CITY OF WENATCHEE

Strategic Plan for GHG Emissions Reduction

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This Wenatchee community strategic plan for reducing GHG emissions and accompanying analysis was conducted by Parametrix. Grace Thirkill, Claudia Denton, Beth Miller, and Suzy Godber of Parametrix provided mitigation scaling analysis, they are the primary authors of this report.

Introduction

The Our Valley Our Future Post-Carbon Economy Initiative, led by the community organization Our Valley Our Future (OVOF), supports Wenatchee Valley's transition to a sustainable, low-carbon economy through emissions reduction, renewable energy adoption, and climate resilience. The initiative recognizes both the risks of climate change and the opportunities for innovation. Its goals are to strengthen the region's economy, protect community health, and enhance long-term resilience.

This Strategic Plan for GHG Emissions Reduction is a collaborative effort between Sustainable NCW, City of Wenatchee, and OVOF. It outlines proven strategies to reduce greenhouse gas (GHG) emissions across the region and analyzes the maximum reduction potential of these strategies. Together, this information provides a foundation for guiding program decisions and advancing regional sustainability. The plan includes:

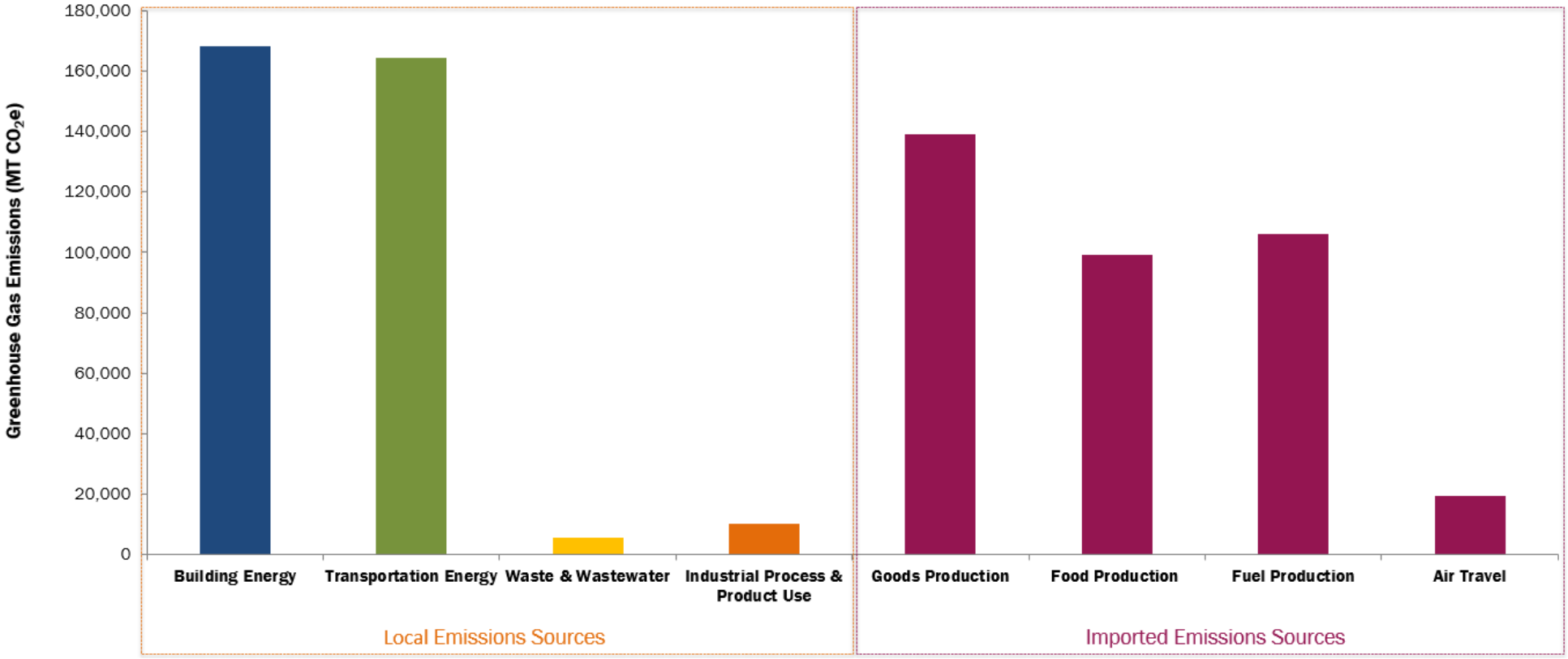
- **Wenatchee's 2023 Community GHG Inventory results –** establishes the baseline for measuring the potential impacts of selected GHG reduction strategies.
- **Summary of Current Community Efforts** – highlights local actions already underway.
- **GHG Emissions Reduction Strategies** – presents recommended strategies to reduce local emissions.
- **GHG Emissions Projections** – estimates the maximum technical potential of the proposed GHG reduction strategies and overlays results with the future expected emissions.
- **Addressing Imported Emissions** – provides recommended strategies to address GHG emissions tied to community consumption of goods and services.

