Washington Energy Decarbonization Examination

Technical Meeting 1

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Welcome + Introductions

Meeting Operating Guidelines

1. Let’s share airtime in order to listen to, and hear from, as many perspectives as possible.
2. Let’s manage our participation together to start and end on time.
3. Let’s use respectful and inclusive language.

Zoom Etiquette

1. Please stay on mute when not speaking, and use the chat to ask questions, while presentations are in-progress.
2. Please use the “raise hand” function to ask a question during Q+A periods, and let us know your name and affiliation (if you have one).
3. Please note that we are recording this session.

Today’s To Dos

- Here is what we are here to do today
  - Review business-as-usual (BAU) and business-as-planned (BAP) data inputs and assumptions

- Here is what we are not here to do today
  - Review BAU and BAP results
  - Review low-carbon scenarios and actions

Agenda

1. Project Overview - 5 min
2. Engagement Review - 5 min
3. Modeling Process - 20 min
4. BAU and BAP assumptions - 20min
5. Discussion - 60 min
6. Next Steps - 5 min

Project Overview

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Why is the Commission undertaking this examination?

Senate Bill 5092, section 143 provided funding for the Commission to:
"examine feasible and practical pathways for investor-owned electric and natural gas utilities to contribute their share to greenhouse gas emissions reductions as described in RCW 70A.45.020, and the impacts of energy decarbonization on residential and commercial customers and the electrical and natural gas utilities that serve them."

RCW 70A.45.020 states that Washington shall limit anthropogenic emissions of greenhouse gases (GHGs) as follows:
(i) By 2020, reduce GHGs to 1990 levels, or 90.5 million metric tons;
(ii) By 2030, reduce GHGs to 50 million metric tons, or 45% below 1990 levels;
(iii) By 2040, reduce GHGs to 27 million metric tons, or 70% below 1990 levels;
(iv) By 2050, reduce GHGs to 5 million metric tons, or 95% below 1990 levels.

Senate Bill 5092, section 143 requirements

The examination must identify and consider:

"(i) How natural gas utilities can decarbonize;

(ii) The impacts of increased electrification on the ability of electric utilities to deliver services to current natural gas customers reliably and affordably;

(iii) The ability of electric utilities to procure and deliver electric power to reliably meet that load;

(iv) The impact on regional electric system resource adequacy, and the transmission and distribution infrastructure requirements for such a transition;

(v) The costs and benefits to residential and commercial customers, including environmental, health, and economic benefits;

(vi) Equity considerations and impacts to low-income customers and highly impacted communities; and

(vii) Potential regulatory policy changes to facilitate decarbonization of the services that gas companies provide while ensuring customer rates are fair, just, reasonable, and sufficient."

What are we working on together?

By June 1, 2023, the Washington Utilities and Transportation Commission will use the Energy Decarbonization Pathways Examination to report to the legislature on "feasible and practical pathways for investor-owned electric and natural gas utilities to contribute their share to greenhouse gas emissions reductions as described in RCW 70A.45.020, and the impacts of energy decarbonization on residential and commercial customers and the electrical and natural gas utilities that serve them."[1]

The legislature will use this information to inform discussions on decarbonization targets and policies for investor-owned natural gas utilities.

This project is about identifying and describing the various pathways to achieve a certain level of natural gas emissions reduction. This project is not about choosing one pathway.

[1] Senate Bill 5092 Section 143.4.

Engagement Review

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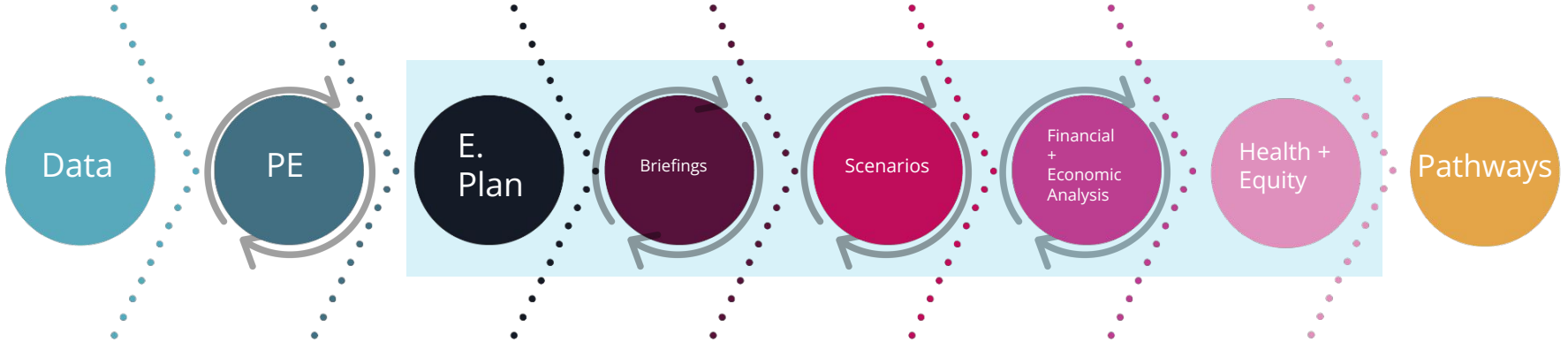
Engagement in Climate Action Planning



Iteration + Adaptive Management

Active Engagement Period

Engagement Approach

- Overall project will be set **involve/collaborate** (see next slide) for influence on the decision.
- We will ensure a transparent and accessible engagement process.
- We will use diverse techniques to effectively reach diverse stakeholders across the state.
- We will gather input on the social, economic, and equity impacts of decarbonization actions.
- We will design engagements to facilitate collaboration, rather than polarization.

IAP2 Spectrum of Public Participation

IAP2's Spectrum of Public Participation was designed to assist with the selection of the level of participation that defines the public's role in any public participation process. The Spectrum is used internationally, and it is found in public participation plans around the world.

INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

Modeling Process Overview

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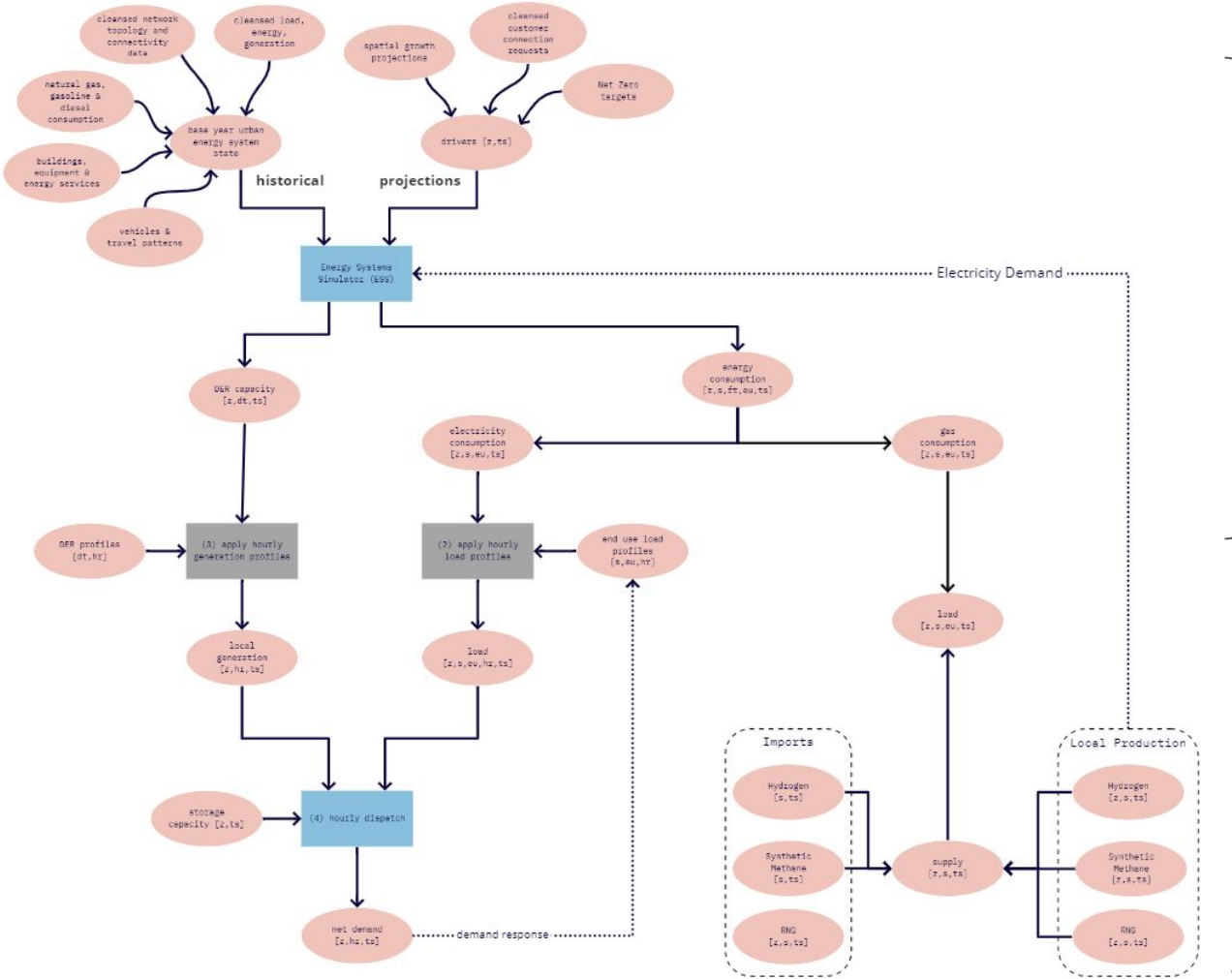
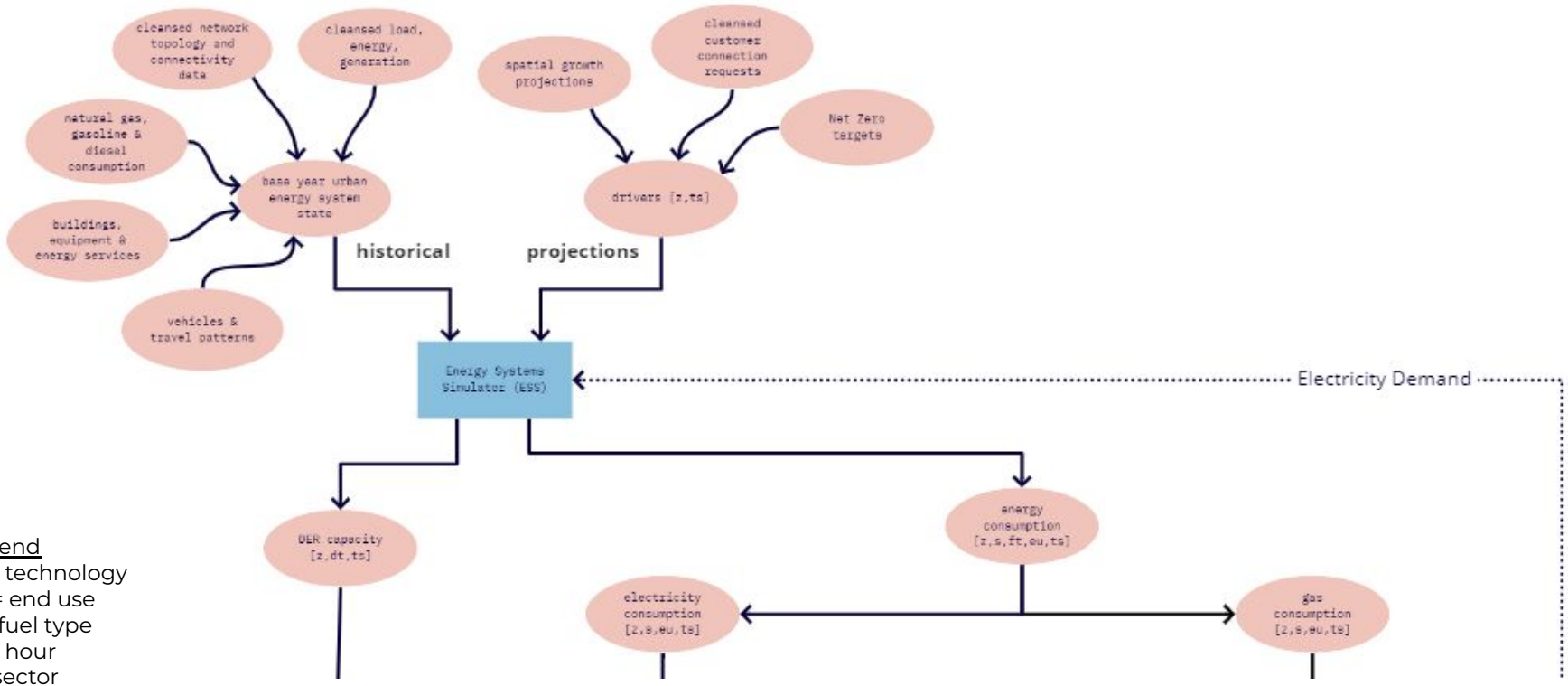

cleansed network topology and connectivity data
cleansed load, energy, generation
spatial growth projections
cleansed customer connection requests
natural gas, gasoline & diesel consumption
Net Zero targets
base year urban energy system state
drivers [z,ts]
buildings, equipment & energy services
historical
projections
vehicles & travel patterns
Energy Systems Simulator (ESS)
Electricity Demand
DER capacity [z,dt,ts]
energy consumption [z,s,ft,eu,ts]
electricity consumption [z,s,eu,ts]
gas consumption [z,s,eu,ts]
DER profiles [dt,hr]
(3) apply hourly generation profiles
(2) apply hourly load profiles
end use load profiles [s,au,hr]
load [z,s,eu,ts]
local generation [z,hr,ts]
load [z,s,eu,hz,ts]
Imports
Local Production
Hydrogen [s,ts]
Hydrogen [z,s,ts]
storage capacity [z,ts]
(4) hourly dispatch
Synthetic Methane [s,ts]
supply [z,s,ts]
Synthetic Methane [z,s,ts]
RNG [z,s,ts]
RNG [z,s,ts]
net demand [z,hz,ts]
demand response
Demand
Supply

