Oregon
Tina Kotek, Governor

OREGON DEPARTMENT OF ENERGY

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AGENDA

Title: Energy Efficiency and Load Flexibility Working Group – Oregon Energy Strategy

Date/Time: August 2, 2024 / 1:00 pm – 3:00 pm

Meeting Link: WEBEX Link

Objectives:

The purpose of this Working Group is to:

- Understand foundational data sources for the reference scenario and ask clarifying questions.
- Provide expertise and feedback on key assumptions related to energy efficiency and load flexibility in the reference scenario out to 2050.
- Discuss "what if" questions to inform additional scenarios that can help understand trade-offs of different clean energy pathways.

Energy Efficiency and Load Flexibility Working Group Members:

Organization	Name
Building Potential	Kerry Meade & Melissa Sokolowsky
Cascade Natural Gas Corporation	Noemi Ortiz
Climate Solutions	Claire Prihoda
Columbia River Inter-Tribal Fish Commission	Christine Golightly
Dragonfly Consulting	Shelley Beaulieu
Energy Trust of Oregon	Spencer Moersfelder & Adam Shick
Monmouth Power	Wade Carey
Northwest Energy Efficiency Alliance	David Clement
Northwest Natural	Laney Ralph & Rebeca Enriquez
Oregon Public Utility Commission	JP Batmale
Oregon People's Utility District Association	Danelle Romain & Mike Freese
Portland General Electric	Jake Wise & Sarah Buchwalter
Resource Innovations	Jeff Mitchell & Rick Dunn
Skip Technology Inc	Brennan Gantner
SunPower/Oregon Solar + Storage Industries Assc'n	Patrick Sterns
Umatilla Electric Cooperative	Alec Shebiel
Wy'East	Robert Wallace

Agenda

1:00 – 1:10	Welcome and Introductions	Edith Bayer, ODOE
1:10 – 1:20	Setting the Stage	Edith Bayer, ODOE
1:20 – 1:35	How energy efficiency and load flexibility are considered in the Oregon Energy Strategy reference scenario	Jeremy Hargreaves, Evolved
1:35 – 2:20	Discussion of reference scenario data and assumptions	Andy Cameron, ODOE Jeremy Hargreaves, Evolved
2:20 – 2:50	Discussion of alternative scenarios	
2:50 – 3:00	Wrap up and Next Steps	Edith Bayer, ODOE

Note: ODOE will open the floor for comments and questions from observers if time permits. Comments and questions can also be submitted to energy.strategy@energy.oregon.gov.

Oregon Department of **ENERGY**

Oregon Energy Strategy
Energy Efficiency and Load Flexibility Working Group

Andy Cameron and Edith Bayer
August 2, 2024

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USING WEBEX

Audio Options

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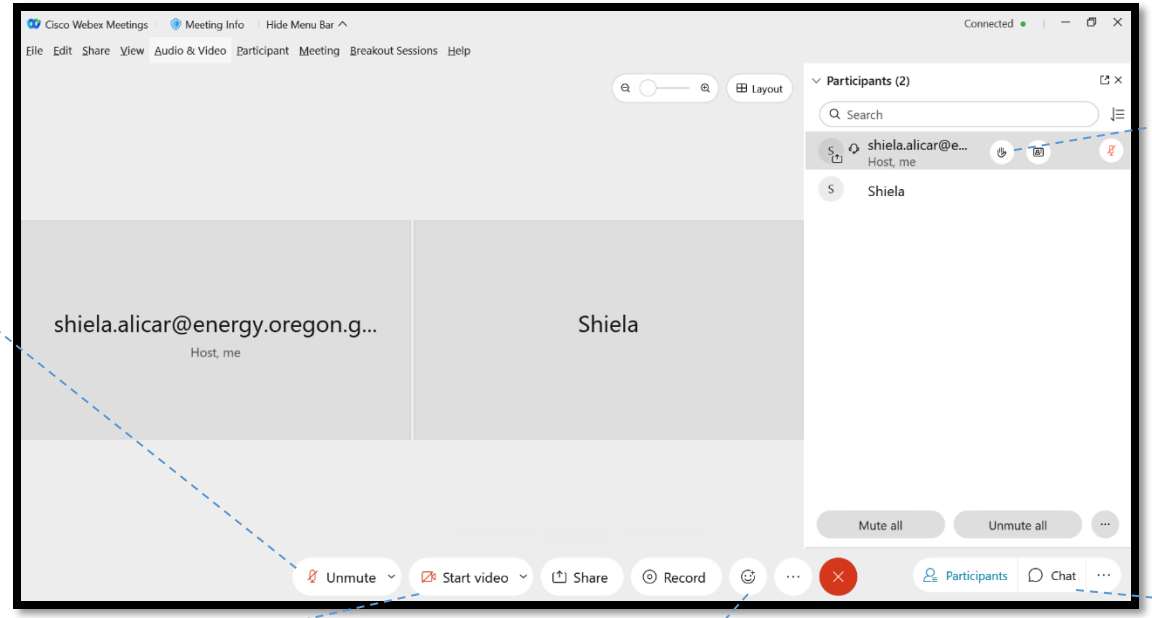
Unmute — *Microphone Off*