If implemented to the maximum technical potential, these strategies **could eliminate 4.4 million metric tons of carbon dioxide equivalent (MT CO_2e) over the next 25 years.** Beyond emissions reductions, these strategies deliver co-benefits such as cleaner air, lower energy costs, and job creation. This plan underscores both the urgency and the opportunity of this moment, calling for sustained collaboration among residents, businesses, and local governments to secure a thriving, sustainable future for the Wenatchee Valley.

Wenatchee's 2023 Community GHG Inventory Results

The 2023 City of Wenatchee community GHG inventory provides the baseline for this strategic plan, detailing both local and imported emissions to guide effective reduction strategies. The inventory estimates total GHG emissions within the City's geographic boundaries for the 2023 calendar year. As shown in Figure 1, the largest sources of local emissions are building energy use (electricity and natural gas) and transportation. In addition, the inventory accounts for imported emissions. These emissions are generated outside the City but are linked to residents through consumption and purchasing patterns. These emissions include the production of food and goods purchased by residents, air travel outside of the City, and fuels for local energy use.

Figure 1: 2023 Wenatchee Community GHG Emissions Inventory Results



**Results of this inventory are further detailed in the report titled "City of Wenatchee Community Greenhouse Gas Inventory, Calendar Year 2023"*

Summary of Current Community Efforts

Across the Wenatchee Valley, community organizations, local governments, and businesses are already advancing energy efficiency, clean transportation, and sustainable consumption initiatives that complement the strategies recommended in this plan. In reducing building energy emissions, Chelan PUD is already supporting household energy efficiency and electrification through a well-developed energy conservation program, including incentives for heating, air conditioning, and ventilation (HVAC) upgrades. This helps residents reduce fossil fuel use as well as lower utility bills.

In reducing transportation emissions, Link Transit is expanding its electric vehicle (EV) bus fleet, and businesses like Northern Fruit are adopting EVs. Additionally, groups such as Plug-In North Central Washington and the Sustainable Bike Co-op are promoting electric mobility and active transportation modes. These initiatives align closely with the EV adoption and mode shift reduction strategies included in this plan. Specifically pertaining to wastewater treatment, the City of Wenatchee is pursuing Industrial Symbiosis opportunities which might include CO_2 capture and other innovative climate actions.

In the consumption and waste sector, nonprofits support reuse and recycling: Waste Loop hosts Repair Cafes and Mending Nights, while Sustainable NCW's Waste Wizard guides residents on recycling, repurposing, or donating items. Thriving farmers markets, thrift stores, and community composting and garden programs further support sustainable choices, from growing food to shopping local and reusing goods. Together, these efforts demonstrate meaningful progress already underway across the region.

GHG Emission Reduction Strategies

The following sections outline strategies to support the Wenatchee community to significantly reduce GHG emissions and move toward a more sustainable future. Strategies are grouped into two categories, building energy and transportation, the community's largest sources of local emissions. Each was selected for its high impact and current technological feasibility. For each strategy, this plan provides:

- A description of the recommended strategy.
- An estimate of its *total technical potential* to reduce emissions over the next 25 years.[1]
- A high-level assessment of implementation costs.

Together, this information illustrates how the selected strategies can contribute to transitioning to a carbon-free future. The accompanying tables summarize the recommended strategies, comparing their estimated reduction potential and costs. More detailed descriptions, along with assumptions and data sources for estimating the total technical potential of each strategy, are provided in *Appendix A: Detailed Methodology and Results for GHG Reduction Potential and Costs.*

[1] **Total technical potential** for GHG mitigation refers to the maximum achievable GHG emissions reductions of a given strategy if implemented fully across the community.

