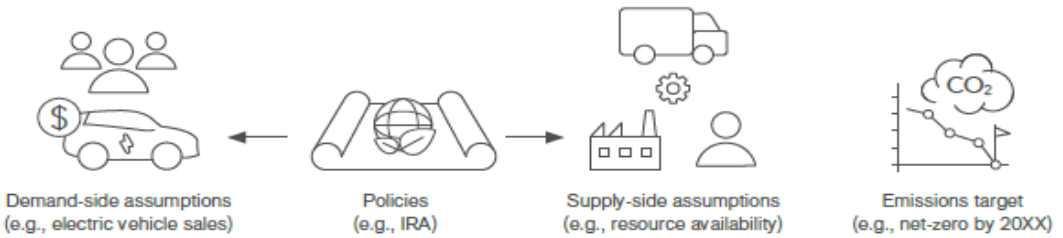
- Model calculates the energy needed to power OR's economy, and the least-cost way to provide that energy under clean electricity and emissions goals
- Key result: Emissions reductions by measure



Economy-Wide Energy Modeling

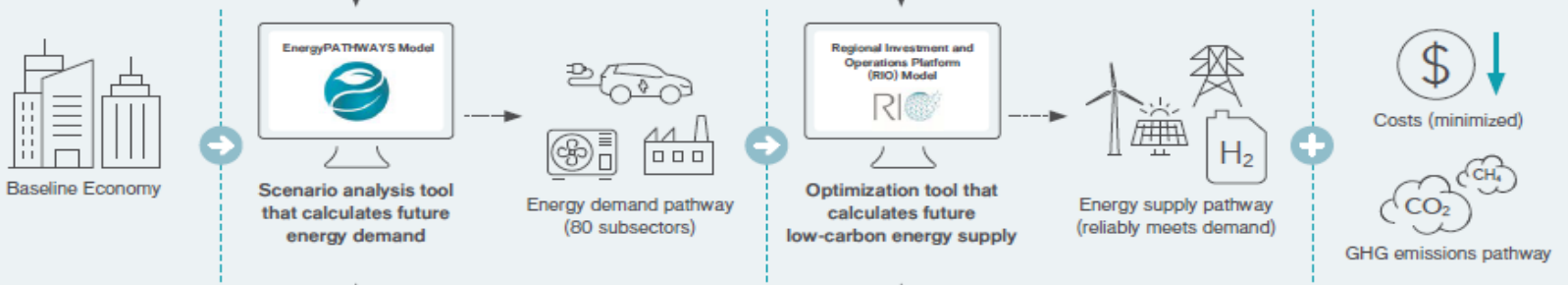
Scenario Assumptions

Model incorporates assumptions about demand-side uses, clean energy policies and incentives, and supply-side resources.



Energy Modeling

Evolved Energy Research uses two models to calculate the least-cost way to provide energy under an emission target: Energy Pathways for demand and RIO for supply.



Best Available Data

Model incorporates relevant and up-to-date energy data from reputable sources, substituted with local data where possible.

Underlying demand data

- Economic subsectors
- Demand technology characteristics
- Capital, operating, and installation costs
- Hourly demand shapes
- Current technology stocks
- Energy service demands
- Fuels efficiencies (electricity, pipeline gas, diesel, etc.)
- Demand drivers (e.g., population)
- Geographies