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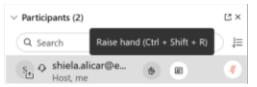

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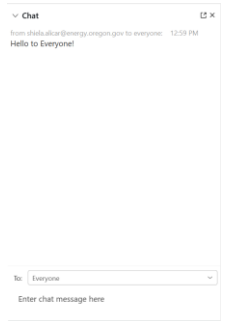
Chat



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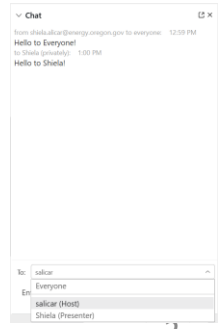
You can send a private message to the Host or Presenter (or all Panelists when there is a Panel).



Video Options

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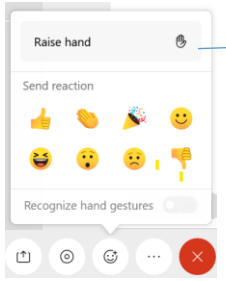
Reactions



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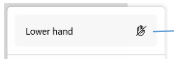

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PURPOSE OF THIS WORKING GROUP

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

- Provide expertise and feedback on key assumptions related to energy efficiency and load flexibility 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; discussion of policy recommendations will take place in early 2025.

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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
Building Potential	Kerry Meade & Melissa Sokolowsky
Cascade Natural Gas Corporation	Noemi Ortiz
Climate Solutions	Claire Prihoda
CRITFC	Christine Golightly
Dragonfly Consulting	Shelley Beaulieu
ETO	Spencer Moersfelder & Adam Shick
Monmouth Power	Wade Carey
NEEA	David Clement
NW Natural	DeLaney Ralph & Rebeca Enriquez
OPUC	JP Batamale
OPUDA	Danelle Romain and Mike Freese
PGE	Jake Wise & Sarah Buchwalter
Resource Innovations	Jeff Mitchell & Rick Dunn
Skip Technology Inc	Brennan Gantner
Sunpower/OSEIA	Patrick Sterns
UEC	Alec Shebiel
Wy'East	Robert Wallace
PSU	Jeff Hummarlund
IBEW	Robert Westerman
NWEC	Mike Goetz & Alessandra de la Torre
Oregon Business for Climate	Tim Miller
PacifiCorp	Laura James
Office of Sustainability | Multnomah County	Tim Lynch
NWPCC	Christian Douglass
Idaho Power	Billie McWinn

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

INTRODUCTIONS

- Please share the following with the group **via chat**:
  - name
  - affiliation
  - geographic location you represent
  - What are you looking forward to this weekend?

