# Building Electrification, Efficiency, and Distributed Energy Resources Policy Working Group

The Building Electrification, Efficiency and DERs Policy Working Group is one of five Policy Working Groups formed to reflect on the results of the Oregon Energy Strategy technical modeling and help identify policy gaps and opportunities. This group will focus on the role of demand side resources – such as HVAC equipment, rooftop solar, and battery storage – to support reliable grid operations and Oregon's decarbonization goals. Equipment choices made in Oregon homes and businesses affect energy consumption for decades and this working group will strive to identify barriers and opportunities to support smart energy decisions.

Model results provide valuable information on the tradeoffs of different energy choices. This document provides a summary of the model results relevant to this working group. It is meant to assist members in processing the results so they can engage in productive policy discussions.

**A few of the most fundamental modeling findings for this working group are:**

- Energy efficiency and demand response reduce the size of future energy systems.
- Delaying energy efficiency and building electrification will result in higher costs for Oregonians.
- Demand response programs reduce future capacity and transmission needs.
- Increasing rooftop solar installations reduces land use concerns associated with utility scale solar.

## Background: Oregon Energy Strategy Energy Pathways Modeling

Using input from Tribes, the Oregon Energy Strategy's Advisory and Working Groups, staff-to-staff conversations with state agencies and participation in an Inter-Agency Steering Group, and comments from the public, ODOE and its technical contractor developed scenarios that represent different energy pathways the state could take to achieve its energy policy objectives by 2050. The model uses a two-step process:

1) It develops a bottom-up demand model to establish baseline and future energy demand in Oregon's economy from now to 2050.
2) It determines the energy supply needed to meet that demand reliably and at least cost.

The model compares energy pathways from a Reference Scenario to six Alternative Scenarios. The Reference Scenario includes "aggressive but achievable" adoption of demand-side technologies and actions, including energy efficiency and electrification. Assumptions were informed by multiple studies that assessed technology options and strategies to decarbonize the energy sector.[i] The model then selected the least-cost portfolio of supply-side solutions to meet this demand over time. The Alternative

[i] ODOE references some studies in the 2022 Biennial Energy Report: *Charting a Course for Oregon's Energy Future*.

Scenarios each change something critical from the Reference Scenario and seek the least-cost pathway across available resources given the new constraint.

For more information on how the modeling works and the key assumptions for the reference and alternative scenarios, see the Energy Strategy Modeling Assumptions and Sources document. Key assumptions refer to specific demand-side inputs or supply-side constraints that were defined as inputs to the model. It is recommended that members of this Working Group review the Reference Scenario assumptions around Buildings and Energy Efficiency and Load Flexibility, and key assumptions for the Delayed Energy Efficiency and Building Electrification, Limited Demand Response, and High Distributed Energy Resources + Limited Transmission alternative scenarios.

High-level key takeaways relevant for all policy working groups include:

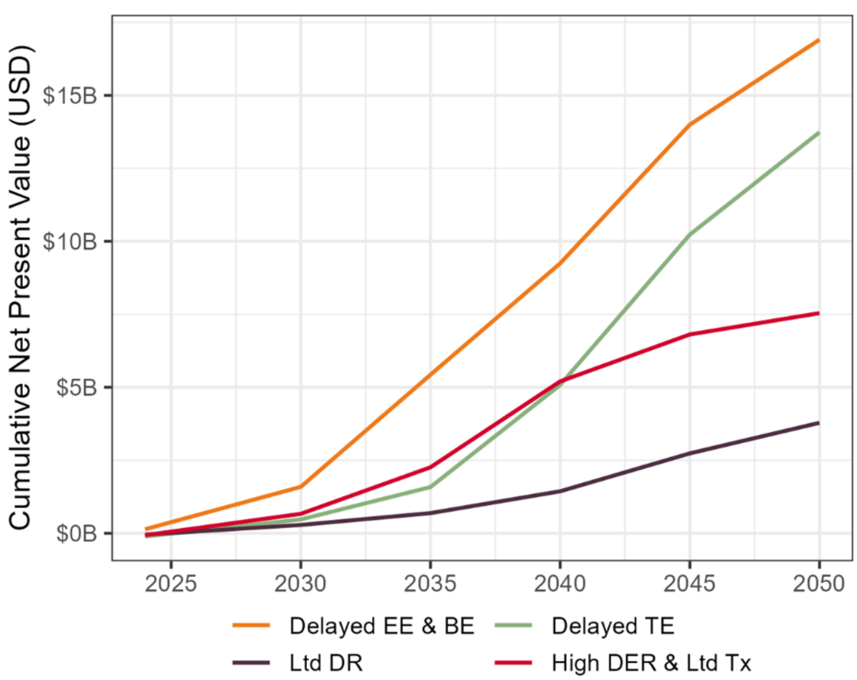
- Oregon has multiple pathways to achieve our energy policy objectives.
- Electrification increases overall system efficiencies.
- Existing energy transition policies get us far.
- More action is needed than current policies will deliver.

