# FAQ: Energy Decarbonization Pathways Examination

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## General Questions

### What is the Energy Decarbonization Pathways Examination?

The Energy Decarbonization Pathways Examination is a study that will examine how investor-owned electric and natural gas utilities can reduce their greenhouse gas emissions. It will also explore how decarbonization actions may impact the environment, public health, equity, jobs, energy costs, and more. The consultant—SSG (Sustainability Solutions Group)—will present its findings to the Washington Utilities and Transportation Commission (Commission) in a report called the *Energy Decarbonization Pathways Examination.*

By June 1, 2023, the Commission will use SSG’s analysis to report to the Washington State Legislature on “feasible and practical pathways” for utilities to reduce greenhouse gas emissions.

The Legislature will use the information to help develop greenhouse gas reduction targets and policies for utilities.

### What is the scope of this study?

The Washington State Legislature passed the 2021-23 Omnibus Operating Appropriations Act in Senate Bill 5092, Section 143(4), requiring the Washington Utilities and Transportation Commission to examine potential pathways for energy utility decarbonization and the impacts of those pathways.

Section 143(3) of the 2021-23 Omnibus Operating Appropriations Act includes the following seven elements, which form the scope of the study:

1. How natural gas utilities can decarbonize;
2. The impacts of increased electrification on the ability of electric utilities to deliver services to current natural gas customers reliably and affordably;
3. The ability of electric utilities to procure and deliver electric power to reliably meet that load;
4. The impact on regional electric system resource adequacy, and the transmission and distribution infrastructure requirements for such a transition;
5. The costs and benefits to residential and commercial customers, including environmental, health, and economic benefits;
6. Equity considerations and impacts to low-income customers and highly impacted communities; and
7. Potential regulatory policy changes to facilitate decarbonization of the services that gas companies provide while ensuring customer rates are fair, just, reasonable, and sufficient.

### Will this study select or recommend specific actions?

No. The Washington State Legislature will decide on a specific course of action.

### How can I get involved?

The public—including all interested and affected parties—is invited to provide their input throughout the project process. Details about how to participate are available on the [project website](https://www.utc.wa.gov/decarbpathways).

## Questions About Decarbonization

### What is decarbonization of an energy system?

Decarbonization of an energy system refers to providing energy while reducing greenhouse gasses emitted into the atmosphere.

### What is required to decarbonize?

Two key things are required to decarbonize an energy system.

1. Energy efficiency is critical. If people in Washington reduce how much energy they use, there will be less pressure on the electrical grid and less need for fuels like clean hydrogen and renewable natural gas.

Washington also won’t have to build as much infrastructure to supply additional clean energy to meet energy demand as the population grows.

1. Moving to energy sources that release no or minimal greenhouse gasses into the air is also key.

These energy sources may include electricity produced with renewable sources like solar, wind, and hydro, [renewable natural gas](https://afdc.energy.gov/fuels/natural_gas_renewable.html), ["green" hydrogen](https://www.h2bulletin.com/knowledge/hydrogen-colours-codes/), and more.

### What is a “decarbonization pathway”?

A decarbonization pathway is a set of actions to reduce greenhouse gas emissions and a schedule for implementing those actions. It includes information on the costs and benefits of those actions, such as how much Washingtonians will pay for energy.

Each decarbonization pathway created in this project will offer a set of options for investor-owned electric and natural gas utilities to decarbonize.

### What actions will be included in the decarbonization pathways?

Here are some common actions SSG expects to include in the decarbonization pathways it develops for this project:

* Retrofit buildings to make them more energy efficient;
* Improve the energy efficiency of industrial facilities;
* Reduce trips in personal cars in Washington’s cities while increasing trips taken by public transit, cycling, and walking;
* Focus on higher-density development, rather than spreading out buildings, so less energy is required to transfer energy from place to place;
* Set higher standards for energy efficiency in new buildings;
* Add new renewable electricity generating capacity;
* Promote demand response in all sectors; and
* Introduce renewable natural gas (RNG) and hydrogen supply sources.

The pathways SSG develops will differ in terms of how much energy demand is met by electricity compared with alternative fuels like green hydrogen or renewable natural gas and where the energy supply to meet that demand comes from.

### What are alternative fuels?

The phrase “alternative fuels” refers to alternatives to fossil fuels (i.e., fuels that are not created with petroleum, natural gas, or coal). Alternative fuels include, but are not limited to, renewable natural gas, synthetic methane, and hydrogen.