Setting the Stage

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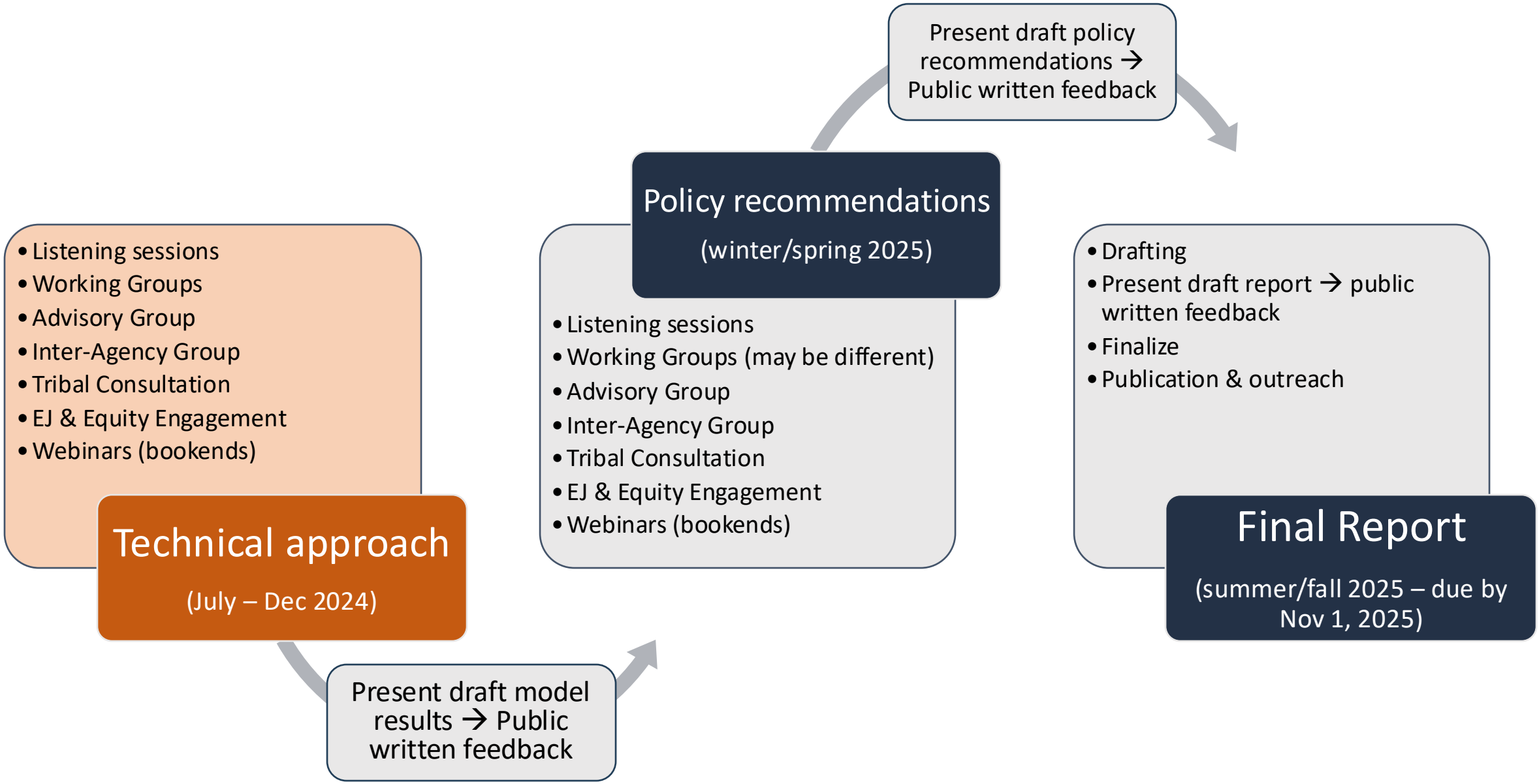
WHERE WE ARE IN THE PROCESS