Underlying supply data

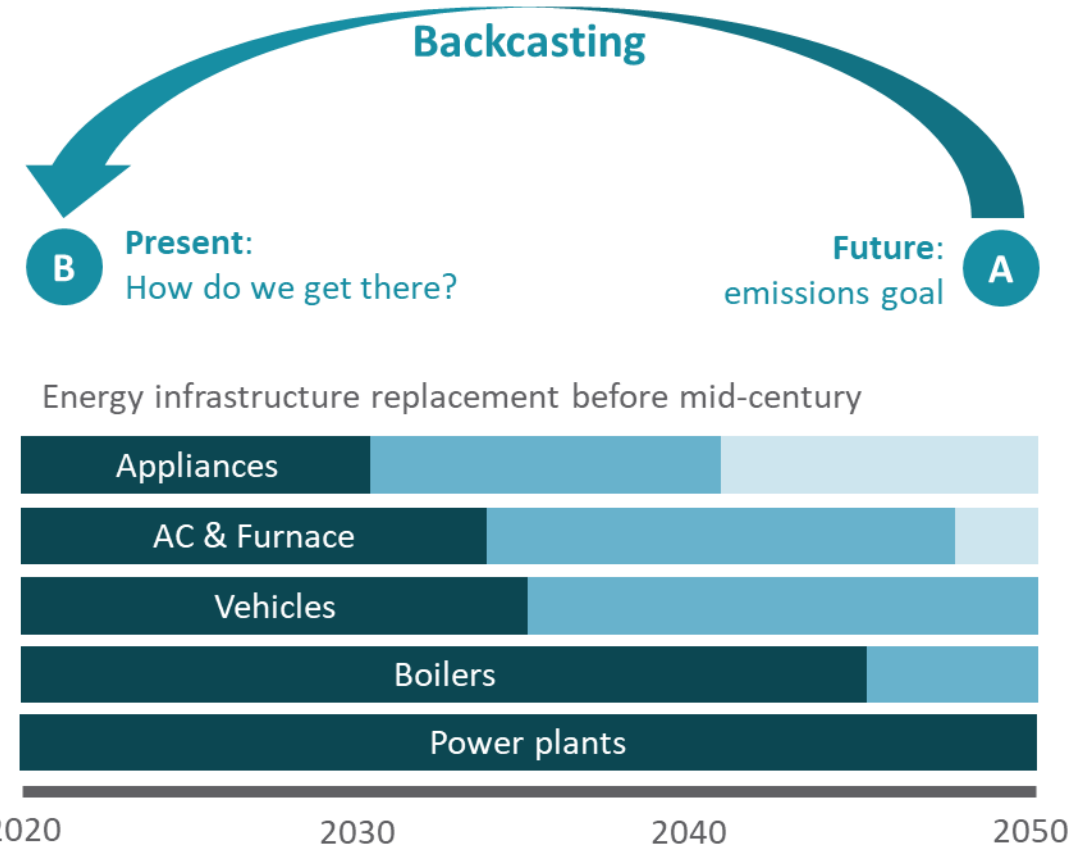
- Existing energy infrastructure
- Existing infratructure scheduled retirement
- Scheduled resource additions already committed
- Energy production and conversion infrastructure characteristics
- Energy transport, storage, and delivery options
- Capital, operating and maintenance, and installation costs
- Resource potentials
- Renewable resource production shapes
- Commodity costs and delivery costs
- Gas global warming potentials
- Land use
- Geographies