Demand

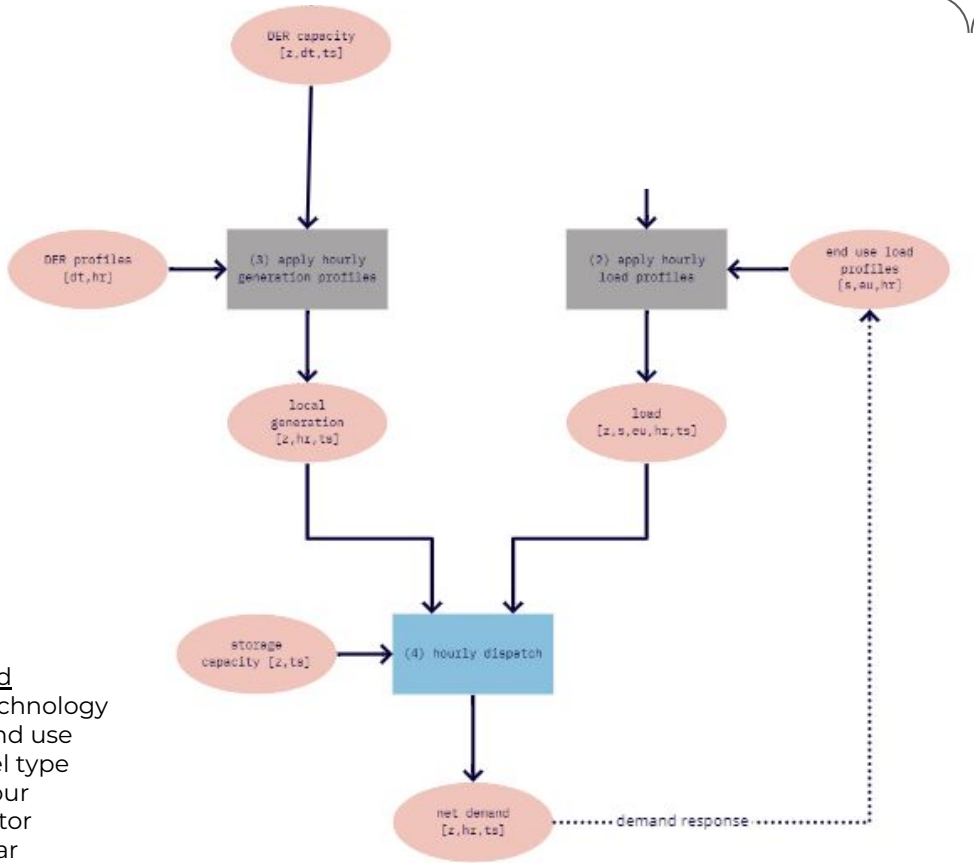


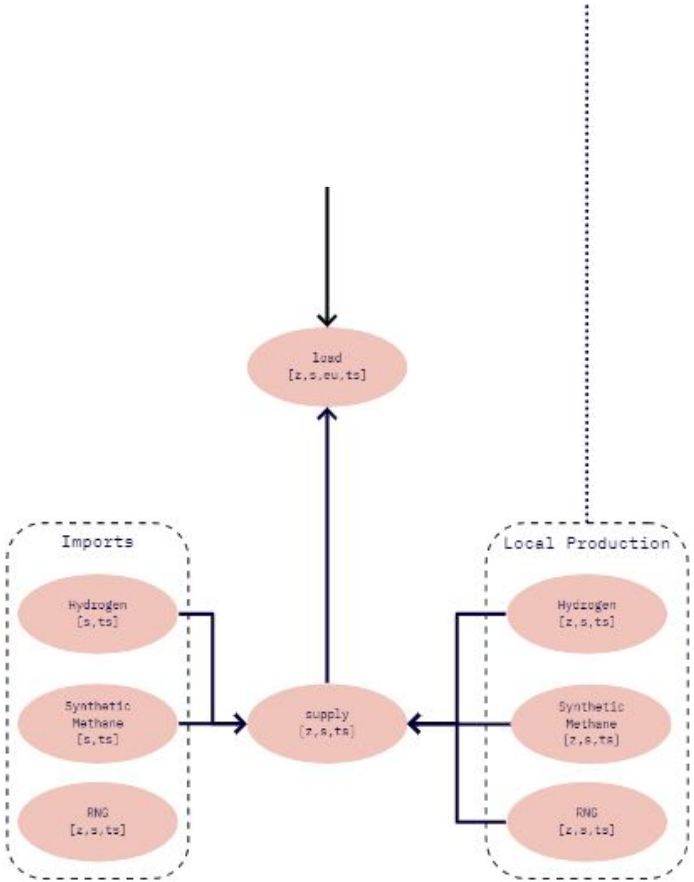
Legend
dt = technology
eu = end use
ft = fuel type
hr = hour
s = sector
ts = year
z = county

Supply

Electricity

Natural Gas





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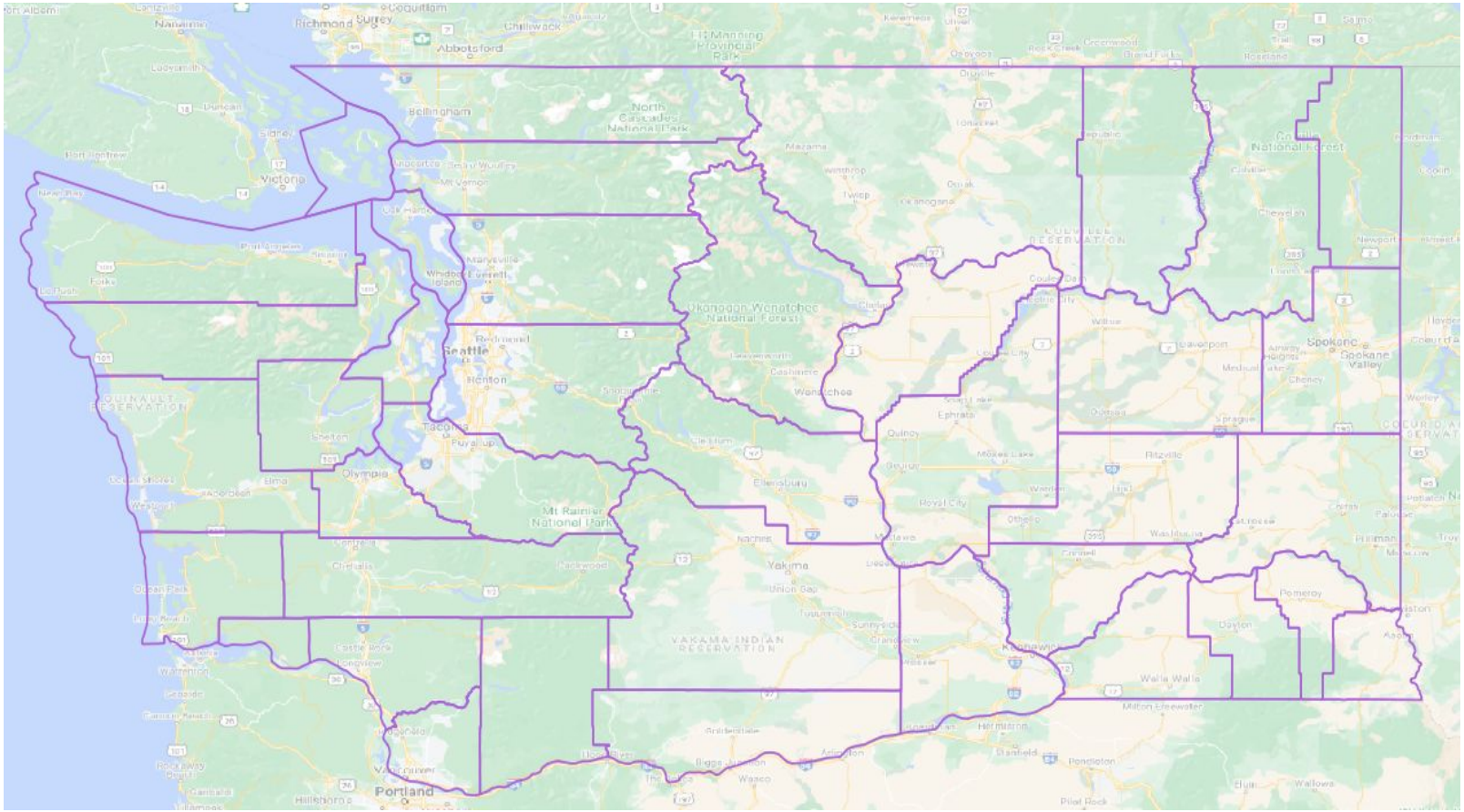
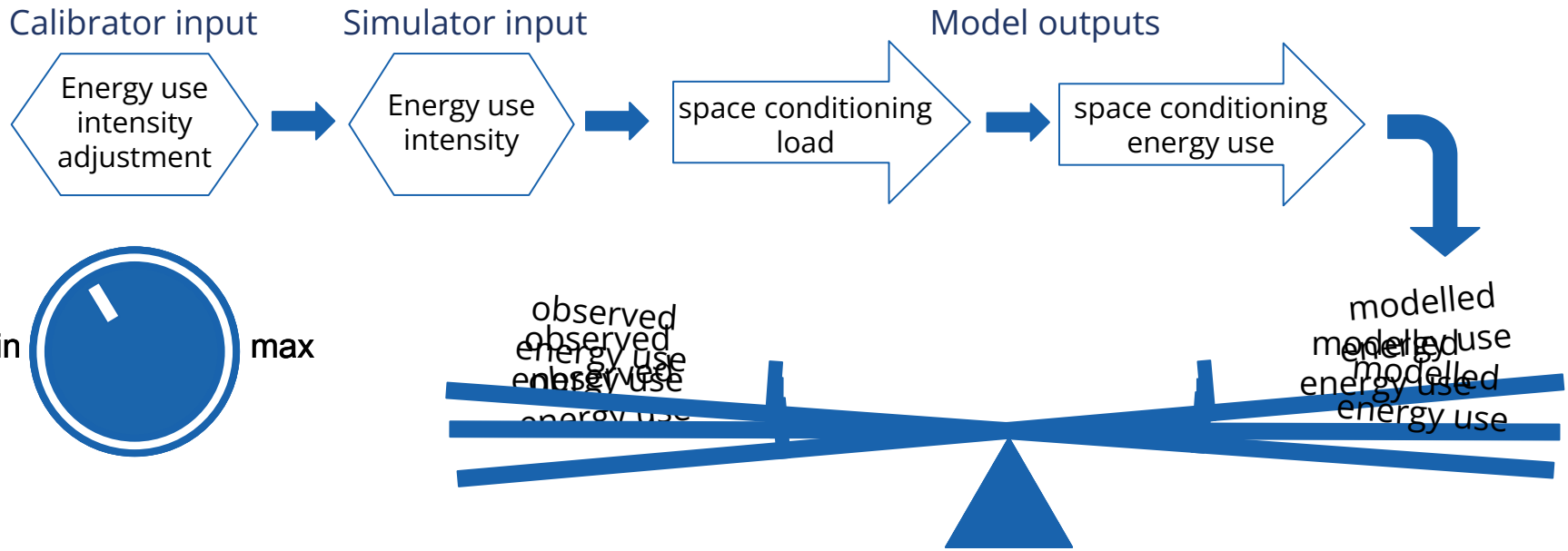
Space