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

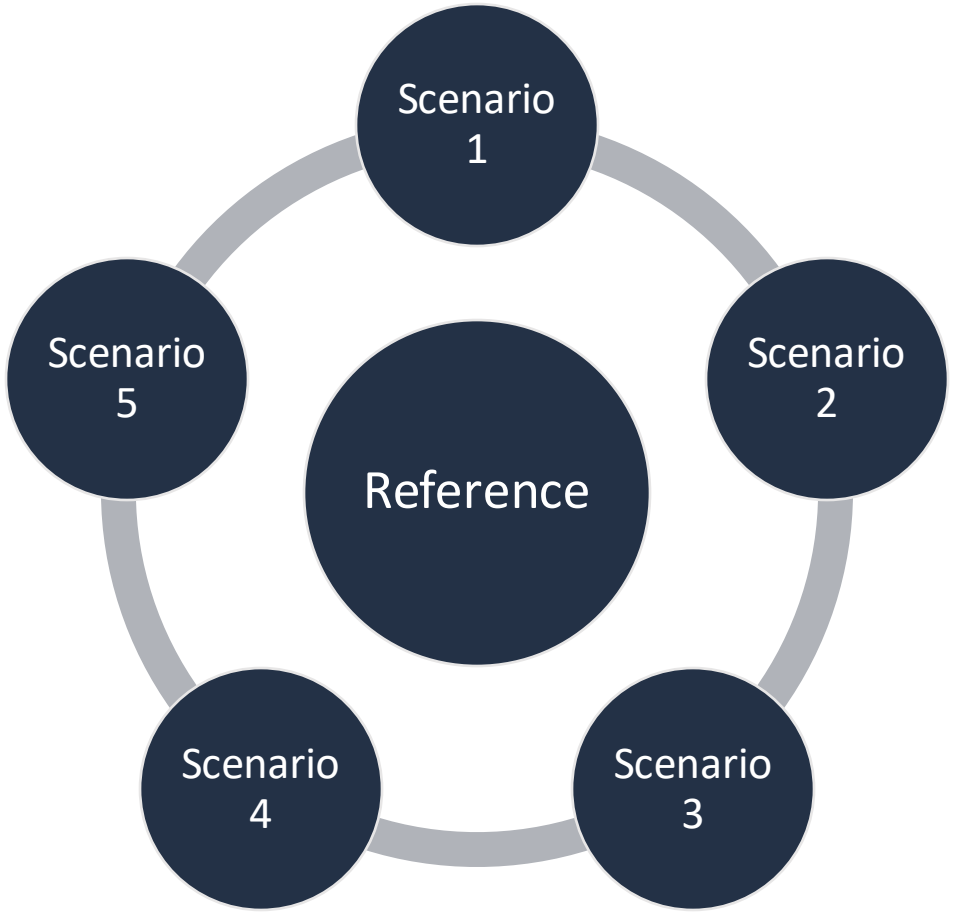
*HB 2021 applies to the large IOUs, PacifiCorp and Portland General Electric Company, as well as to electricity service suppliers.

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….

SUMMARY OF MODELING APPROACH



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

Scenarios 1-5: Test alternative pathways to uncover differences and trade-offs with reference pathway
(What if there is more or less transmission? What if heat pump or electric vehicle adoption is slower than expected? etc.)

How electricity generating technologies are considered in the Oregon Energy Strategy reference scenario