EVOLVED ENERGY RESEARCH

Clean Energy Transition Institute

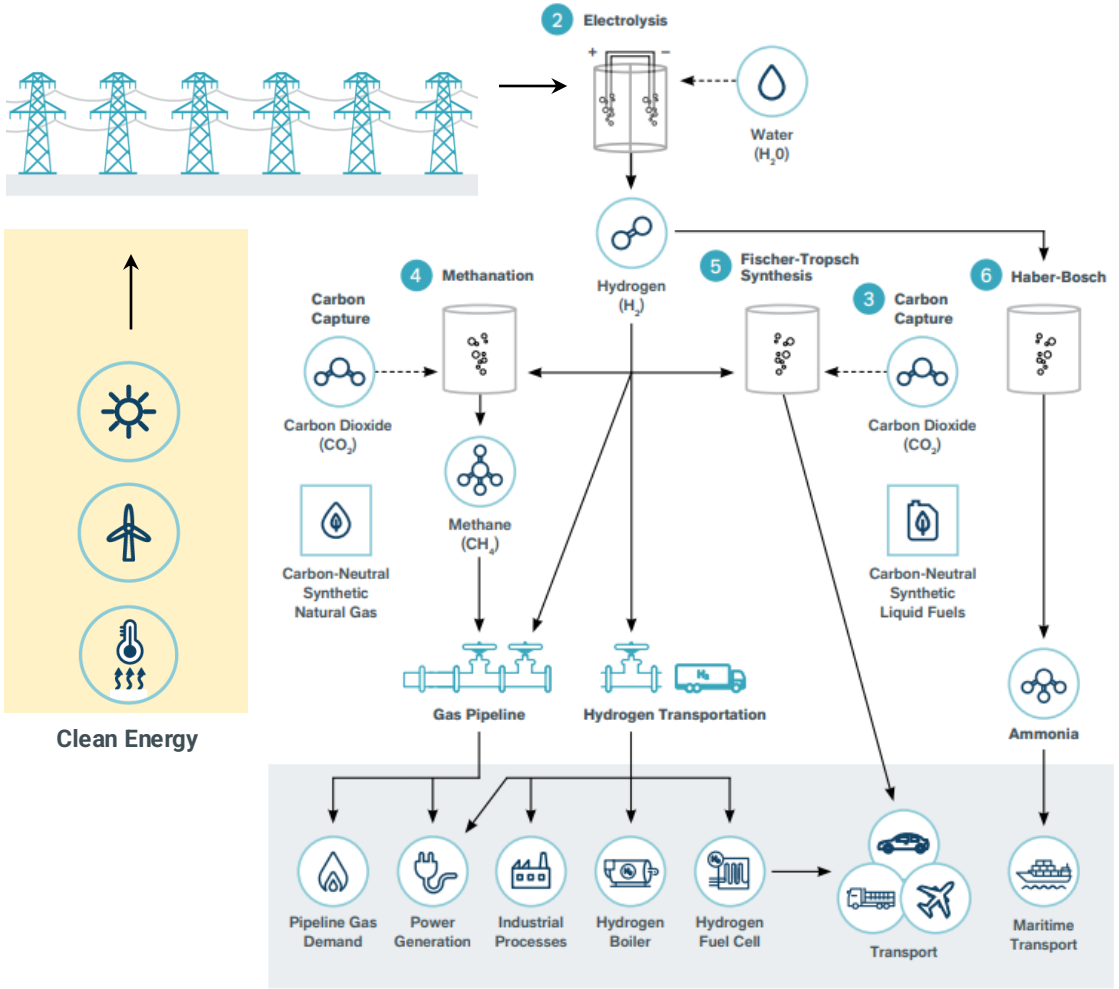
Forecasting vs. Backcasting

- **Forecasting**: project changes based on expected customer behavior given incentives/technology
  - e.g result of current policy
- **Backcasting**: start with an end-point and work backwards to infer customer adoption over time
  - What is the best path to be on?
  - Target for future policymaking: Where is current policy falling short?
  - All options available in the long term