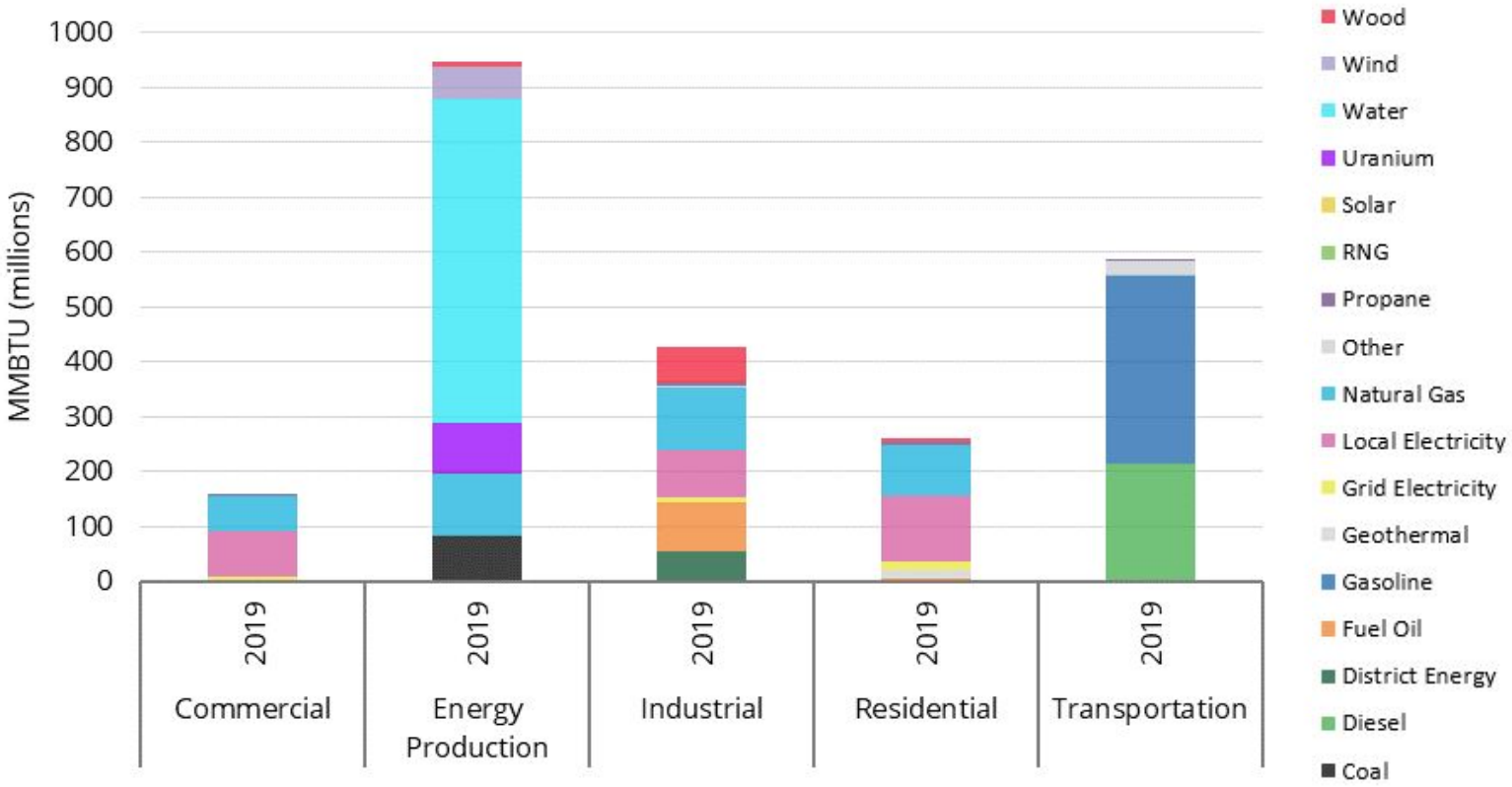

Abbotsford
Bellingham
Victoria
Seattle
Bellevue
Tacoma
Olympia
Wenatchee
Yakima
Spokane
Portland
Mt Rainier National Park
North Cascades National Park
Okanogan Wenatchee National Forest
YAKAMA INDIAN RESERVATION
Walla Walla

Calibration

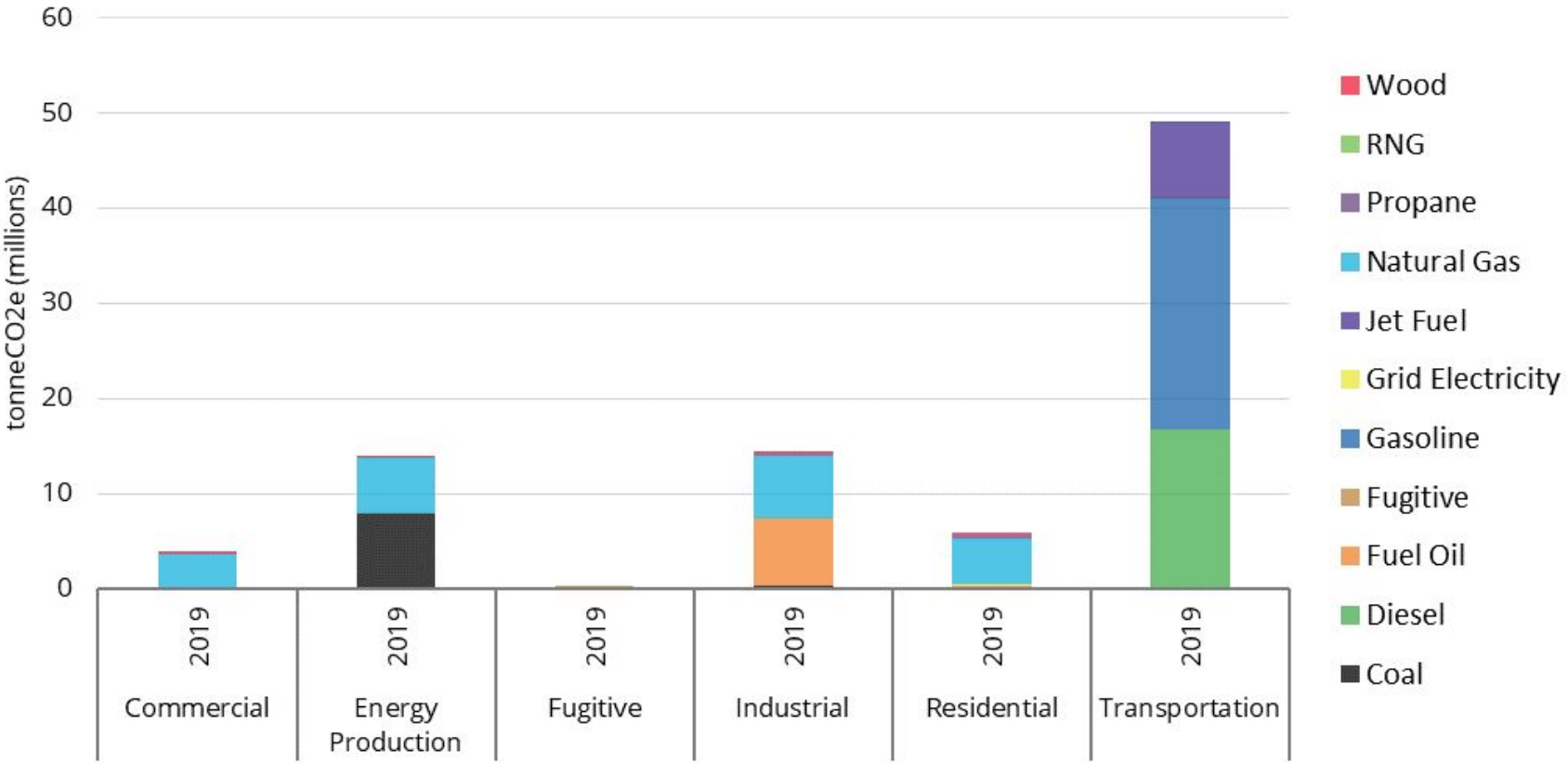
Adjust calibrator input parameters to ensure that model outputs align with observed data



Total Energy by Sector by Fuel Type



Total Emissions by Sector by Fuel Type



Calibration Data Sources - Demand

Population by county, age, sex	US Census - 2019 ACS
Residential buildings by county and type	US Census - 2019 ACS
Residential floor space by county and type	Replica land use data
Non-residential floor space by county and type	Replica land use data NEEA CBSA
Natural gas deliveries by county	Utility data
Electricity sales by utility and customer sector	EIA Form 861
Other fuel use	SEDS
Equipment shares	NEEA RBSA and CBSA
Personal use vehicles	WDOT - vehicle registration data
Transit miles and fuel use	WDOT - Summary of Public Transportation