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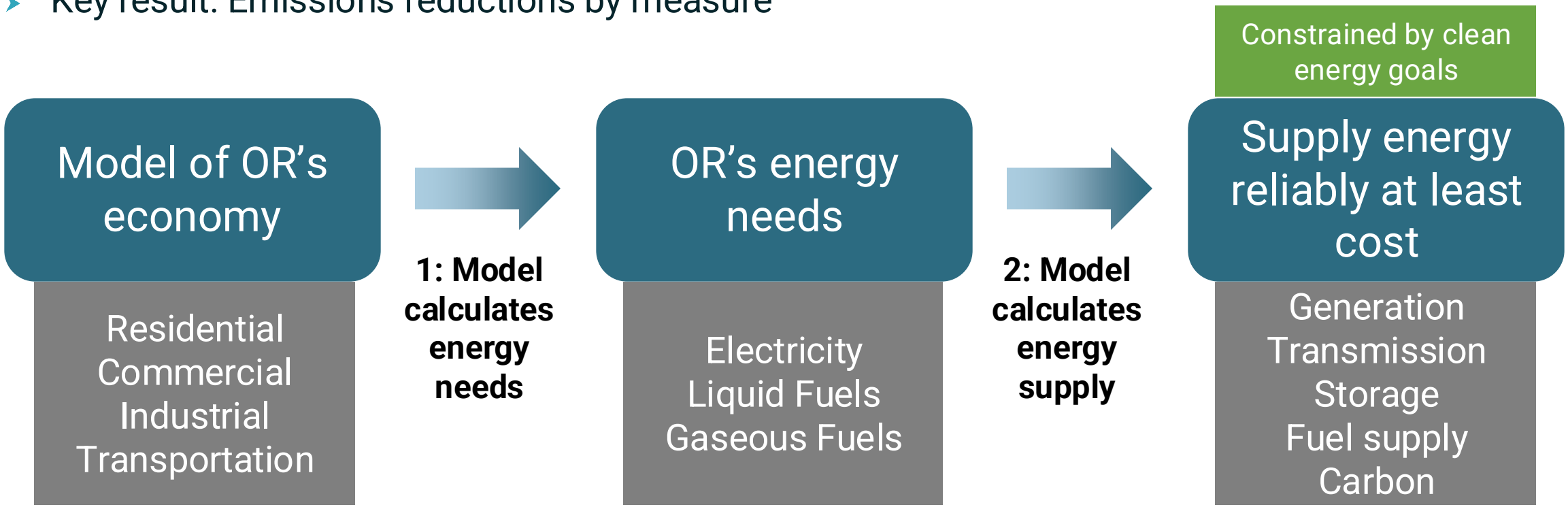
Oregon Energy Strategy Technical Consulting

High Level Description of Modeling Approach

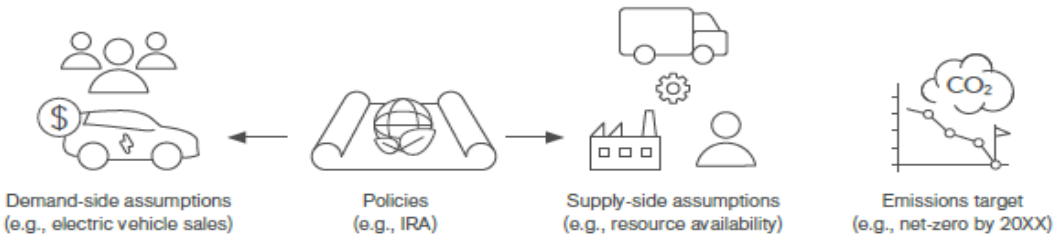
- Model calculates the energy needed to power OR's economy, and the least-cost way to provide that energy under clean electricity and emissions goals
- Key result: Emissions reductions by measure