Integrated Supply Side: Electricity and Fuels

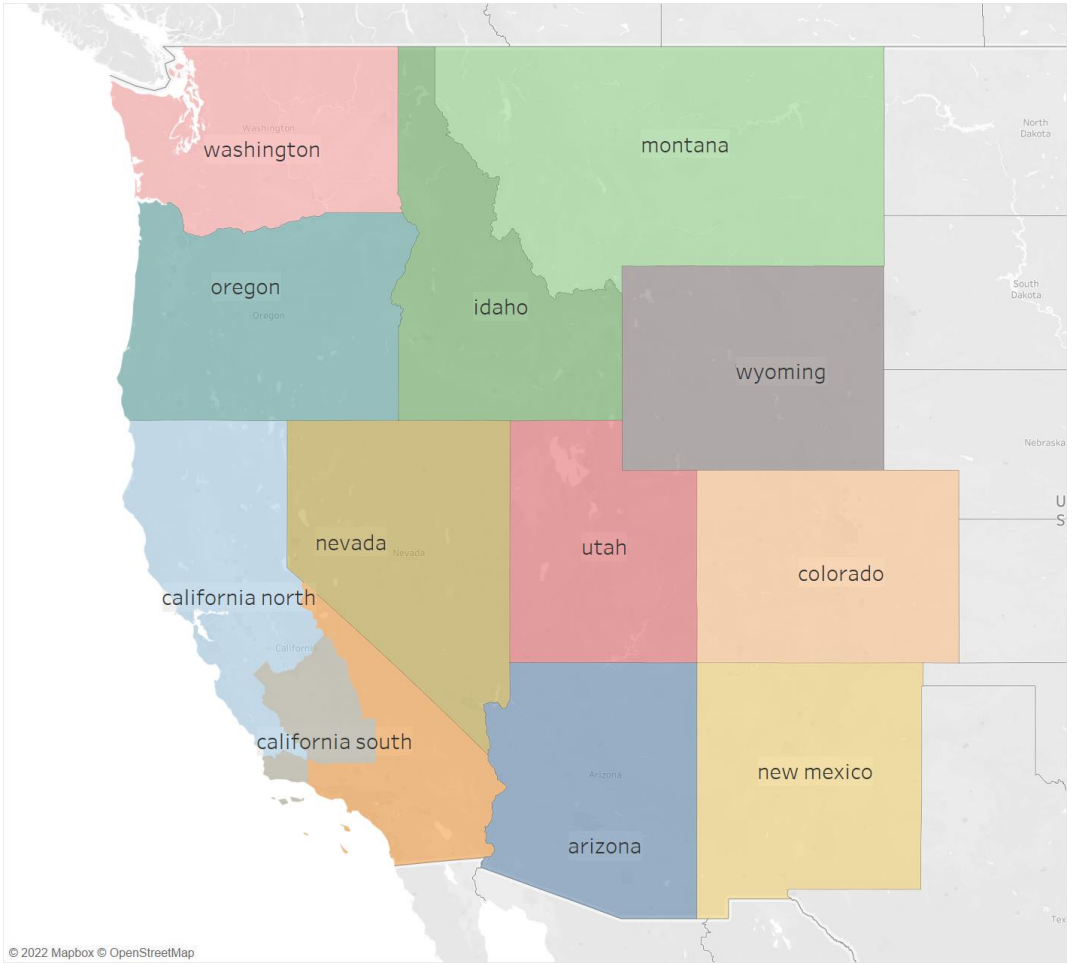
- What are the supply side investments that best meet energy demands?
- Conventional means of “balancing” the electricity grid may not be the most economic or meet clean energy goals
- New opportunities: Storage and flexible loads
- Fuels are another form of energy storage
- Large flexible loads from producing decarbonized fuels:
  - Electrolysis, synthetic fuels production



Source: CETI, NZNW, 2023

Model Geography

- Western United States with state level representation, California represented as 2 zones, and a single rest-of-the-US zone
- Contextualizes the decisions made in Oregon operating as part of a larger energy system
  - Competition for fuels including biomass, renewables, and hydrogen derived from renewables
  - Balances the electricity system over a large and diverse region – assumes single balancing authority
  - Captures transmission line and pipeline flow and build constraints
  - Resource, load, and temporal diversity contribute to economy and region-wide least cost strategy to reach net zero
- Modeling 2 zones in Oregon to represent East-West Tx constraints



Potential Expansion Of Interstate Transmission

- Power of Place – West: Identified major substations for interties between states, the existing corridors, the potential to reconductor or co-locate transmission in those corridors, and new potential right of ways for additional transmission expansion