Calibration Data Sources - Supply

Electricity production capacity, generation, and fuel use	EPA eGRID
Electricity trade (intrastate and interstate)	WA Department of Commerce Fuel Mix Disclosure data

BAU and BAP Assumptions

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Business-As-Usual Definition

To be a business-as-usual scenario is:

- A pathway to 2050 should no intervention to energy systems or emissions producing activities occur
- State policies or planning is not integrated at all
- Reflects the population and employment growth and distribution and the resulting energy and emissions

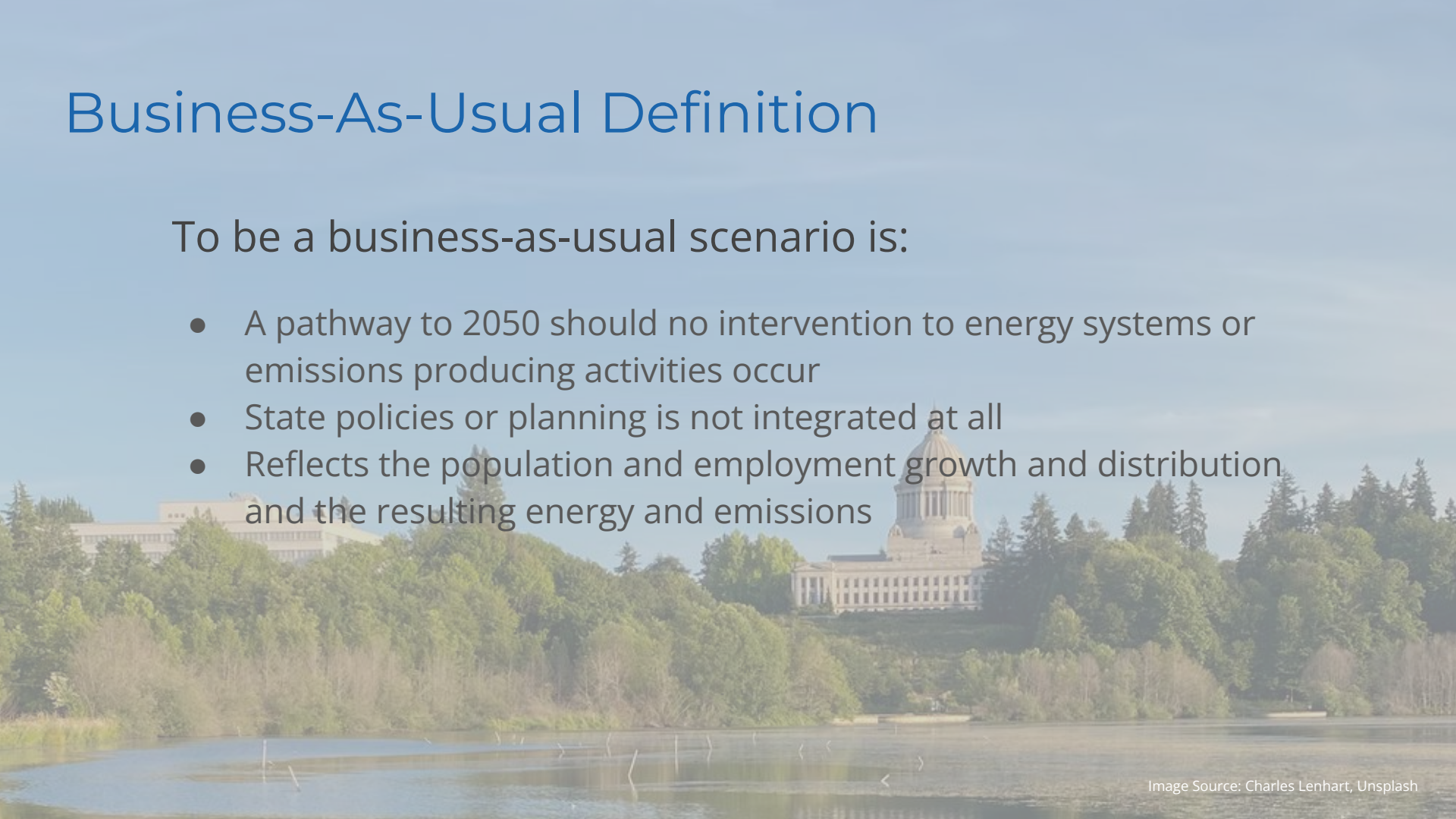


Image Source: Charles Lenhart, Unsplash

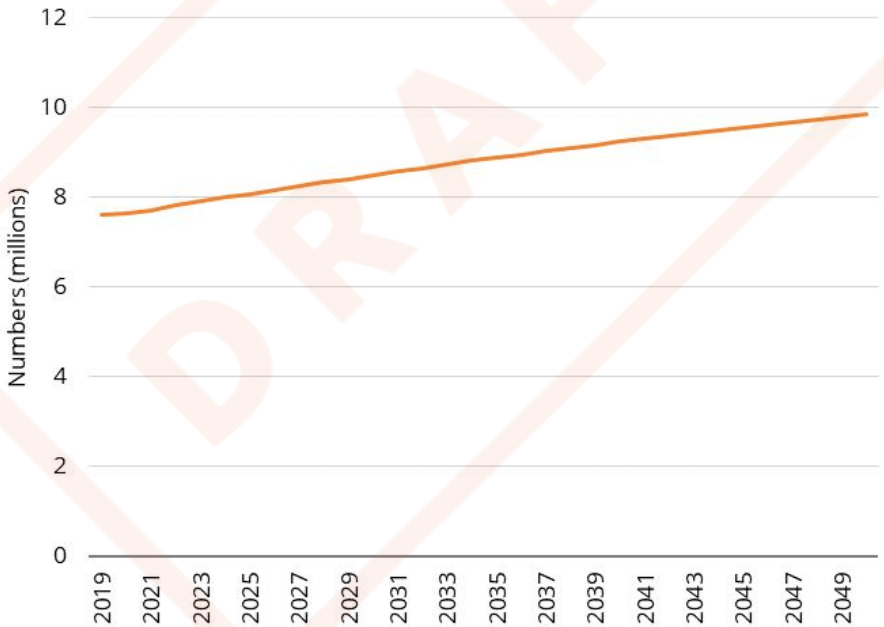
BAU Assumptions

- Population growth
- Employment growth
- Transportation fuel standards
- Heating and cooling degree days
- Energy use by buildings
- New building growth

Image Source: Jeff Finley, Unsplash

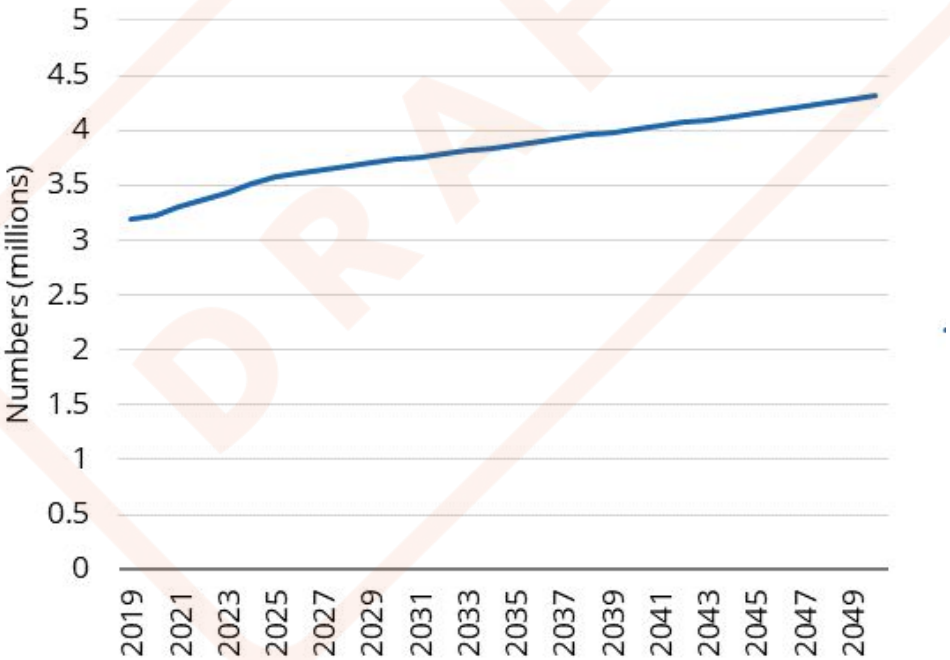
Business-as-usual (BAU)