Building Energy Strategies

Strategy Description		GHG Mitigation Technical Potential (25-years)		Estimated Cost
Residential Electrification and Energy Efficiency	This strategy recommends phasing out fossil fuels in homes by switching to efficient electric systems and improving energy efficiency to cut emissions, reduce energy demand, and lower utility costs.	**156,424 MT CO_2e**	Models if all residential housing types were fully electrified and weatherized to the highest possible standard with maximum energy efficiency over a 20-year timeframe.	Upfront costs can be significant: $3,000–$8,000 for a ductless heat pump, $1,500–$3,000 for a heat pump water heater, $800–$1,200 for electric appliances, and $15,000–$50,000 for efficiency upgrades. While these expenses may be partly offset by lower energy bills, incentives that help reduce upfront costs are uncertain in the future.
Commercial Energy Efficiency	This strategy recommends efficiency upgrades in commercial buildings resulting in reduced energy use, emissions, and utility costs.	**541,058 MT CO_2e**	Models if all Wenatchee commercial buildings were fully weatherized and with the highest efficiency standard over 10-year timeframe, including lighting retrofits, HVAC upgrades, and other electrical and natural gas upgrades.	Costs range from $3–$8/sf for lighting retrofits, $20–$33/sf for HVAC upgrades, and $2–$12/sf for electrical upgrades. Baseline lighting studies average $6.84/sf.
Solar Installation	This strategy recommends rooftop solar on all advantageous building types, maximizing feasible capacity to cut grid demand, reduce emissions, and lower long-term energy costs.	**1,131,114 MT CO_2e**	Models installation of rooftop solar on all advantageous buildings over a 10-year timeframe, maximizing feasible capacity to cut grid demand, reduce emissions, and lower long-term energy costs.	Cost of installed rooftop solar systems average about $3 per watt for residential and $2 per watt for commercial projects. Over time, these systems can significantly reduce electricity bills, often paying for themselves within several years.

Transportation Strategies

Strategy Description		GHG Mitigation Technical Potential (25-years)		Estimated Cost
 **Mode Shift & VMT Reductions**	This strategy recommends shifting vehicle trips to alternative modes like transit, walking, and biking to reduce vehicle miles traveled and cut fossil fuel use.	624,321 MT CO_2e	Models the combined maximum benefits for neighborhood design, transit, and trip reduction programs, which could cut transportation emissions by up to 25% over 10 years.	Mode shift and VMT reduction strategies vary from low-cost telework and trip programs to high-capital transit expansion, with neighborhood design improvements in between. Beyond cutting emissions, they save households money and enhance safety, access, and mobility.
 **Electric Vehicle (EV) Adoption**	This strategy recommends shifting gas powered vehicles to electric vehicles to reduce fossil fuel use.	1,055,973 MT CO_2e	Models the transition to 100% of passenger cars driven in Wenatchee to become EVs over a 10-year timeframe.	EVs cost about $5,000–$12,000 more upfront than gas vehicles, but drivers save $1,750–$2,200 annually on fuel and maintenance, ranging about $6,000–$21,000 over a vehicle's lifetime.
 **Heavy Duty On-Road Fuel Switch**	This strategy recommends heavy duty diesel-powered vehicles use drop-in replacements, such as renewable diesel, to drastically reduce tailpipe diesel emissions.	888,335 MT CO_2e	Models a complete replacement of all on-road heavy-duty diesel consumption with R99 (99% renewable diesel), phased in linearly over a 10-year timeframe.	Purchasing R99 can typically range $0.20–$0.50 more per gallon than petroleum diesel. Prices fluctuate based on market trends.