## Questions About the Model

### What is an energy and emissions model?

An energy and emissions model is a digital tool to evaluate potential future outcomes related to energy use, production, and consumption, along with associated emissions based on a set of input assumptions. The factors shaping energy consumption are complex, so energy and emissions are best modeled using systems dynamics models.

### What are systems dynamics models?

[Systems dynamics](https://www.uib.no/en/rg/dynamics/39282/what-system-dynamics) models are tools to help understand non-linear behavior in a complex system with time delays and feedback loops that shape outcomes over time. These models are constrained by physical systems (i.e., the turnover of building and vehicle stocks), which shape energy use, which, in turn is also shaped by feedback loops, like the adoption of a new technology. This modeling approach is unconstrained in that it can depart from historical patterns, which is critical for evaluating transformative change in the energy system without being limited by data on historical behavior.

### What model is being used for this project?

The Energy Systems Simulator (ESS) is an energy, emissions, and finance accounting tool developed by SSG. The model enables bottom-up accounting for energy supply and demand by drawing on data about fuel use by sector (e.g., transportation, residential buildings, non-residential buildings, etc). The model incorporates data on:

* renewable resources (hydro, solar, wind, geothermal, renewable natural gas, biofuels, etc.),
* conventional fuels (gasoline, diesel, fossil natural gas, coal, etc.),
* Infrastructure that consumes energy (e.g., vehicles, appliances, dwellings, buildings), and
* how energy is transferred (e.g., as electricity or heat).

The model tracks how energy moves through the energy system and the emissions produced in the process over space and time based on current and future geographic and technology trends. These trends are incorporated into the model through a series of assumptions. For example, the model incorporates assumptions on electric vehicle uptake rates based on Washingtons Advancing Green Transportation, Zero-Emission Vehicles and Move Ahead Washington initiatives. The model calculates energy and emissions by tracking physical flows or activity (e.g., energy demand and miles traveled by vehicle) as determined by energy-consuming infrastructure, or stocks (e.g., buildings, vehicles, heating equipment, etc.).

The model incorporates and adapts concepts from [the system dynamics approach to complex systems analysis](https://www.uib.no/en/rg/dynamics/39282/what-system-dynamics). For any given year, the model traces the flows and transformations of energy. It follows sources through to the type of energy (e.g., gasoline, electricity, hydrogen) and how it is used (e.g., personal vehicle use, space heating) to energy costs and GHG emissions.

The model achieves an energy balance in which supply matches demand by accounting for efficiencies, technology conversion, and trading losses at each stage of the journey from source to end use. Achieving this balance ensures that the energy accounting is complete by showing how all energy supplied into the system can be traced to a final demand.

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### What are the benefits of using this model?

This modeling approach has the strengths detailed below.

* Bottom-up: ESS tracks how many and what types of energy-using equipment and infrastructure (physical stocks such as homes and cars) are in the area being studied, where they are located, how they are used, and how many GHG emissions are produced in the process. The model tracks how stocks evolve as the population grows or the economy expands. This allows us to evaluate the impacts of plans, legislation, and policies in Washington state as a whole or by county.
* Geography: ESS can report on impacts at state or sub-geography levels (i.e., county level).
* Transformation: As a systems dynamics model, ESS has the flexibility to evaluate actions that can transform the energy system, rather than being limited by data on historical behavior.
* Transparency: The modeling logic, methods, and assumptions used are being documented in a Data, Methods, and Assumptions Manual that will be accessible to the public via the project website.
* Economic impacts: ESS calculates marginal abatement costs—meaning the cost per metric ton of greenhouse gasses reduced—for each program or action and evaluates economic indicators, such as operating and capital impacts, in each sector. These results can be reported at the state and county levels.
* Public health outcomes: ESS tracks how patterns of behavior, such as how much people walk or cycle, shift as a result of scenario actions. This enables evaluation of the public health benefits of behavior changes that can be facilitated by decarbonization actions. The model also tracks air pollution benefits resulting from reduced fossil fuel combustion.
* Equity: The model can be used to evaluate the impacts of programs on families with varying socioeconomic status by tracking the potential impacts of decarbonization actions on energy costs, access to public transit, and other factors in “archetypical” households. An archetypical household is a representation of a typical household in a particular category, such as low-income, middle-income, and high-income.