Action	Details	Sources
Population Growth	7.61 million people in 2019 8.89 million people by 2035 (avg of 1.05% per year) 9.85 million people by 2050 (avg of 0.7% per year) Average rate of growth - 72,329 people per year	Office of Financial Management Projections of the state population by age, sex and race Growth Management Act population projections for counties: 2010 to 2040



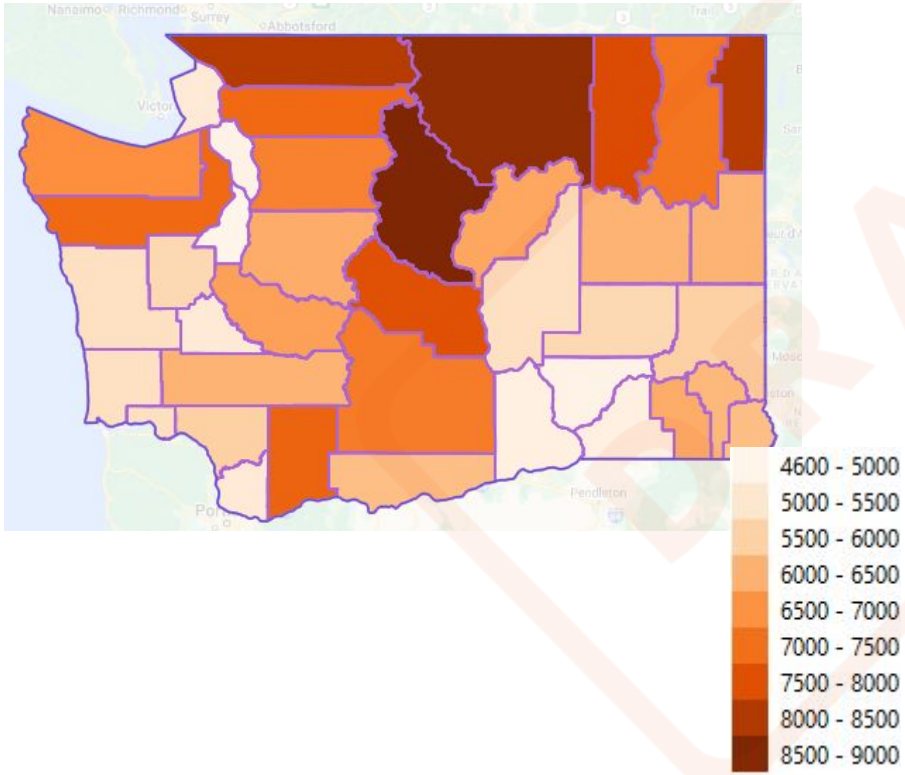
Business-as-usual (BAU)

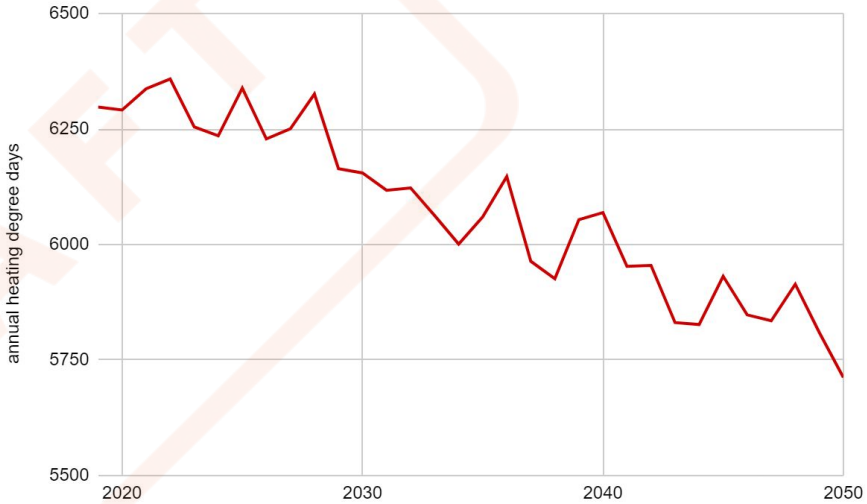
Action	Details	Sources
Employment Growth	3.20 million jobs in 2019 3.87 million jobs by 2035 (avg of 0.5% per year) 4.32 million jobs by 2050 (avg of 0.7% per year) Average rate of growth - 36,162 jobs per year	Office of Financial Management Long-Term Economic Forecast



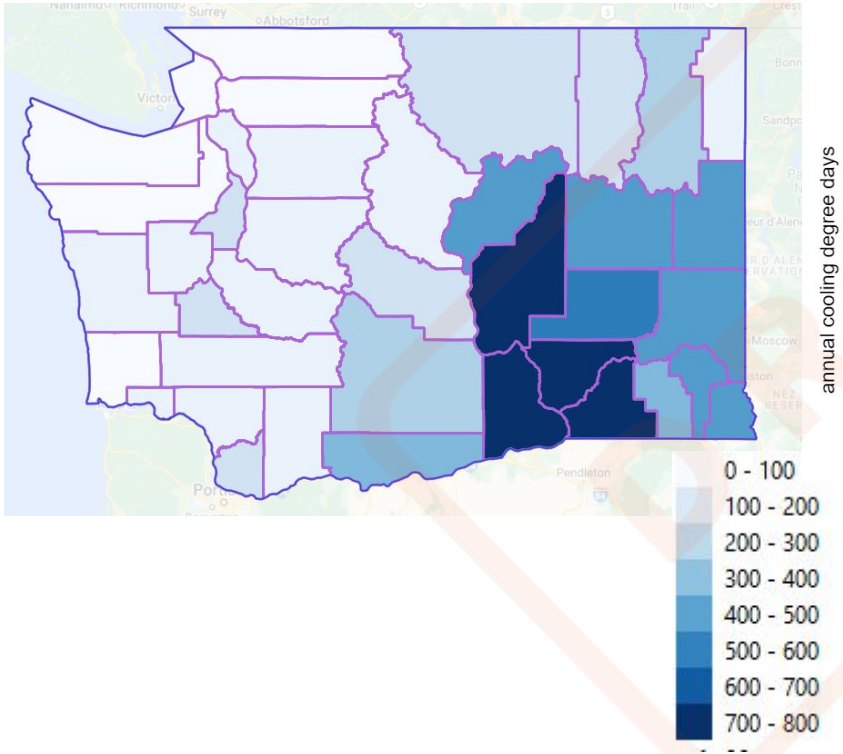
Business-as-usual (BAU)		
Action	**Details**	**Sources**
Transportation Fuel Standards	CAFE Fuel standards: Vehicle fuel consumption rates reflect the implementation of the U.S. Corporate Average Fuel Economy (CAFE) Fuel Standard for Light-Duty Vehicles, and Phase 1 and Phase 2 of EPA HDV Fuel Standards for Medium- and Heavy-Duty Vehicles.	(2012) (CAFE standards) retrieved from https://www3.epa.gov/otaq/climate/documents/420f12050.pdf http://www.nhtsa.gov/fuel-economy
Heating and Cooling Degree Days	Projections of Heating and Cooling degree days by county - Climate Explorer (nemac.org)	Climate Explorer (nemac.org) Statistically downscaled global climate models for county and county-equivalents
Energy Use by Buildings	Baseline building equipment types/stocks held from 2019-2050.	Residential Energy Consumption Survey (RECS) for baseline building equipment types State Energy Data System (SEDS) for building equipment efficiencies
New Building Growth	Residential buildings. Buildings are added alongside population growth; building types added based on building mix of county where population growth is happening. Non-residential buildings. Growth based on projected growth in employment; building types added based on building mix of county where job growth is happening.	