GHG Emissions Projections

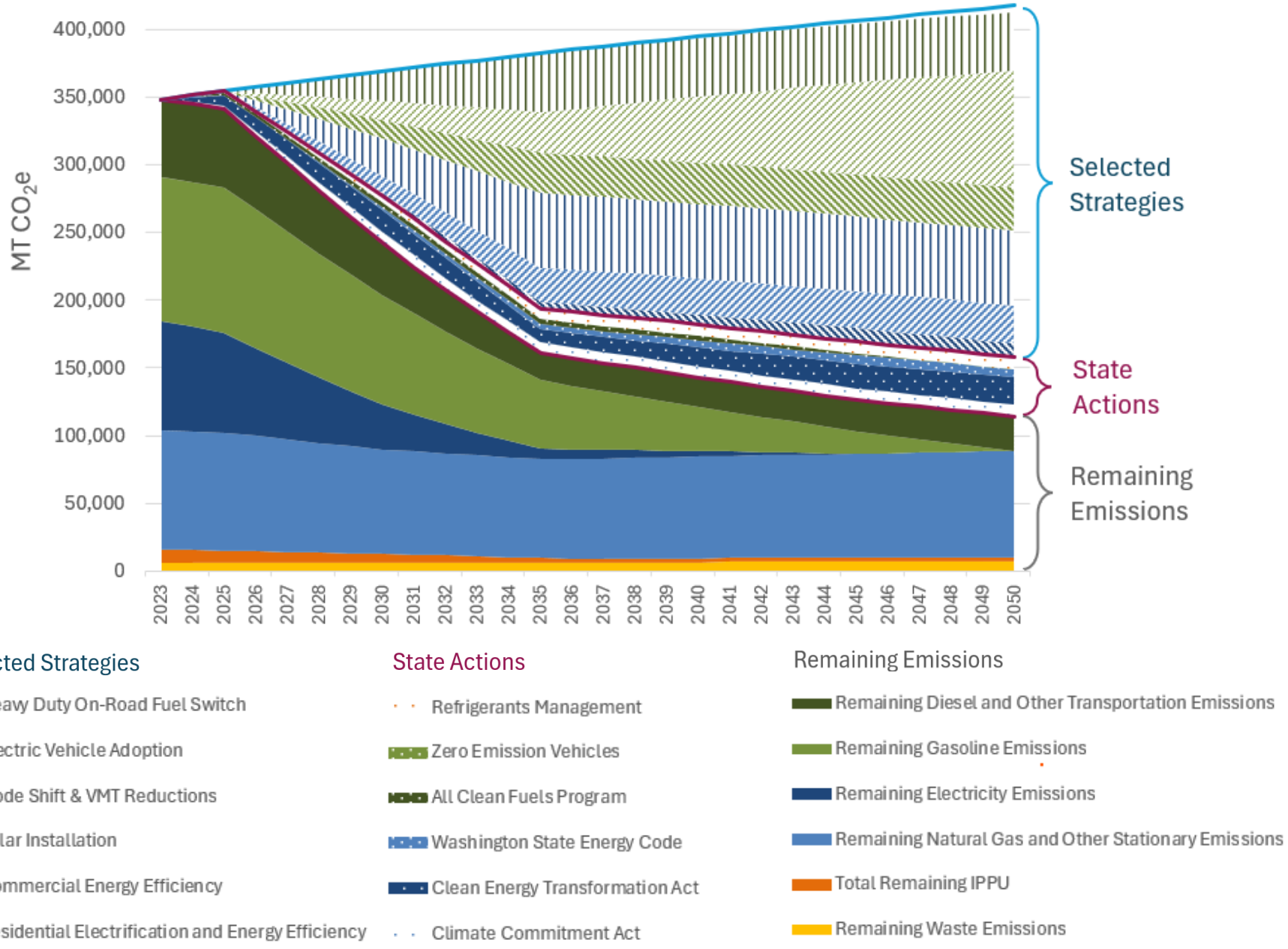
This section presents the projected impact of emissions reductions from the strategies selected to support the Wenatchee community's transition to a low-carbon future. Based on the 2023 community GHG inventory, a 25-year forecast was developed to project emissions trends and estimate potential reductions through 2050. The analysis uses the total technical potential, the maximum achievable GHG reductions if strategies are fully implemented across all sectors and technologies to show what is possible under optimal conditions.

As shown in Figure 2 on the following page, GHG emissions in the Wenatchee Valley are expected to rise steadily over the next 25 years if no action is taken, driven largely by population growth and associated increases in energy use and transportation (blue line at the top). This "unchecked growth" scenario would significantly increase the region's carbon footprint.

To illustrate how strategies can change this trajectory, the forecast layers the impact of the recommended local mitigation strategies with state-level policies. Because many of these strategies overlap, care was taken to assign reductions in a logical order to avoid double counting. First, unchecked growth projected emissions were estimated using county-level Growth Management Act (GMA) population forecasts through 2050. Next, reductions were credited to selected strategies before state-level policies, recognizing that local efforts often provide the first line of action. Finally, strategies were sequenced by type, giving priority to those that reduce overall energy usage, such as efficiency improvements and conservation, followed by those that reduce the carbon intensity of remaining usage, such as switching to renewable energy or low-carbon fuels.