### What will the model tell us?

SSG’s modeling approach allows users to explore plausible future pathways. It is a useful approach for evaluating ways to transform the energy system. The model quantifies how much emissions can be reduced by specific decarbonization actions. This includes the cost, financial returns, or savings of implementing those actions. The impact of any given decarbonization action is shaped by when it is implemented in relation to other actions in the decarbonization pathway. For example, electrifying vehicles results in greater emissions reductions after electricity generation from fossil fuels is removed from the system.

For each pathway, the model will provide data on:

* Electricity demand (annual and peak) that must be met with renewable generation;
* In-state renewable generation, imports, and exports;
* Natural gas demand that must be met with RNG, synthetic methane, or hydrogen;
* In-state alternative fuel production, imports, and exports;
* Demand response;
* Energy storage;
* Required investment; and
* Household energy costs.

This information will help the Washington State Legislature explore different options for transforming the energy system.

### What is a scenario?

A scenario provides a view of the implications of developments and actions over a certain period of time, based on a coherent and internally consistent set of assumptions about key driving forces (e.g., rate of technological change, price). Scenarios are neither predictions nor forecasts, nor are they meant to be prescriptive about what must be done. Rather, they are a tool for understanding the implications of a given set of actions.

### What scenarios will be developed for this study?

This study includes the development of at least four scenarios—a business-as-usual scenario, a business-as-planned scenario, and two decarbonization scenarios. The decarbonization scenarios will be compared with the business-as-usual and business-as-planned scenarios to explore the potential impact of decarbonization actions. The bundle of actions applied in a given scenario is described as a “decarbonization pathway.”

### What are the business-as-usual and business-as-planned scenarios? How do they differ?

The business-as-usual (BAU) scenario is a pathway to 2050 should no intervention to energy systems or emissions producing activities occur. The BAU applies assumptions about the growth and geographic distribution of population and employment and climate projections to current activity patterns to simulate a “do nothing” trajectory of energy use and emissions. The BAU provides the context for the business-as-planned scenario.

The business-as-planned (BAP) scenario is created by applying existing plans, legislation, and policies on top of the BAU scenario. These include the Clean Energy Transformation Act (CETA), the Climate Commitment Act (CCA), the Washington State Energy Code (WSEC), the Clean Buildings Act for Washington, and other transportation-related policies. The BAP is the reference scenario against which the decarbonization scenarios are compared.

The BAU is an intermediate step in the creation of the BAP. Highlighting the BAU as its own scenario allows the impacts of existing state policies and legislations to be quantified and visualized through comparing energy and emissions trajectories from the BAP to those of the BAU.

### What are some of the main plans, policies and legislation being modeled in the BAP?

* The Clean Energy Transformation Act (CETA),[[1]](#footnote-1) which requires 100% of electricity delivered to Washington customers by Washington electric utilities to be supplied with carbon free resources by 2045.
* The Climate Commitment Act (CCA), which creates an emissions cap-and-invest program to reduce GHG emissions (from approximately 75% of Washington's sources of GHG emissions) to net zero by 2050. Entities covered by the program include industrial facilities, certain fuel suppliers, in-state electricity generators, electricity importers, and natural gas distributors with annual GHG emissions above 25,000 metric tons of carbon dioxide equivalent (CO2e). SSG models this as an overall emissions reduction for covered entities.
* Move Ahead Washington, a set of transportation investments focused on increasing the use of active transport like walking and cycling, increasing public transit ridership, and electrifying some Washington State Ferries.
* The Washington Advancing Green Transportation Act, which encourages people to adopt electric and alternative fuel vehicles by providing tax credits, exemptions, and grants for personal, public, and private-use vehicles. SSG models the potential effects of these incentives as increases in EV adoption over time.
* The Clean Buildings for Washington Act and the Clean Buildings Performance Standard, which requires existing commercial buildings over 50,000 square feet to meet energy use performance standards by 2028. SSG assumes the benchmarking targets will be met by the legally mandated deadlines.
* The 2018 Washington State Energy Code - Commercial, which requires new commercial buildings to use heat pumps for space heating and at least half of water heating (with exceptions).
* Legislation in the cities of Seattle, Shoreline, and Bellingham banning the use of natural gas for space heating in commercial buildings and apartment buildings over four stories tall.
* The Clean Fuels Standard, which requires fuel suppliers to gradually reduce the [carbon intensity](https://www.eia.gov/tools/glossary/index.php?id=carbon%20intensity) of transportation fuels to 20% below 2017 levels by 2038.