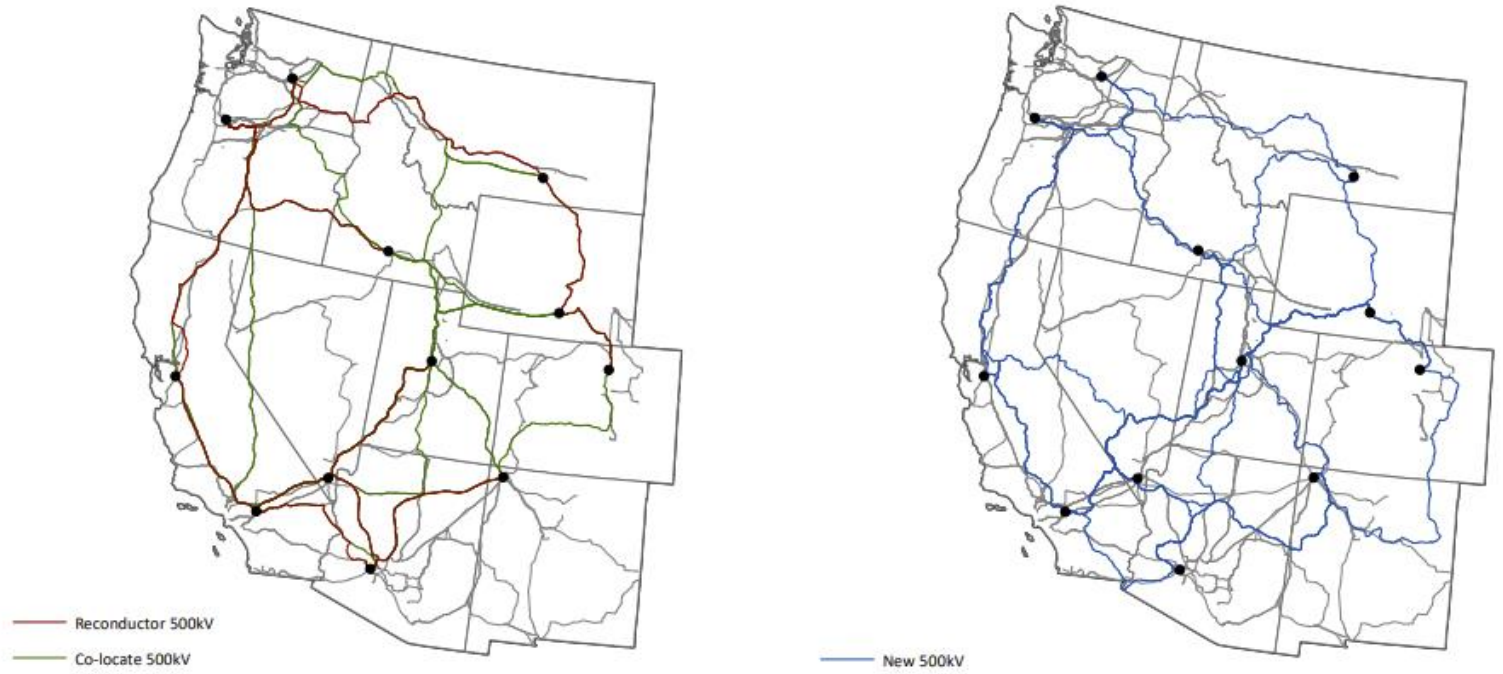


Fig. S8. Least cost path model results showing 500 kV transmission lines. Left: reconductored and co-located 500 kV lines only. Right: new 500 kV lines only.)
Source: Power of Place-West

COST ASSUMPTION FOR TRANSMISSION EXPANSION

Cost Comparison– Example Lines

EVOLVED ENERGY RESEARCH

- Significantly higher costs across the supply curve in PoP transmission estimates
  - Multipliers considerably increase costs over ReEDS estimates
  - Do these prices align with expectations?