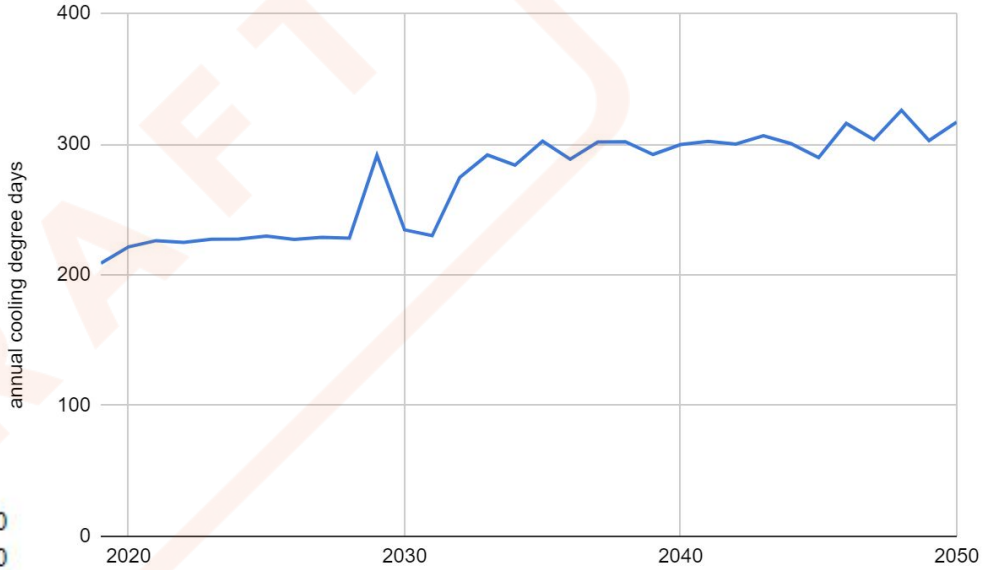
Heating Degree Days - BAU



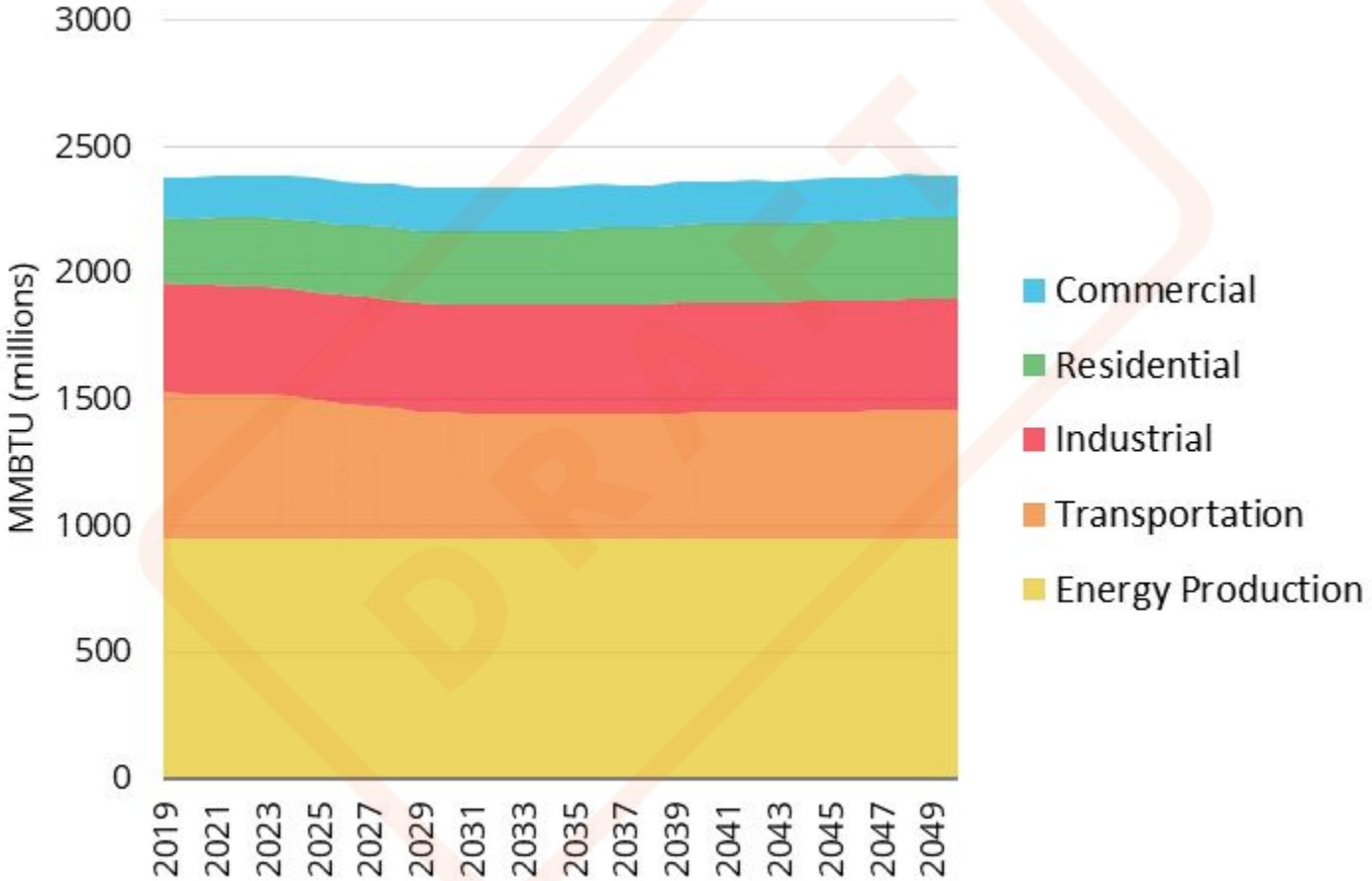


Cooling Degree Days - BAU





Total Energy by Sector - BAU



Business-As-Planned Definition

To be a business-as-planned action, it must be:

- In rule;
- Funded;
- Legislatively required; or
- Following market trends (e.g., observed EV adoption rates)

Image Source: Charles Lenhart, Unsplash

The BAP Incorporates:

- Clean Energy Transformation Act (CETA)
- Climate Commitment Act (CCA)
- Washington State Energy Code (WSEC)
- Clean Buildings Act for Washington
- Move Ahead Washington
- Advancing Green Transportation
- EV Supporting Infrastructure

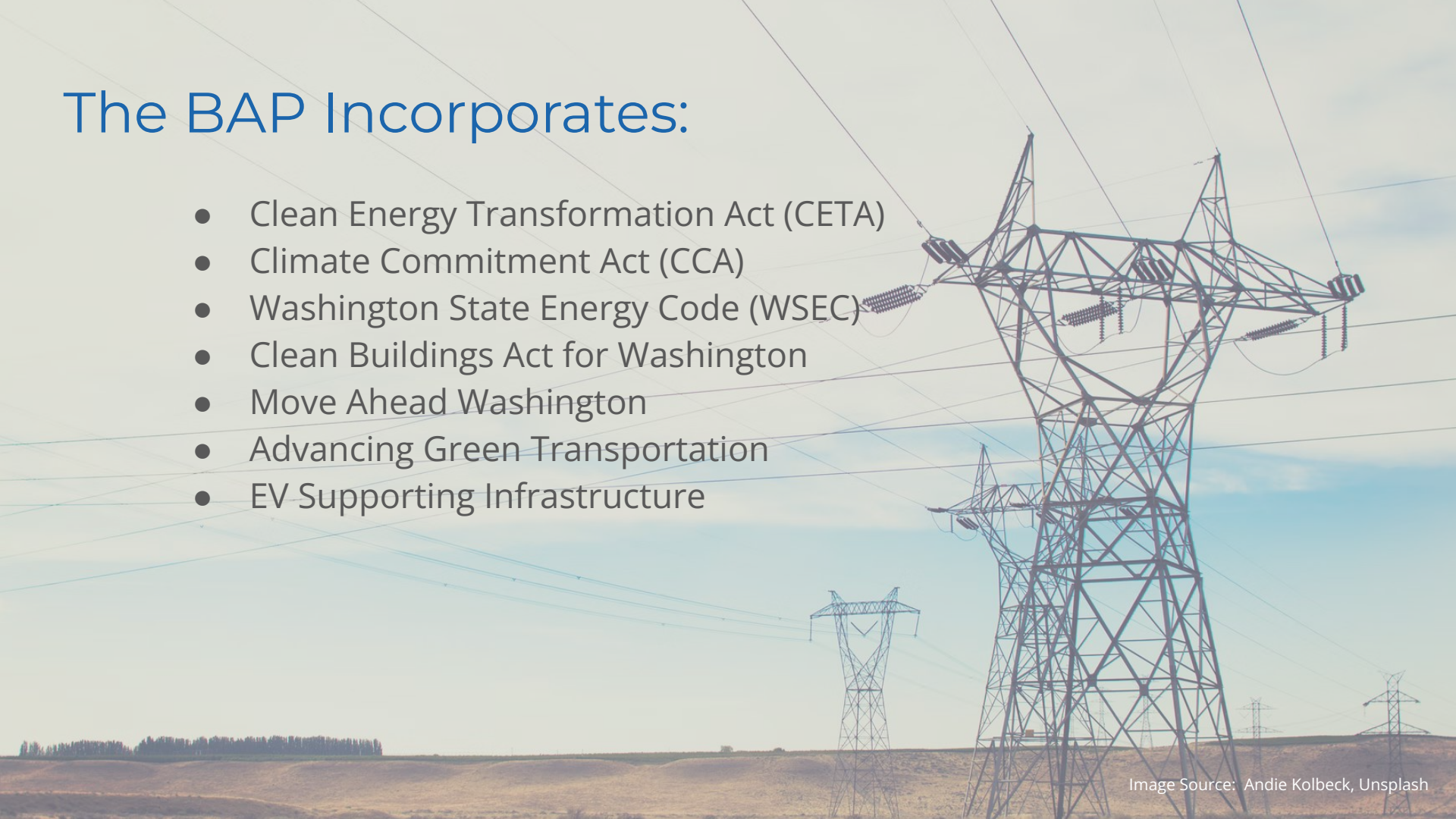


Image Source: Andie Kolbeck, Unsplash

Business as Planned (BAP)