### How are the decarbonization scenarios developed?

Decarbonization scenarios are developed based on themes. In this study, one scenario is focused on a faster, more intense shift to electrification (of buildings, transportation, industry, etc.), while another scenario is focused on deploying alternative fuels with moderate electrification (hybrid scenario).

After identifying the themes, SSG identifies appropriate decarbonization actions to model. To model the actions, SSG comes up with quantified parameters and set dates for adoption based on ongoing or projected trends at the national, state, and local levels; targets (such as EV adoption); or what may be required to meet the emission reduction targets. Action parameters typically include a specification of the action (what will happen, i.e., a reduction in energy use), when it will happen and be completed (typically a year), where it will happen (geography wide or in specific sub-geographies), and how much will happen (i.e., all, half, a percentage of, etc.). For example, an action to decarbonize buildings in the residential sector could include an assumption that all new residential buildings constructed after 2030 will be built to [Passive House standards](https://www.phius.org/passive-building/passive-building) using a Thermal Energy Demand Intensity (TEDI) target (a measurement of heat required by a building).

### How is SSG analyzing capacity and infrastructure needs for electricity generation, transmission, and distribution?

As described above, the ESS model generates annual energy demand projections to 2050 for the BAP and other scenarios based on bottom-up accounting of energy-consuming end uses in the state.

This energy demand is disaggregated by county, sector, fuel type, and end use. Electricity demand is extracted from these projections and input into a separate, hourly model for further analysis. The hourly model produces projections of total hourly demand at the county level for the entire year by applying an 8,760-hour load profile that shows how energy consumption is spread out over different uses, such as space heating, space cooling, water heating, lighting, and plug load. Demand by county is aggregated to demand by [balancing authority](https://www.eia.gov/todayinenergy/detail.php?id=27152). The model will be used to construct a corresponding hourly supply curve by balancing authority based on assumptions about new and existing generation from the Northwest Power and Conservation Council (NWPCC) 2021 Power Plan.

The hourly analysis identifies gaps between hourly demand and supply curves (i.e., when demand exceeds supply and vice versa) within each balancing authority in Washington. Actions related to energy supply and storage will be applied in the model to figure out how to deal with these gaps. Surplus demand (when demand exceeds supply) will be handled through a series of actions such as incentives for customers to reduce consumption during peak periods (demand response), electricity storage, decentralized renewable electricity, imported renewable electricity, and additional renewable electricity generation capacity. Surplus supply (when supply exceeds demand) will be handled through a series of actions such as electricity storage, exporting electricity to other jurisdictions, and curtailment.

This analysis will determine how much capacity will be required for each balancing authority within a given decarbonization pathway, as well as required interchange between balancing authorities and imports into the state. SSG will calculate the difference between the required and existing capacity to identify the additional capacity required out to 2050 for each scenario. Similarly, SSG will calculate the difference between the transmission capacity and the maximum simulated interchange over all hours of a year on a given link to identify the additional transmission capacity required. While the deployment of various technologies is not cost optimized in the hourly model, the model will assess the associated costs of generation and transmission capacity expansion.

### How is SSG analyzing peak natural gas demand in this study?

SSG will explore the impact of peak energy demand through sensitivity analysis on the decarbonization scenarios. In the decarbonization scenarios, the simulated deployment of heating systems will include some backup heating systems. For the sensitivity analysis, space heating hourly demand profiles by fuel type will be adjusted to simulate reduced efficiency of heat pumps and a greater reliance on the backup heating systems during both a single day and a multiple day extreme cold event. Likewise, space cooling hourly demand profiles will be adjusted to simulate higher peak electricity usage during single day and multiple day extreme heat events. The peak electricity demand within these sensitivity analyses will be compared to the simulated hourly supply to assess the magnitude of the gap between demand and supply and quantify potential actions that would fill that gap. Furthermore, the sensitivity analyses will be compared to each other to compare the impact of extreme weather events on peak electricity demand relative to peak natural gas demand under different scenarios (e.g., high electrification vs. hybrid).

