# Oregon Energy Policy Simulator (EPS) Summary Documentation

## Estimating Economy-wide Emissions for Oregon

The Oregon Energy Policy Simulator (EPS) accounts for emissions produced in the following sectors: electricity generation, building energy consumption, industrial energy consumption, industrial process emissions, agriculture process emissions, land use change, and transportation.

Our primary sources are federal data sets from the Environmental Protection Agency (EPA), Energy Information Association (EIA), and the National Renewable Energy Lab (NREL). The table below summarizes our data sources and methodology.

- **DATA SOURCES**

| Sector | Subsectors | Source | Methodology | Benchmarking Sources for Comparisons |
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| ELECTRICITY | In-state capacity and generation; out of state imports | For capacity and generation: EIA's Form 923 and EIA's Form 860<br><br>For imports/exports: Oregon Department of Energy | Added all utility-owned generation and capacity in-state. No scaling needed.<br><br>Total imports and exports are held constant, but the share of imports that are coal declines based on the PacifiCorp 2019 Integrated Resource Plan. | Emissions - EPA "State CO2 Emissions from Fossil Fuel Combustion, 1990-2017", AEO "State CO2 Emissions from Fossil Fuel Combustion", Oregon DEQ's Greenhouse Gas Emissions |
| BUILDING ENERGY USE | All energy use, all building components, residential and commercial buildings | NREL Electrification Futures Study - Reference Scenario & EIA's "State Energy Data Systems" | Start year energy use for residential and commercial buildings is taken as the previous 5-year average from EIA's State Energy Data System. Future scaling is taken from NREL, which reports total energy use by fuel type and demand technology in OR for each year 2017-2050. | Energy Use - EIA's "State Energy Data Systems" 2018 CO2 Emissions - AEO "State CO2 Emissions from Fossil Fuel Combustion", Oregon DEQ's Greenhouse Gas Emissions |
| INDUSTRIAL ENERGY USE | All fuel use for industrial sector | Energy Information Association's Annual Energy Outlook tables on Industrial Energy Use & | Scaled down by Census Data (County Business Patterns) employment by industrial subsector and state compared | Energy Use - NREL Electrification Futures and EIA's "State Energy Data Systems" |

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| | | EIA's "State Energy Data Systems" | to national employment by industrial sector | Emissions - EPA "State CO2 Emissions from Fossil Fuel Combustion, 1990-2017" & AEO "State CO2 Emissions from Fossil Fuel Combustion", Oregon DEQ's Greenhouse Gas Emissions |
| INDUSTRIAL PROCESS EMISSIONS | Process Emissions | EPA Global Non-CO2 Greenhouse Gas Emissions Projections & Mitigation Potential: 2015-2050 & Oregon DEQ's Greenhouse Gas Emissions | Scaled down US data to OR using a variety of sources, including Oregon DEQ's Greenhouse Gas Emissions and data from EPA's FLIGHT tool and EPA's State Inventory Tool Output Dataframe | Oregon DEQ's Greenhouse Gas Emissions |
| AGRICULTURE, LAND USE AND FORESTRY | Livestock emissions Natural carbon sinks and sources (LULUCF) | EPA "State Inventory and Projection Tool" | | Emissions - EPA "State CO2 Emissions from Fossil Fuel Combustion, 1990-2017" & AEO "State CO2 Emissions from Fossil Fuel Combustion", Oregon DEQ's Greenhouse Gas Emissions, Oregon Global Warming Commission Forest Carbon Accounting Project |
| TRANSPORTATION | All energy use, vehicle miles | Energy Information Association's Annual Energy Outlook tables, NREL Electrification Futures Study - Reference Scenario, & EIA's "State Energy Data Systems" | Scaled down US data, using NREL to find the proportion of national vehicle stock and service demand in OR. | Emissions - EPA "State CO2 Emissions from Fossil Fuel Combustion, 1990-2017", AEO "State CO2 Emissions from Fossil Fuel Combustion", Oregon DEQ's Greenhouse Gas Emissions |

# Understanding the Business-as-Usual, Expanded Clean Fuels, and HB 2021 Scenarios

The Oregon EPS model includes several built-in reference scenarios. The first is a **business-as-usual (BAU) scenario**, which represents all policy that is currently enacted in Oregon. Once these policies are implemented, they will become part of the **BAU scenario**.