This stepwise approach reflects the realities of population-driven growth while demonstrating the full technical potential of local climate strategies. Together, the projections highlight both the challenge of rising demand and the opportunity to bend the curve toward a more sustainable, low-carbon future for the Wenatchee Valley.

Figure 2: Projected Emissions Reductions with Selected Strategies and State Actions with Remaining Emissions



Addressing Imported Emissions

In addition to reducing local emissions, the Wenatchee community has opportunities to address **imported emissions** which are GHGs generated outside the community from producing the goods and services that residents purchase and consume. Reducing these emissions focuses on changing local consumption patterns, purchasing choices, and behaviors to lower energy and fuel use and reduce waste. While these strategies do not directly cut emissions within the City, they can significantly reduce the community's overall carbon footprint.

Each strategy below includes a high-level descriptions of the strategy, GHG reduction potential, and cost implications. Together, these strategies aim to demonstrate how lifestyle and consumption changes can build towards a post-carbon future.

Reduced Consumption of New Goods

Description

Reducing community-wide demand for new goods lowers the emissions associated with manufacturing, transportation, and disposal of those goods. This strategy can be supported by community programs to encourage the reuse, repair, and sharing of goods and services.

Estimated GHG Reduction Potential

Up to 557,544 MT CO_2e avoided over 25 years, based on a 25% reduction in consumption of new goods.

Cost Implications

Community members would save money by spending less on consumer goods. Community programs such as public education and events may require modest investments.

Reduced Food Waste

Description

Reducing wasted food lowers imported emissions from farming, processing, and transportation of food as well as the emissions from landfilled organic waste. The majority of the benefit lies in the avoided upstream emissions, so the focus should be on consuming what you already have to save edible food from spoiling. This strategy can be supported by community education campaigns, food recovery programs, and expanded composting services.

Estimated GHG Reduction Potential

While not modeled, cutting food waste has the potential to significantly reduce both upstream and landfill emissions. For Wenatchee, even modest reductions could yield meaningful climate benefits.

Implications

Community members and businesses can save money by purchasing less food and making better use of it. Community programs such as composting or donation programs may require modest investments.

Reduced Meat Consumption

Description

Reducing meat and dairy consumption, particularly red meat, reduces the demand for food products that have the largest known climate impacts. Even small dietary changes such as "Meatless Mondays" or swapping out a couple of meals a week can lower upstream agricultural emissions while also often improving public health.

Estimated GHG Reduction Potential

While not modeled, reducing meat and dairy consumption is among the most impactful individual action community members can take for reducing imported emissions.

Implications

Cost implications vary depending on individual choices and dietary preferences. Plant-based alternatives are often similarly priced or less expensive than meat products, depending on product types. Community programs such as education and awareness campaigns may require small investments.

Reduced Air Travel

Description

Reducing air travel has some of the greatest potential impacts for individual transportation emissions as air travel is one of the most emission-intensive activities on a per-trip basis. Reducing discretionary flights, substituting rail travel or virtual alternatives, and prioritizing local travel options can significantly reduce imported emissions.

Estimated GHG Reduction Potential

While not modeled, reductions in short-haul and frequent flights can have a disproportionately large effect on lowering an individual's carbon footprint.

Implications

Community members can save significantly by substituting or reducing air travel. Costs may arise in the form of time tradeoffs or reduced convenience, though these could be offset by changing plans, improvements in virtual connectivity and alternative travel infrastructure.

Conclusion

Even if all the strategies outlined in this plan are implemented to their full technical potential over the next 25 years, they will not eliminate all GHG emissions from the Wenatchee community. Instead, these strategies represent the most feasible and impactful strategies available today, serving both as a roadmap for significant near-term progress and as a call to action for continuing to build toward a post-carbon economy.

The remaining emissions after implementation are largely from sources that are harder to mitigate. These include continued reliance on natural gas for certain commercial and industrial uses, diesel consumption in off-road vehicles and equipment, and categories such as industrial processes and product use (IPPU) and waste that are either technologically limited or outside of the community's direct control. Addressing these sectors will require advances in technology, supportive state and federal policies, and broader systems change beyond the community scale.

While these challenges remain, Wenatchee and the State of Washington are already making great strides. The strategies identified in this plan build off the community's existing successes and commitment to climate action. They provide a framework for accelerating progress that can help Wenatchee continue to be a leader in the transition to a post-carbon future.