Economy-Wide Energy Modeling

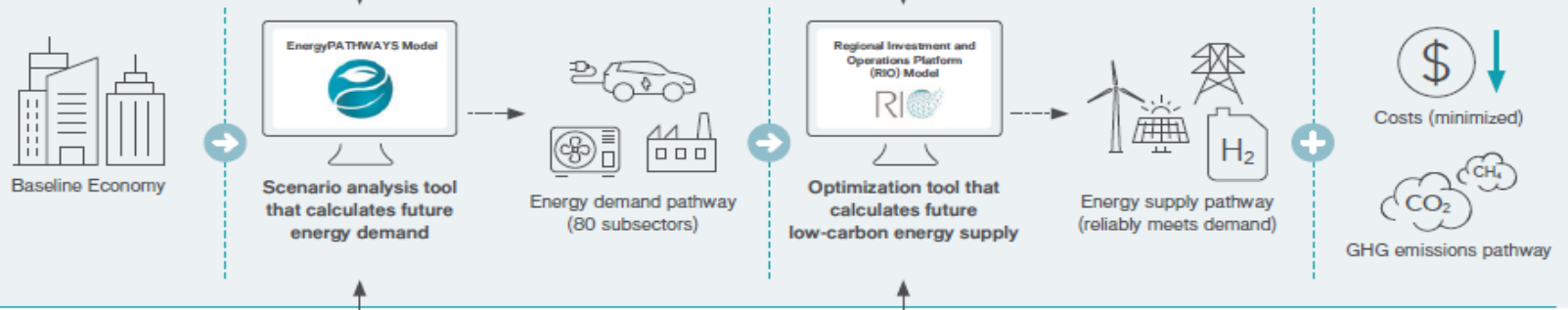
Scenario Assumptions

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

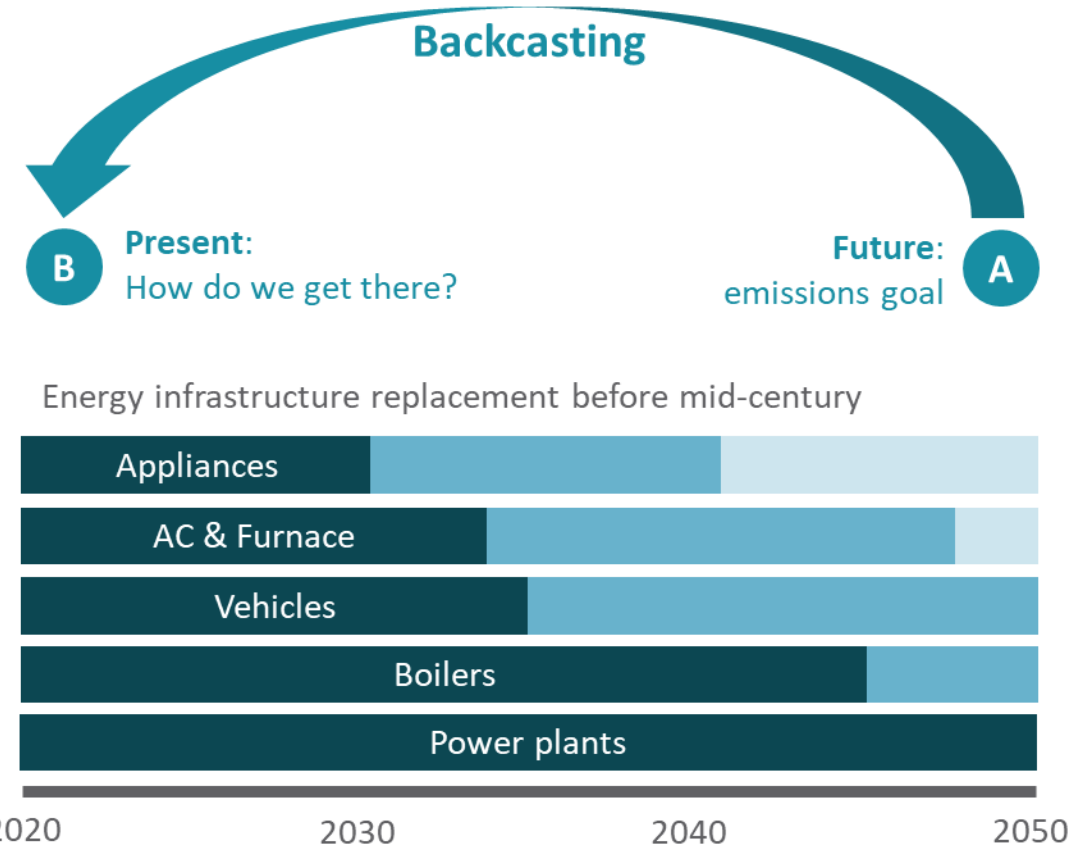
- Existing energy infrastructure
- Existing infratructure scheduled retirement
- Scheduled resource additions already committed
- Energy production and conversion infrastructure characteristics
- Energy transport, storage, and delivery options
- Capital, operating and maintenance, and installation costs
- 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