**As you review the key findings below, ask yourself:** What policies does the State of Oregon need to support building electrification and efficiency? What topics need to be better understood before policy choices can be made about distributed energy resources?

## Key Finding 1: Delayed energy efficiency and building electrification represents the highest cost of all the scenarios that were modeled.

Model results indicate that building electrification, energy efficiency, and demand response are significant drivers of cost savings for Oregon's future energy systems. The model demonstrates that a delay of 10 years in energy efficiency and building electrification results in approximately $17 billion in additional costs through 2050. This is the highest cost of all the scenarios that were included in the model. Limiting demand response results in almost $4 billion in additional costs.

**Figure 1: Additional Costs Associated with Delayed Energy Efficiency, Building Electrification, and other Model Scenarios**




*Note: Net present value costs calculated with a 3% societal discount rate.*

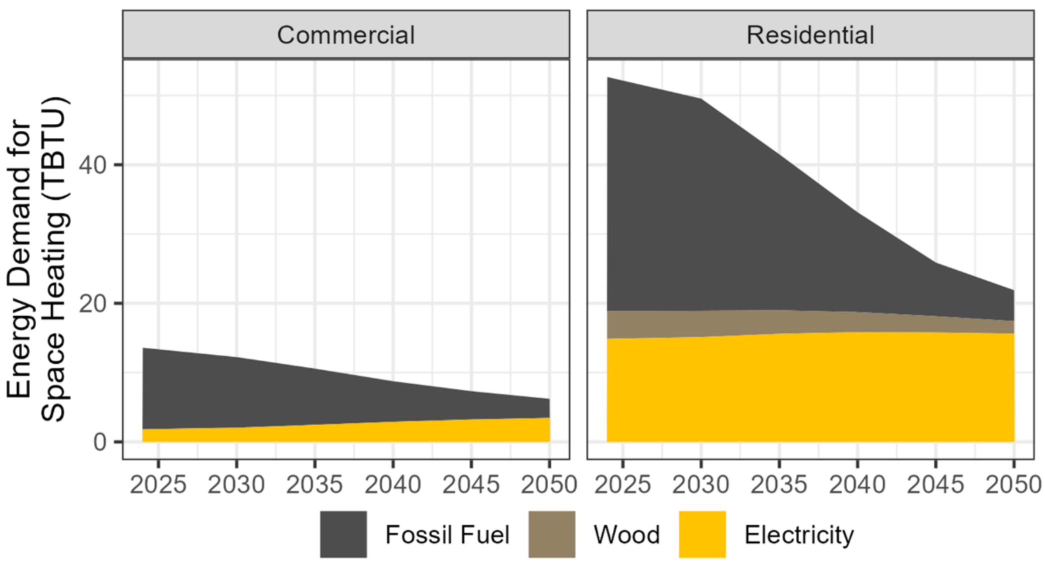
The reference scenario in the model assumes existing policies play out for residential and small commercial space heating technologies, including 65 percent electric heat pump sales by

2030, 90 percent by 2040, and 50 percent of Oregon homes participating in demand response programs by 2050.

## Key Finding 2: Building electrification results in system-wide reductions in energy demand.

Converting existing electric resistance heating and gas furnaces to electric heat pumps increases electricity demand but drives down total future energy demands. The model demonstrates that aggressive adoption of electric heat pumps will reduce total energy demand, from 2024 to 2050, by about 55 percent for commercial space heating and about 60 percent for residential space heating. Over the same period electricity demand increases by about 14 percent across both sectors.

**Figure 2: Energy Demand for Space Heating in the Commercial and Residential Sectors**




Delaying energy efficiency and building electrification by 10 years increases total energy demand by about 2 percent in 2030, increasing to about 6 percent per year starting in 2040. Part of this increase would be from low carbon fuels, which would need to be used in fossil fuel heating systems to comply with state climate goals.