### How is SSG incorporating the effects of new potential loads (i.e., vehicles, industries, etc.) in the model?

New potential electricity demand in all sectors will be included in both the annual model and the hourly model. In the residential and commercial sectors, new electricity demand may be added through new electricity-only buildings or the conversion of equipment in existing buildings from fossil fuel sources to electricity. Building envelope efficiency assumptions will affect the rate of increase in additional electricity demand. In the transportation sector, electric vehicles will be introduced “on the margin” as replacements to old vehicles that retire, rather than being replaced all at once. In the industrial sector, assumptions for the fuel conversion of industrial processes are specified by industry sub-sector and end use. The annual demand by sector, fuel type, and end use is passed to the hourly model where corresponding hourly demand profiles are applied to spread the annual demand over all hours in a year.

### How is SSG accounting for climate zones and differences in energy demand in different parts of the state?

Energy demand is being modeled by political zones (counties), using county-specific, projected climate modeling for heating degree days and cooling degree days. This allows us to account for the relevant climate zones in different parts of the state.

Projections are obtained from National Environmental Modeling and Analysis Centers (NEMAC) Climate Explorer (<https://crt-climate-explorer.nemac.org/>). SSG is using the “lower level” projections based on Representative Concentration Pathway 4.5 for specific climate future temperature changes. The RCP 4.5 scenario is a stabilization scenario, which means [the radiative forcing level](https://climate.mit.edu/explainers/radiative-forcing) stabilizes at 4.5 W/m2 before 2100, based on an assumption that a range of technologies and strategies for reducing GHG are deployed.

The Climate Explorer tool uses modeled data for the contiguous United States based on statistical downscaling of temperature and precipitation projections from the Coupled Model Intercomparison Project Phase 5 (CMIP5) using Localized Constructed Analogs (LOCA). LOCA data for historical and future periods are freely available for the contiguous United States, southern Canada, and northern Mexico via [Data.gov](https://catalog.data.gov/dataset/projected-future-loca-statistical-downscaling-localized-constructed-analogs-statistically-downs).

### What range of temperatures from the data source NEMAC Climate Explorer are being used to analyze demand loads?

NEMAC has annual projected data and historical extreme weather data. The annual projections account for long-term changes in summer and winter temperatures in each county. Historical extreme weather data in conjunction with the long-term projection trajectories will guide how SSG sets future extreme weather events around peak loads on the hottest and coldest days for analyzing future demand loads.

### How will specific assumptions around access to transmission infrastructure, regional electricity markets, and storage/battery technologies affect the modeling process?

These following exogenous assumptions will be inputs into the decarbonization scenarios.

*Access to transmission infrastructure*  
The assumption is that transmission infrastructure does not constrain the dispatch of electricity supply to serve demand. The model imputes flows among balancing authorities on an hourly basis based on scenario assumptions around supply, demand, and trade. If the calculated flow from one balancing authority to another exceeds the transmission capacity between the balancing authorities, the model adds capacity to that link and calculates the cost associated with that expansion. This modeled transmission capacity expansion is not optimized for cost but represents the quantitative impact of the assumptions that compose a given scenario.  
  
*Regional electricity markets*  
The model does not include optimization logic that would drive capacity expansion or procurement decisions based on the state of regional electricity markets. Rather, the model uses exogenous assumptions about imported and exported electricity for each scenario. Through scenario analysis the implications of different degrees of reliance on out-of-state renewable electricity production (within the Western Interconnection) to serve electricity demand within Washington will be evaluated.  
  
*Storage technologies*  
The assumed electricity storage capacity by technology in each scenario will contribute to how hourly gaps between electricity supply and demand may be addressed. Surplus supply will accumulate in storage up to the maximum capacity in certain hours and will be discharged to meet excess demand in other hours. Feedback iterations between the hourly and annual models will help to determine the amount of storage capacity required for each scenario. Scenario assumptions will include details on the storage technology deployed and their associated costs. These assumptions will take into account and build on Washington’s existing 320 MW of existing energy storage, as well as 314 MW of pumped hydro storage capacity, based on initiatives such as the Washington Clean Energy Fund’s recent funding for four utility-scale energy storage projects. The specific details of these assumptions across the decarbonization scenarios will be shared in the Data Methods and Assumptions manual.

### How will sections 4bii - iv of the 2021-23 Omnibus Operating Appropriations Act be addressed/analyzed without doing independent production cost modeling?

The goal of this study is to provide the Legislature with possible pathways for decarbonizing natural gas utilities. These pathways will allow the Legislature to understand the impact demand-side policies have in relation to current supply side studies.