Backcasting Discussion

- Forecasting vs. backcasting efficiency and electrification can result in different long-term load forecasts
  - Forecast ‘reference’ case with 0.2% load growth
  - Back-cast ‘low carbon’ scenarios see periods with 2-3% load growth
  - Early 2020s may be seen, in retrospect, as a period of maximum load growth uncertainty
- Efficiency and electrification required for feasible low-emissions pathway
  - Timing of electrification has more uncertainty than its long-term scale

End-Use Sectors Modeled

- Approximately 80 demand sub-sectors represented
- The major energy consuming sub-sectors are listed below:

Key energy-consuming subsectors:

Residential Sector
- Air-conditioning
- Space heating
- Water heating
- Lighting
- Cooking
- Dishwashing
- Freezing
- Refrigeration
- Clothes washing
- Clothes drying

Commercial Sector
- Air-conditioning
- Space heating
- Water heating
- Ventilation
- Lighting
- Cooking
- Refrigeration

Industrial Sector
- Boilers
- Process heat
- Space heating
- Curing
- Drying
- Machine drives
- Additional subsectors (e.g., machinery, cement)

Transportation Sector
- Light-duty autos
- Light-duty trucks
- Medium-duty vehicles
- Heavy-duty vehicles
- Transit buses
- Aviation
- Marine vessels

Source: CETI, NWDDP, 2019

Demand-Side Modeling

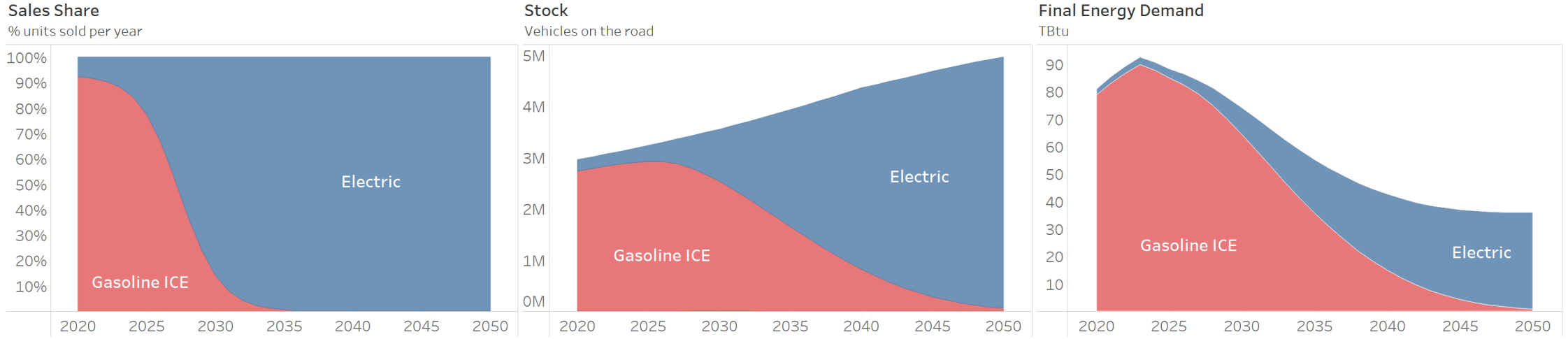
- Scenario-based, bottom-up energy model (not optimization-based)
- Characterizes rollover of stock over time
- Simulates the change in total energy demand and load shape for every end use

Illustration of model inputs and outputs for light-duty vehicles

Input: Consumer Adoption
EV sales are 100% of consumer adoption by 2035 and thereafter

Output: Vehicle Stock
Stocks turn-over as vehicles age and retire

Output: Energy Demand
EV drive-train efficiency results in a drop in final-energy demand



Reference scenario data and assumptions

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KEY DATA SOURCES FOR EXISTING STOCKS