**Figure 3: Additional Energy Required Each Year in Delayed EE & BE Scenario versus the Reference Scenario**

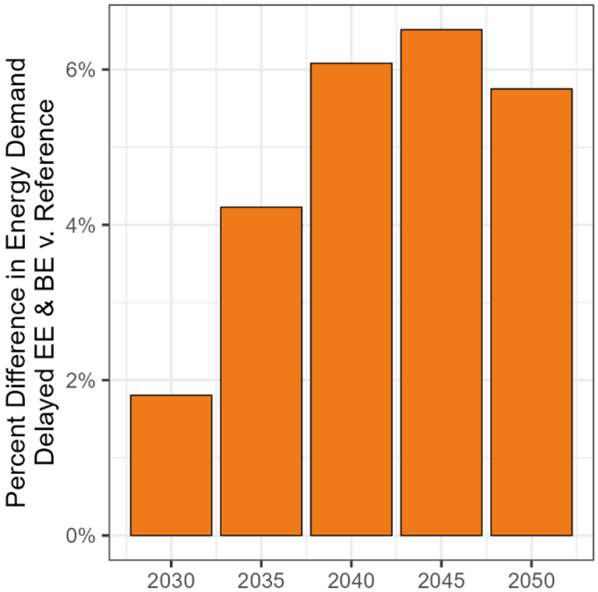
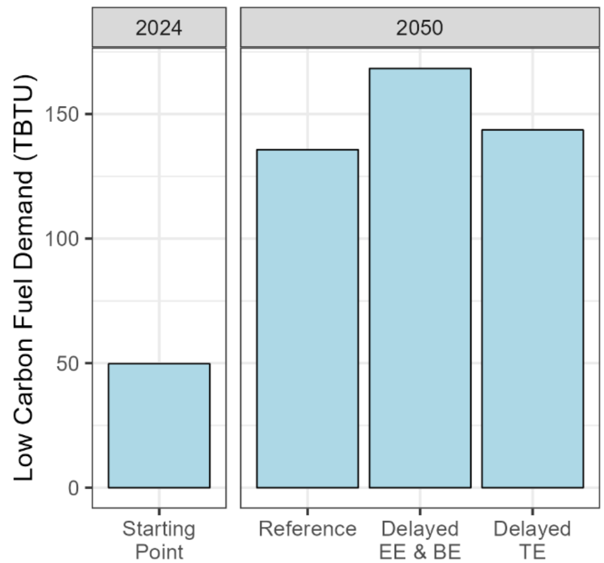
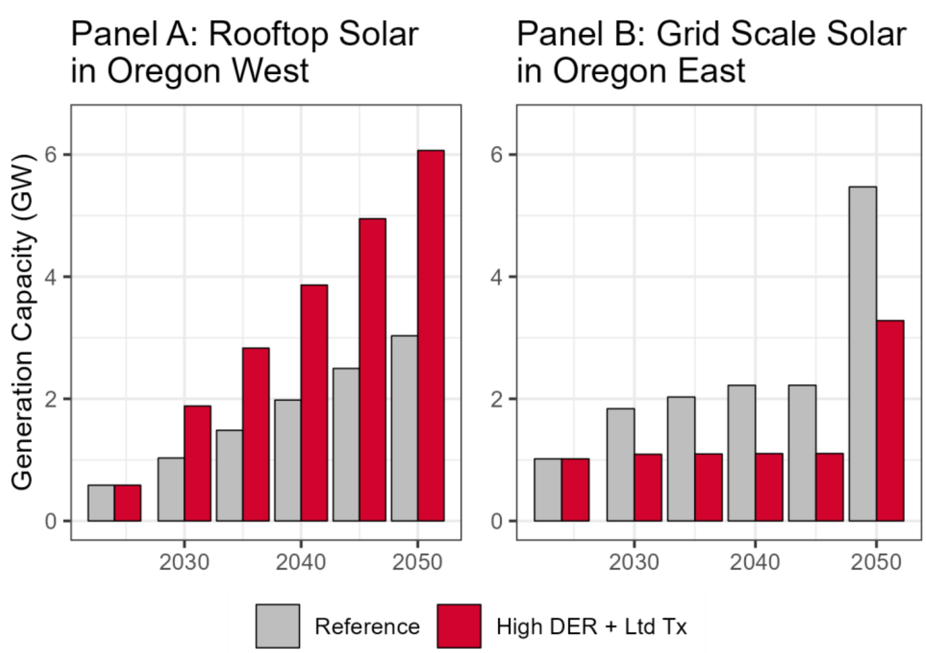