SSG’s analysis will compare future low-carbon pathways projections with current supply-side projections. This will indicate whether the modeled demand falls within or outside of a range that can be reliably managed by the existing and planned energy supply system. If the pathways fall within the limits, then implementing the pathway would be feasible without major changes. If the pathways fall outside the limits, SSG will analyze how far the pathway is from the reference point to understand how much more transmission capacity is required or how much more supply needs to be added; the reliability and adequacy challenges of renewable technologies; and how additional transmission capacity and supply may affect ratepayers’ energy bills and equity. SSG is not evaluating solutions based solely on criteria such as cost, reliability, or adequacy.

The following sources guide our future supply-side assumptions:

* Northwest Power and Conservation Council - [2021 Northwest Power Plan](https://www.nwcouncil.org/2021-northwest-power-plan/)
* Princeton University - [Net-Zero America](https://netzeroamerica.princeton.edu/)
* [Electricity and Natural Gas Utility IRPs](https://www.utc.wa.gov/regulated-industries/utilities/energy/infrastructure-and-energy-planning/integrated-resource-plans-irps)

### What are the drivers of energy demand?

SSG is exploring the following list of drivers of energy demand in this analysis.

* Residential and non-residential buildings
  + Energy for heating and cooling
  + Energy for water heating
  + Energy for devices and appliances (e.g., lighting, plug load, major appliances)
* Industrial buildings
  + Energy for heating and cooling
  + Energy for water heating
  + Energy for lighting and running industrial devices (e.g., lighting, motors)
  + Energy used for industrial processes
* Transportation
  + Vehicle miles traveled by class of vehicle and engine type (and resulting energy use)
  + Number of vehicles by class and engine type
* In-state energy production
  + Electricity
  + Hydrogen
  + Renewable natural gas (RNG)
  + Synthetic methane

Refer to the Data, Methods and Assumptions Manual located on the Commission website for this study (<https://www.utc.wa.gov/decarbpathways>) for more detailed information.

### What assumptions are being made to account for population and load changes due to the COVID-19 pandemic?

To populate the model, SSG uses 1-year American Community Survey (ACS) estimates for the 20 counties with populations of over 65,000 and the 5-year ACS for the remaining 19 counties with smaller populations for which 1-year data is not available.

The Business-as-Usual scenario includes assumptions about population growth based on the Washington Office of Financial Management’s state and county population projections. These projections include high, medium, and low scenarios of population growth; for this project SSG is using data for age and gender from the medium series.

The Business-as-Planned scenario reflects temporary shifts in how and where energy is used due to the effects of the COVID-19 pandemic, such as increased working from home by office workers and decreased transit ridership in urban counties. These shifts are assumed to be temporary given the lack of availability of long-term data around these trends. SSG will use [sensitivity analyses](https://en.wikipedia.org/wiki/Sensitivity_analysis) around these trends to examine the magnitude of their effect on energy and emissions.

### What are the data sources for building data, and how are they being used?

The following data sources are being used to inform the types of buildings in both the residential and non-residential buildings stocks and the energy consumption, end uses share, and fuel mix targets used for model calibration.

*Table 1. Sources for residential building stock data.*

| **Data** | **Source** |
| --- | --- |
| Residential buildings by county, type, and year built | US Census - 2019 American Community Survey |
| Residential floor space per unit by county and type | Replica land use data |
| End use equipment fuel shares | Northwest Energy Efficiency Alliance Residential Building Stock Assessment II |

Table 2. Sources for non-residential building data.

| **Data** | **Source** |
| --- | --- |
| Non-residential buildings by type and year built | Northwest Energy Efficiency Alliance Commercial Building Stock Assessment 4 |
| Non-residential floor space by county and type | Replica land use data |
| Non-residential floor space by type and year built | NEEA CBSA 4 |
| End use equipment fuel shares | NEEA CBSA 4 |

Table 3. Sources for energy consumption target data.

| **Data** | **Source** |
| --- | --- |
| Natural gas deliveries by sector and county | Utility data |
| Electricity sales by utility and customer sector | US Energy Information Administration Form 861 |

Refer to the Data, Methods and Assumptions Manual located on the Commission website for this study (<https://www.utc.wa.gov/decarbpathways>) for more detailed information.

### How will the Washington Department of Commerce’s Fuel Mix Disclosure be used to calibrate the model?

Through the fuel mix program, utilities disclose the resources used to generate the electricity sold within Washington state. The data includes the name of and fuels used by the generating plant, including plants outside of Washington, as well as the amount of energy it generates that is sold by the utility in Washington.  
  