**Business-as-Usual:** Energy Innovation and our partners built a forecast of Oregon's economy-wide greenhouse gas emissions through 2050 using publicly available, national models of energy consumption (EIA's Annual Energy Outlook, NREL's Electrification Future Study). The BAU Scenario is the model's foundation, capturing projected changes based on economic growth, technology and cost changes, and existing policy commitments.

The following policy scenarios are designed to reflect very recently passed or imminently planned policies. In future updates, once these policies are implemented, they will become part of the **BAU scenario**.

**Recent Policy Developments Scenarios:** We include two variations of this scenario, H.B. 2021, the expanded Clean Fuel Standards as outlined in Executive Order 20-04, and Oregon's Clean Trucks Rule. This scenario has been reviewed with in-state partners. The Recent Policy Developments – No Added Imports Scenario assumes no additional imports of clean electricity, while the Added Wind and Solar Imports version assumes the resulting decrease in coal imports from H.B. 2021 is met with an increase in wind and solar imports.

**Example Climate Protection Program Scenario:** Oregon's recently approved Climate Protection Program will enforce declining limits on GHG emissions from natural gas and transportation fuel consumption. Because there is no one prescriptive policy pathway to meet the emissions caps, we designed an example scenario to meet the program requirements (primarily using efficiency and electrification). This scenario is built on top of the policies from the Recent Policy Developments Scenarios. Of note, we assume roughly 2.5 MMT emissions reductions will come from 'Community Climate Investments' (CCIs), along with emissions banking and trading by the year 2050, as allowed under the program. The CCI mechanism allows natural gas and transportation fuel suppliers to purchase emissions reduction credits from non-governmental organizations that invest in Oregon-based projects that reduce GHG emissions and benefit local communities. In the absence of more recent analysis of expected CCIs and banked instruments, we rely on an estimate from ICF International's 2021 modeling study on CPP options, which was commissioned by the Oregon DEQ. Given uncertainty about how CCIs will be implemented, CCIs are not explicitly modeled in the EPS (meaning 2050 emissions from covered fuels are 2.5 MMT higher than the target in the CPP Scenario).

## SUMMARY OF POLICY ASSUMPTIONS

| Sector | BAU Scenario | Recent Policy Developments Scenarios | Example Climate Protection Program Scenario |
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| Electricity | • Includes Oregon's Renewable Portfolio Standard<br>• Reported electricity sector emissions include emissions from both imported and exported electricity generation; electricity imports/exports held constant | • Electricity sector emissions (including emissions from imported electricity) fall 80% below 2010-2012 levels by 2030, 90% by 2035, and 100% by 2040 (H.B. 2021 scenarios) | • Electricity sector emissions (including emissions from imported electricity) fall 80% below 2010-2012 levels by 2030, 90% by 2035, and 100% by 2040 (H.B. 2021 scenarios) |
| Buildings | • From EIA's Annual Energy Outlook and NREL<br>• Assumes some equipment performance improvements over time, based on market data (described here) | | • Improvements in building component efficiency<br>• 100% electric new appliances and buildings by 2040 ("building component electrification") |
| On-Road Transportation | • From EIA's Annual Energy Outlook and NREL<br>• Includes 2012 Federal Corporate Average Fuel Economy Standards (CAFE) standards (full text via AEO)<br>• Federal EV subsidies<br>• Economic adoption of EVs<br>• Oregon Clean Fuels Program as currently written | • The Clean Fuels Program targets are increased in line with Executive Order 20-04 to 20% by 2030 and 25% by 2035<br>• The Clean Trucks Rule, which requires varying shares of new freight LDV and HDV sales to be electric | • The Clean Fuels Program targets are increased in line with Executive Order 20-04 to 20% by 2030 and 25% by 2035<br>• The Clean Trucks Rule, which requires varying shares of new freight LDV and HDV sales to be electric<br>• 100% electric new light-duty vehicle sales by 2035<br>• Increased biofuel use in vehicles, which together with the electrification measures above reduces the carbon intensity of Oregon's transportation roughly 50% |
| Industry | • From EIA's Annual Energy Outlook and NREL<br>• Assumes equipment performance improvements over time (described here)<br>• Does not include implementation of the Kigali Amendment to the Montreal Protocol. | | • Improvements in industrial efficiency<br>• 50% of identified industrial electrification potential |