**Figure 4: Additional Low Carbon Fuel Required Each Year in Delayed EE & BE Scenario versus the Reference Scenario**




## Key Finding 3: Rooftop solar in western Oregon reduces the need for grid-scale solar to be built in eastern Oregon.

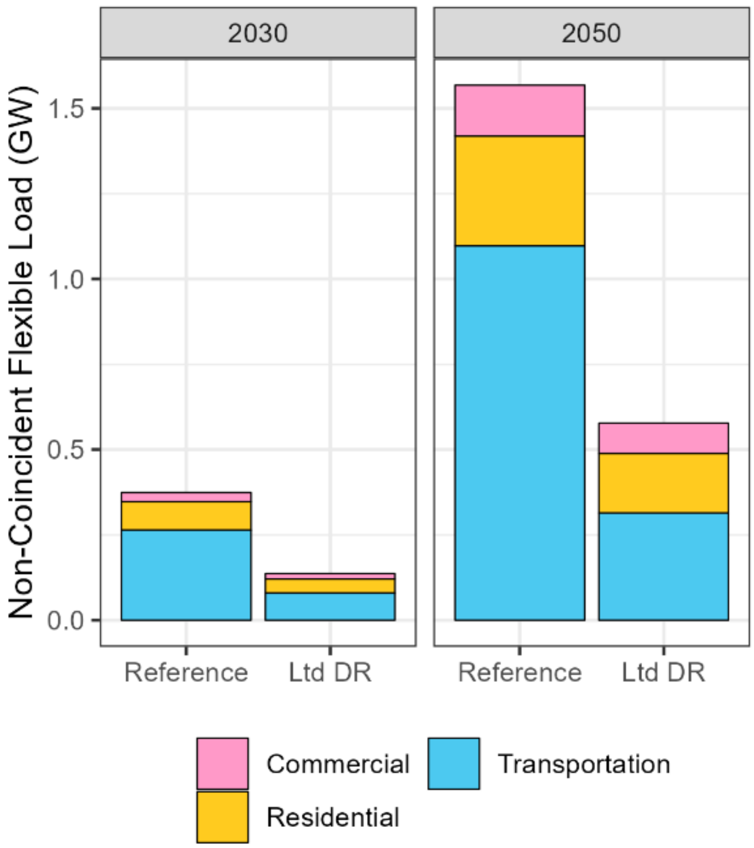
**Figure 5: Projected Solar Capacity in Western Oregon and Eastern Oregon Under Two Modeling Scenarios**




Rooftop solar installations displace the need for some grid scale solar energy developments. The model considers two rooftop solar scenarios. One is based on the Northwest Power and Conservation Council's rooftop solar projection and includes about 3.2 GW of rooftop solar in 2050. The *High Distributed Energy Resources + Limited Transmission model* scenario increases rooftop installation in 2050 to 6.5 GW of total capacity. Most of the rooftop solar installations in both cases are modeled in western Oregon while most of the ground mounted solar is modeled in eastern Oregon. The additional 3.2 GW of rooftop solar *High Distributed Energy Resources + Limited Transmission model* scenario saves over 2 GW of eastside solar and about 15 square miles of land.

## Key Finding 4: Demand response programs reduce future capacity and transmission needs.

**Figure 5: Projected Flexible Loads in 2030 and 2050 Under Two Modeling Scenarios**




The model demonstrates how customers with smart thermostats, smart water heaters, battery storage systems, and electric vehicles can enroll in utility demand response programs to shift peak loads. Reducing peak demand displaces the most expensive future energy resources.

The Reference Scenario assumes 2/3 of all EVs participate in managed charging by 2030, and 50 percent of households will participate in demand response programs for HVAC and water heating by 2050. For the *Limited Demand Response* scenario these values are reduced to 20 percent of EVs in 2030 and 5 percent of HVAC and water heating loads in 2050.

The capacity of flexible load contributions in 2050 will vary based on customer participation. The model projects that loads associated with managed charging of EVs will represent the largest opportunity for demand response, followed by residential and small commercial.