Electricity demand by county is calculated in the model based on building electricity use. SSG uses service territory data from the U.S. Energy Information Administration (Form 861) to determine which counties are served by each utility.

SSG uses these data sources to estimate the amount of electricity each utility provides to each county and, in turn, the fuel source used to generate the electricity used in each county.

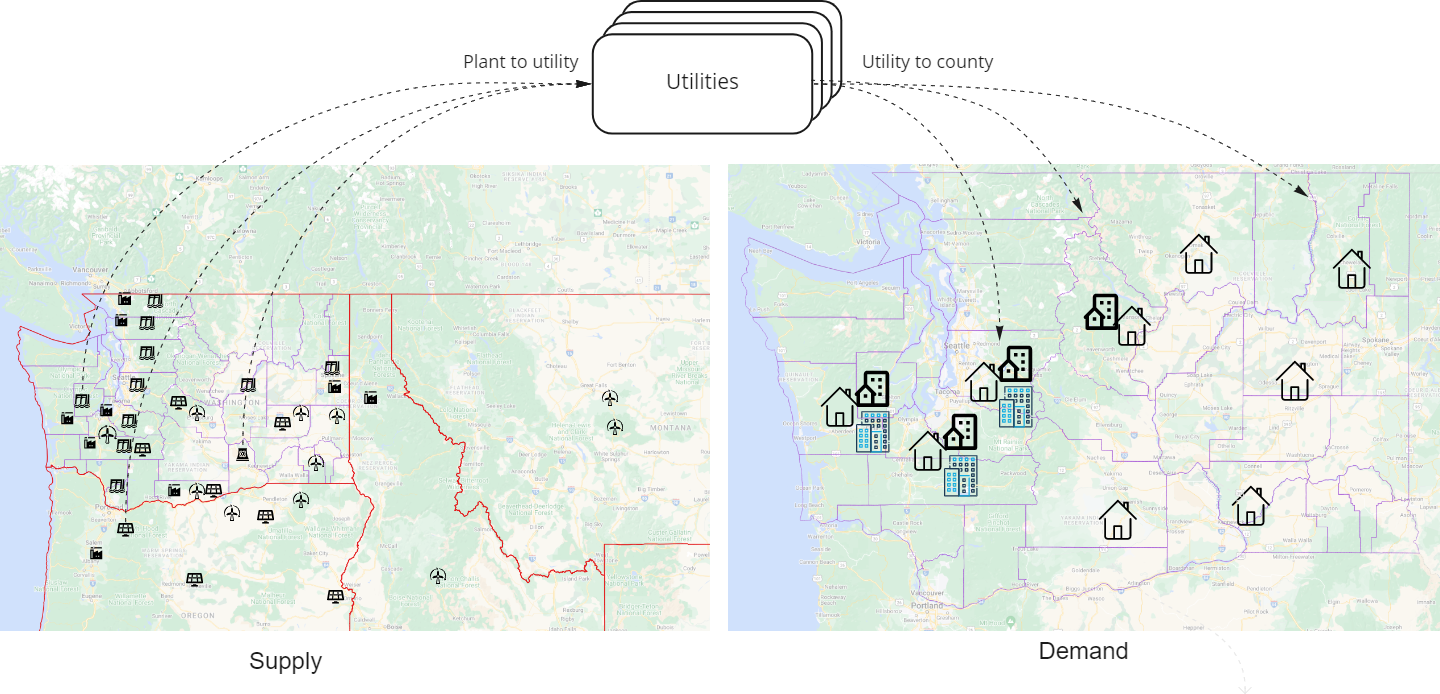


Figure 1. Modeled electricity supply allocated to demand.

1. The CETA requires electric utilities to develop a four-year Clean Energy Implementation Plan (CEIP) for the GHG neutral and clean energy standards, and establish interim targets for meeting the standards. Since this study goes beyond 2026, SSG cannot accurately anticipate and describe a plan for investor-owned utilities (IOUs) to meet the requirements of CETA. An overall CETA emissions reduction, showing the impact of the CETA target, will be shown as part of the Business-As-Planned (BAP) scenario. Detailed CETA pathways will be modeled as part of the decarbonization scenarios to explore the different ways IOUs could comply with CETA. [↑](#footnote-ref-1)