Tx Corridor $/kW	NREL ReEDS	2x ReEDS	PoP Reconductor	PoP Co-location	PoP New Corridor
Montana --> Washington	257	514	2121	1714	1868
Oregon --> CA North	731	1461	2058	1687	1967
Idaho --> Montana	454	907	1664	1260	1316
Oregon --> Idaho	221	442	1902	1582	1506

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Within Zone Transmission

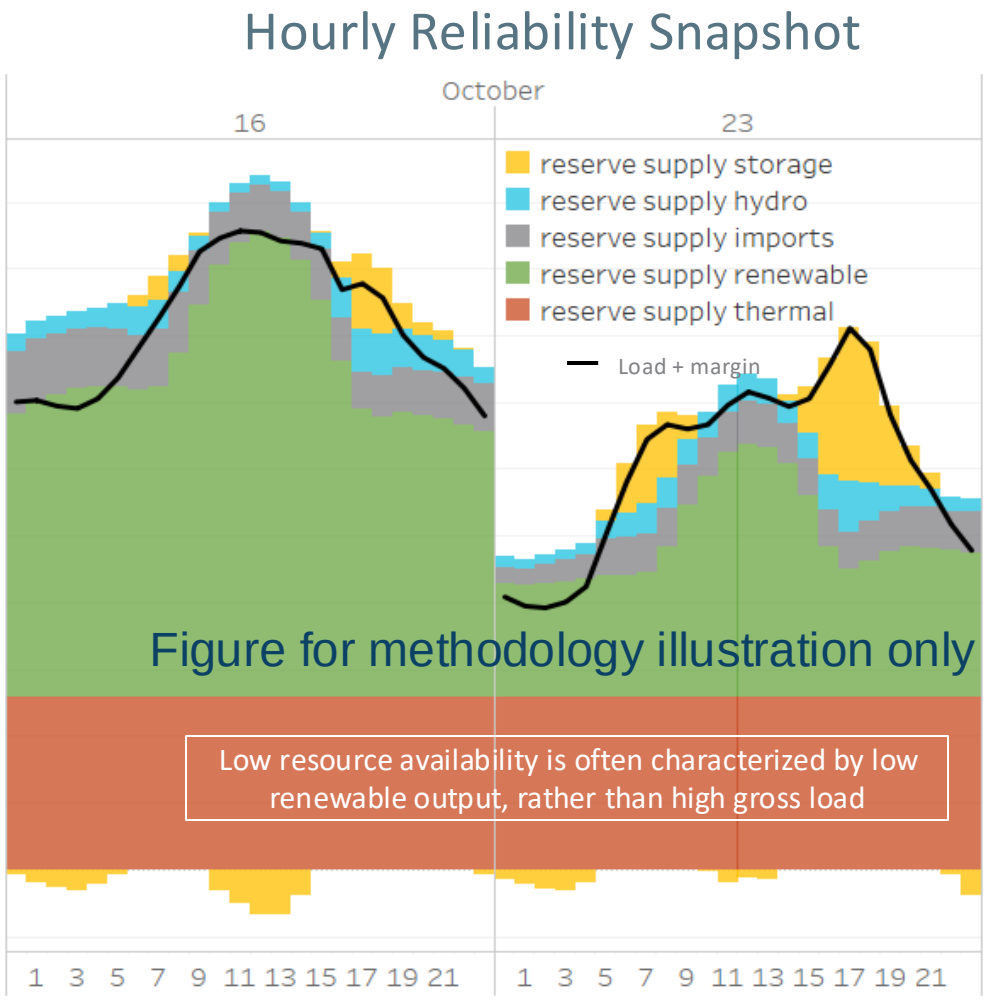
- No physical representation of within zone transmission or distribution
  - High-level approach to estimating electric and gas T&D costs
  - Correlates in-state electric transmission and distribution capacity expansion costs with the total increase in net distribution system peak
- Captured with historical transmission and distribution costs
  - Uses historical $/MWh from EIA
- Model optimization decisions are not impacted by electric T&D cost assumptions; flexible load is a notable exception
  - Higher distribution upgrade cost assumptions will drive more load shifting in the model; lower costs will drive less load shifting

Natural Gas Infrastructure Cost Modeling Approach for this Study

- Uncertainty about the impact of declining gas throughput on gas infrastructure costs
  - Are parts of the system decommissioned or do only flow rates decline?
- Conservative assumption: Assume that declining gas throughput results in zero gas infrastructure cost decline (i.e., that all gas infrastructure costs are fixed, none are variable)
- Possible to perform cost sensitivity calculations to show how costs would change under different targeted electrification/gas decommissioning cost assumptions
- This approach is suited to the gas system because EER's models do not optimize gas throughput or investment based on these cost assumptions

How Does RIO Approach Transmission Reliability?