Input	Data Source
Building envelope	EIA Residential Energy Consumption Survey /EIA Annual Energy Outlook and data from Home Energy Score Program
Residential space & water heating	NEEA Residential Building Stock Assessment and data from Home Energy Score Program
Commercial space & water heating	NEEA Commercial Building Stock Assessment
Cooking and other appliances	Residential: NEEA Residential Building Stock Assessment Commercial: NEEA Commercial Building Stock Assessment
Technology stock replacement rate	Residential: EIA Residential Energy Consumption Survey and potentially local/regional data (still in discovery) Commercial: EIA Annual Energy Outlook and Commercial Building Energy Consumption Survey and potentially local/regional data (still in discovery)
Lighting	NEEA CBSA/RBSA for existing stocks HB2561: 100% LED sales by 2025
Data center load growth	Northwest Power and Conservation Council Forecast
Customer-side batteries	**What level of adoption / participation should we assume?**

ENERGY EFFICIENCY IN BUILDINGS

Input	Starting Point, informed by past Oregon studies	Suggested Changes from ODOE and Working Group Input
Building envelope	Weatherize 95% of existing commercial and residential home envelopes by 2040 (suggested starting point based on Oregon Climate Action Commission analysis*) **Savings 10-20% household energy savings.**	
EE Space heating (Residential and commercial)	Assume existing policies play out. **What should we set as electric heat pump adoption goal out to 2050?**	
EE Improvements to natural gas space heating	Gas spacing heating efficiency increases by vintage as technology improves and standards become tighter Option for hybrid gas/electric heat pump systems; differentiated by climate zone	
Residential Water Heaters	Assume existing policies play out. **What should we set as electric heat pump adoption goal out to 2050?**	
Commercial Water Heaters	Assume existing policies play out. **What should we set as electric heat pump adoption goal out to 2050?**	
Industrial process efficiency	**1% efficiency improvements per year across all sectors**	

*Oregon Climate Action Roadmap to 2030, Roadmap to 2030 — Oregon Climate Action Commission

LOAD FLEXIBILITY IN BUIDLINGS

Input	Starting Point, informed by past Oregon studies	Suggested Changes from ODOE and Working Group Input
DR - households	Includes space heating, cooling, water heating, electric vehicles, customer side batteries if they are participating **What % of eligible stock is participating?**	
DR - commercial	Includes space heating, water heating, cooling, smart buildings **What % of eligible stock is participating?**	
DR - industrial	Includes dual fuel boilers, thermal energy storage, process flexibility, heating, cooling **What % of eligible stock is participating?**	
Customer sited stand-alone storage	**What level of grid services should we model?**	
Flexible load parameters	Space heating loads can be delayed or advanced by 1 hour Water heating loads can be delayed or advanced by up to 2 hours Air conditioning can be delayed or advanced by 1 hour	

LOAD FLEXIBILITY, EVS

Input	Starting Point, informed by past Oregon studies	Suggested Changes from ODOE and Working Group Input
Flexible Loads (EVs)	**Start at 0, ramp up to 2/3 of residential EVs participate in managed charging by 2030**	
Flexible Loads (EVs)	**Start at 0, ramp up to 1/3 of commercial EVs participate in managed charging by 2030**	
V2G	**What level should we assume? (for light-, medium-, heavy duty vehicles; vehicle fleets)**	
Flexible Load Parameters	Residential vehicle charging can be delayed by up to 8 hours Commercial vehicle charging can be delayed by up to 3 hours	

What if…?

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Guided Discussion on Alternative Scenarios/Levers

- What if there is lower demand response participation?
- What if there is higher demand response participation?
- What if adoption of energy efficiency technologies is slower?
- What if there is more gas use in buildings?
- What if Oregon sets a more ambitious economy-wide GHG target?

Wrap up and Next Steps

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OPPORTUNITIES FOR FURTHER ENGAGEMENT

Provide Written Public Comment

- Written public comment can be submitted at: https://odoe.powerappsportals.us/en-US/energy-strategy/
- Written public comment is open until August 31

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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