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| Land use/Agriculture | • Agriculture, biomass, and forestry projections | | |

## Example Climate Mitigation Scenario

**US NDC Scenario**

Energy Innovation developed a US NDC Degree Scenario, which is designed to meet the US Nationally Determined Contribution of 50%-52% below 2005 GHG emissions by 2030. This national scenario has been downscaled to Oregon, adjusting for differences in the state technology mix compared to the national technology mix. This policy scenario is illustrative and is meant to represent one set of policies that could be used to reduce emissions in line with a national NDC scenario. Below, we show the policy assumptions in the NDC scenario.

### POLICY ASSUMPTIONS IN THE US 1.5 DEGREE SCENARIO

| Sector | US 1.5 Degree Scenario |
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| Electricity | • Clean Electricity Standard of 80% by 2030, 100% by 2035<br>• Accelerate deployment of storage, transmission, and demand response<br>• No new construction of coal and natural gas plants |
| Buildings (Residential & Commercial) | • 100% electric new appliances and buildings by 2030 (“building component electrification”)<br>• 15% of existing buildings are retrofit by 2050<br>• Enhanced building efficiency |
| Transportation | • 100% electric new light-duty vehicle, motorbike, and bus sales by 2035<br>• 100% electric new medium- and heavy-duty truck sales by 2045<br>• 20% light-duty vehicle miles traveled reduced or shifted from BAU by 2050<br>• 6% heavy-duty trucking miles reduced from BAU by 2050 due to better freight logistics |
| Industry | • 100% achievement of HFC emissions reduction potential by 2030, consistent with the Kigali Amendment to the Montreal Protocol plus additional measures such as HFC recovery<br>• 14% improvement in industrial energy intensity/efficiency by 2050<br>• 100% by 2050 shift from fossil fuels to a mix of electricity and hydrogen, varying by industrial potential for each fuel type, by 2050<br>• 10% reduction in cement demand and 15% reduction in iron and steel demand from improved material efficiency policies by 2050 |

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| | • 100% achievement of potential emissions reductions from methane capture and destruction in the water and waste and natural gas distribution sectors by 2030<br>• 100% of hydrogen is produced via electrolysis by 2050<br>• 50% remaining industrial CO2 process emissions captured and sequestered through CCS by 2050 in the cement, iron and steel, and chemicals industries<br>• 100% achievement of cement clinker substitution by 2030 |
| Land use & Agriculture | • 100% achievement of potential additional carbon uptake from riparian reforestation, avoided forest conversion, post-wildfire replanting, deferred timber harvest, and avoided sagebrush conversion by 2030<br>• 100% achievement of livestock methane measures (such as requiring anaerobic digesters) and cropland and rice measures by 2030 |

## Calculating Policy Impacts

**Calculating Impacts of Policies (Emissions, Jobs, Health Impacts)**

For additional information on Energy Innovation's Energy Policy Simulator, please view the tutorial here.

**About the EPS**

The Energy Policy Simulator is a non-partisan, open-source, and peer-reviewed model. The EPS was developed to evaluate the impacts of climate and energy policies on emissions, costs and savings, and fuel consumption. The EPS model is used by policymakers to select and refine climate legislation. For example, the EPS model was used to assess the impact of climate policies for the U.S. House Select Committee on the Climate Crisis. EPS users input climate policies and the model then analyzes interacting policy impacts to forecast environmental and economic outcomes. The model generates a variety of data outputs including greenhouse gas emissions, criteria pollutant emissions, capital and operating cash flow changes, and macroeconomic changes to GDP and jobs. RMI and Energy Innovation are currently developing EPS models for 20 U.S. states.

The EPS model is available for download online here. And full documentation on methodology and assumptions are available online here.

## Contact

If you have questions about using the EPS, we recommend first watching our video series, available here. For further information on the EPS, contact us at policy@energyinnovation.org.