- Reliability is assessed across all modeled hours with explicit accounting for:
  - Demand side variations – higher gross load than sampled
  - Supply side availability – outage rates, renewable resource availability, energy availability risk, single largest contingencies
- Transmission reliability dynamic based on available resources in the zone of origin and a derate on the transmission line
- Advantage over pre-computed reliability assessments because it accommodates changing load shapes and growing flexible load
  - Any pre-computed reliability assessment implicitly assumes a static load shape, which is not a realistic assumption
- No economic capacity expansion model can substitute fully for a LOLP study, but different models offer different levels of rigor



Reference scenario data and assumptions

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ELECTRIC TRANSMISSION DISCUSSION

- How should we model the transmission transfer capacity between eastern and western Oregon?
- Are The Nature Conservancy's *Power of Place* transmission line costs the most appropriate assumption for the model? Should other cost assumptions be considered? For example, climate impacts mitigation and/or response to wildfires and other disasters?
- Should we have different timeline considerations for transmission expansion? Reconductoring existing lines versus building new lines?

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GAS DISTRIBUTION & TRANSMISSION DISCUSSION

- Are there future costs for natural gas distribution and transmission systems you think should be included in the model?
- Are the assumptions around electrification adoption and how that will be considered in natural gas system costs reasonable? Are there other forecasts or studies that could inform this?
- Are there considerations around fuel blends or repurposing natural gas infrastructure for future lower carbon fuels? What should the model assume for the costs and availability to distribute alternative fuels?

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ELECTRIC DISTRIBUTION DISCUSSION

Should the model accurately reflect costs associated with future distribution system upgrades?

- Upgrades driven by electrification.
- Upgrades driven by natural hazards / climate change
  - Proactive projects such as undergrounding, vegetation management, controls, and monitoring equipment.
  - Reactive costs such as increased insurance costs, pole replacements and other repairs from wildfires, winter storms, etc.

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OTHER MODELING INPUTS and ASSUMPTIONS

- Are there other electricity distribution and transmission system modeling inputs that you would like to discussion?
- Are there other natural gas distribution and transmission system modeling inputs that you would like to discussion?

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What if…?

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ALTERNATIVE SCENARIOS DISCUSSION

- What if Electricity load growth is higher (or lower) than current forecasts?
- What if wildfire costs are higher than current forecasts?
- Should the model demonstrate non decarbonization costs?
- What if transmission expansion to access out of state resources is limited to existing corridors?

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Wrap up and Next Steps

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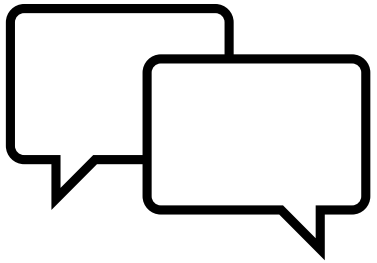
OPPORTUNITIES FOR PUBLIC COMMENT



Provide written public comment through
August 31, 2024 by visiting:

https://odoe.powerappsportals.us/en-US/energy-strategy/

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Thank you

RESOURCES:

Project page: https://www.oregon.gov/energy/Data-and-Reports/Pages/Energy-Strategy.aspx

ODOE's website: www.oregon.gov/energy

Contact us: energy.strategy@energy.Oregon.gov

Edith Bayer: edith.bayer@energy.Oregon.gov