Action	Details	Sources
Clean Energy Transformation Act (CETA)	Requires Washington's electric utilities to achieve 100% coal-free electricity generation by 2025; 100% carbon neutral electricity generation by 2030 (80% actually generated; 20% can be offsets, RECs, etc.); 100% clean electricity generation by 2045. - annual demand -> hourly demand - determine supply to meet hourly demand (80% demand met by 2030, 100% demand met by 2030) - add capacity if required - assume plant to utility routing is same as what is in place now	SB 5116 (CETA) Final Bill Report
Climate Commitment Act	**45%** reduction by **2030**, **70%** by **2040** and **95%** by **2050** in greenhouse gas emissions. Starting on Jan. 1, 2023, the cap-and-invest program will cover industrial facilities, certain fuel suppliers, in-state electricity generators, electricity importers, and natural gas distributors with annual greenhouse gas emissions above 25,000 metric tons of carbon dioxide equivalent. CPACE (HB 2405), Urban Heat Island Mitigation (HB 114), Renewable Hydrogen by PUDs (SB 5588), Solar Fairness Act (SB 5223)	SB 5125 Climate Commitment Act SB 5223 SB 5588 HB 2405 HB 1114

Business as Planned (BAP)

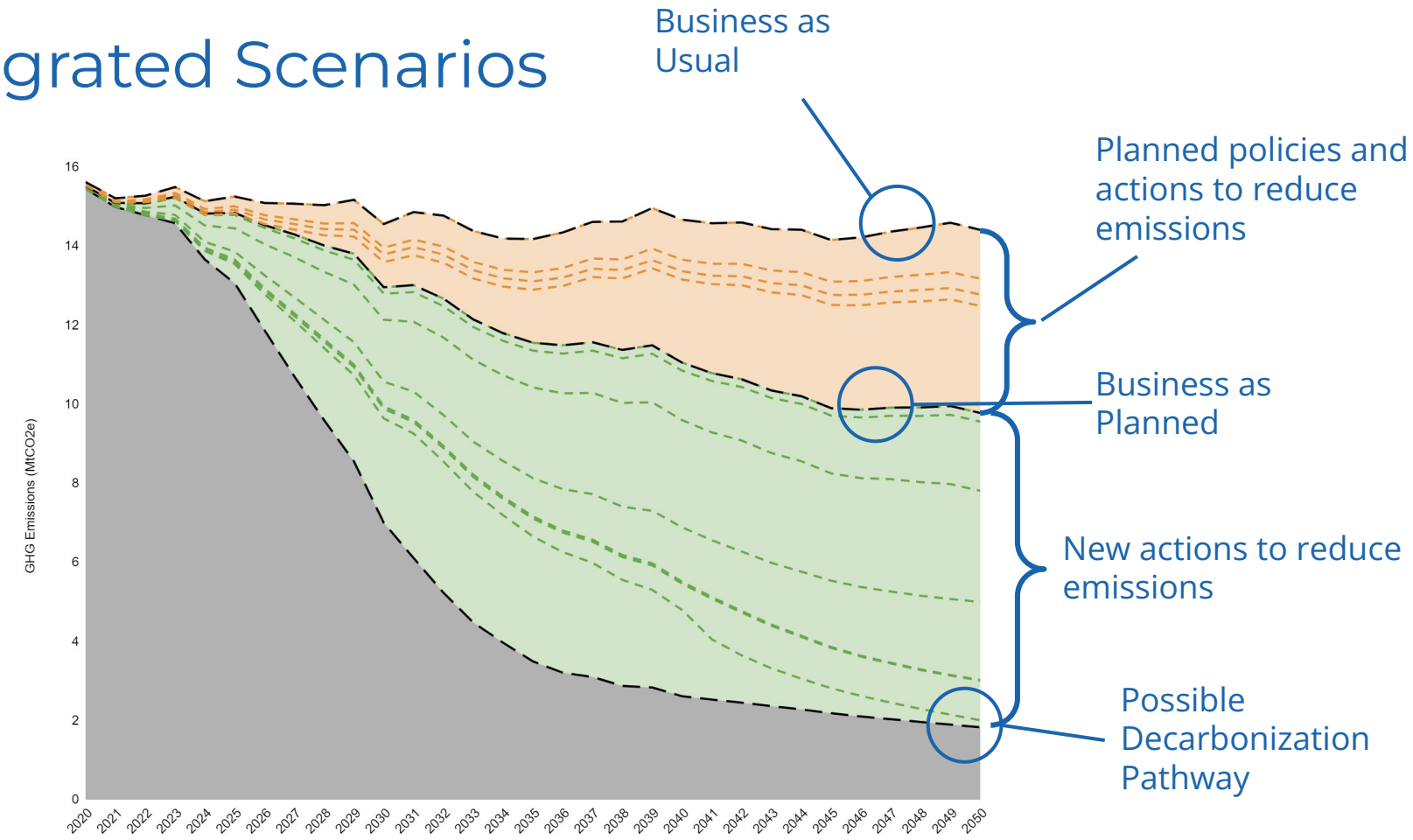
Action	Details	Sources
Washington State Energy Code (WSEC)	Relevant elements - New commercial (includes multifamily 4 stories and higher) 100% electric heat pumps heating and 50% electric heat pump water heating - Buildings between 2013 and 2032 move to 70% reduction in energy use over this time period - Banning of natural gas for space and water heating in some cities	Washington State Energy Code Washington State Energy Code Roadmap
Clean Buildings Act for Washington	Tier 1 - Existing buildings more than **50,000** sqft need to meet energy targets, starting in **2026**. Tier 2 - Existing buildings **22,000** sqft or larger and multifamily buildings need to meet energy targets starting in **2027.**	Washington State Clean Buildings Performance Standard

Business as Planned (BAP)

Action	Details	Sources
Move Ahead Washington	A $16.8 billion comprehensive transportation funding and appropriations package which leverages anticipated funds from the Climate Commitment Act's cap-and-invest allowance auctions to preserve and maintain existing transportation infrastructure, expand transit, cycling, and walking infrastructure, replace diesel ferries with hybrid electric ones, and support hydrogen and electric vehicle infrastructure deployment across the state. Approx $10 billion from CCA and $6 billion from other sources Mode shift: 5% increase in bike/ped and transit ridership between now and 2050, in the urban counties. Rural counties 2%	House 2022 Supplemental Transportation Budget Proposals Legislative Evaluation & Accountability Program Committee Transportation Document

Advancing Green Transportation	HB 2042 - Encourages electric vehicle and alternative vehicle adoption by providing tax credits, exemptions, grants, and technical support for electric and alternative vehicles purchases
	
	HB 5811 - Directs the Department of Ecology to adopt the motor vehicle emissions standards of California, including its Zero Emissions Vehicles program; also requires labels to be affixed that disclose the comparative GHGs for new vehicles, including passenger cars, light duty trucks, and medium duty passenger vehicles.
	- Standards start taking effect in 2024.
	- New personal use and light duty commercial vehicle sales; **8%** in **2024** and **100%** in **2035**
	- By 2035, deliveries to Washington must be:
	  - **55%** Classes 2b–3 trucks – vans, medium pickup trucks
	  - **75%** Classes 4–8 trucks – delivery trucks, delivery/service vans, lighter truck tractors, bucket trucks
	  - **40%** Class 8 truck tractors – cement trucks, dump trucks, sleeper cab trucks
		HB 2042
		HB 5811
		Department of Ecology - Zero Emission Vehicles

Integrated Scenarios



Implementation

Key enabling factors important for Washington's successful implementation of the BAP and future actions

- Programing, planning, authority, funding, and implementation
- Access to transmission infrastructure and regional electricity markets
- Storage/Battery technologies
- RNG and hydrogen technologies and markets
- Electric vehicle infrastructure
- Emerging technologies

Low-carbon scenarios will explore the possibilities of some these technologies and pathways

Next Steps

1. Model reference scenarios (BAU, BAP)
2. Define/model low carbon scenarios
3. Financial analysis
4. Co-benefits/equity analysis