Appendix A: Detailed Methodology and Results for GHG Reduction Potential and Costs

The descriptions below provide details for individual GHG emissions reduction calculations. Parametrix created custom calculations for each strategy based on experience in climate action planning throughout Washington and beyond. Methods for calculating emissions reductions are consistent with Greenhouse Gas Protocol's Global Protocol for Community-Scale Greenhouse Gas Emissions (GPC), the protocol used for the sector-based GHG inventory. In general, strategies are calculated by identifying the difference in the activity level of a strategy from baseline and multiplying by an emissions factor as follows:

GHG Reduction (MT CO_2e) = Change in Activity Level X Emissions Factor

- Activity Level = quantity of input
  (e.g., tons of waste, kWh of electricity, therms of natural gas)
- Emissions Factor = emissions intensity of the strategy
  (e.g., landfill methane per ton of waste, grid electricity emissions per kWh)

Where there are multiple activities resulting from a strategy, total GHG Reduction is calculated by adding together the reductions from each of the activities. For example, GHG reductions from shifting energy use from natural gas to electricity would require adding the GHG reductions from a decrease in natural gas activity level to the GHG emissions due to an increase in electricity activity level. GHG Reductions are shown as positive numbers. Calculations are done in such a way to avoid double counting of a benefit. For example, transportation emissions will be reduced partly from mode shift and partly from electric vehicles, but not fully from both.

Some activity levels are also tied to population, which is expected to grow over time. See Shared Variables below for the projected population growth and data points used repeatedly throughout the calculations.

Shared Variables

Variable	Value	Source
Number of households (occupied housing units)	14,158	*U.S. Census Bureau American Community Survey (2023)*
Percent multifamily households (2 or more units)	32%	*U.S. Census Bureau American Community Survey (2023)*
State of Washington population	7,812,880	*U.S. Census Bureau (2023)*
City of Wenatchee population	35,526	*U.S. Census Bureau (2023)*

Population growth rate	See table below	*Washington Department of Commerce*

City of Wenatchee Projected Population Growth Rates		
Year	**Projected Population**	**Growth Rate**
2025	36,134	0.85%
2026	36,442	0.85%
2027	36,744	0.83%
2028	37,042	0.81%
2029	37,337	0.80%
2030	37,626	0.77%
2031	37,911	0.76%
2032	38,191	0.74%
2033	38,465	0.72%
2034	38,734	0.70%
2035	38,999	0.68%
2036	39,259	0.67%
2037	39,516	0.65%
2038	39,769	0.64%
2039	40,019	0.63%
2040	40,266	0.62%
2041	40,511	0.61%
2042	40,752	0.59%
2043	40,989	0.58%
2044	41,222	0.57%
2045	41,454	0.56%
2046	41,684	0.55%
2047	41,911	0.55%
2048	42,136	0.54%
2049	42,359	0.53%
2050	42,579	0.52%

Specific Strategy Methodologies and Costs

Residential Electrification and Energy Efficiency

Description

Total technical potential of GHG emissions reduction measures if all residential housing types were fully electrified and weatherized to the highest possible efficiency standard over a 20-year phase in period. This strategy eliminates fossil fuel use in homes by transitioning all space heating, water heating, cooking, and appliances to electric alternatives and achieving maximum energy efficiency savings through energy efficiency and weatherization upgrades. Based on regional household

averages, this results in fully electrified, highly-efficiency homes that minimize energy demand, reduce GHG emissions, and lower long-term utility costs to residents.

Assumptions

Potential savings were calculated using regional data from the U.S. Energy Information Administration (EIA)'s Residential Energy Consumption Survey (RECS) and the U.S. Census Bureau's American Community Survey (ACS), supplemented with assumptions from the Northwest Power Plan (NWPP) on household energy performance. Maximum efficiency savings reflect a composite average of available retrofit measures across building types and ages. 93% of homes in Wenatchee use electricity as their primary home heating fuel; therefore, most of the emissions savings will come from energy efficiency measures. Total residential emissions reductions are estimated at 19.5%, with less than 1% from electrification of heating and hot water and 99% from building envelope upgrades and efficiency measures. These values represent average potential savings across the housing stock, recognizing variation by household characteristics and upgrade feasibility. Implementation is modeled over a 20-year phase in period.

Costs

Upfront costs include the price of new electric equipment. For heating and cooling, the typical cost for a ductless heat pump is $3,000–$8,000[2] and $1,500–$3,000 for a heat pump water heater[3]. Cost of other electric appliances, such as dryers or stoves, range $800-$1,200[4][5]. Efficiency upgrades are typically more expensive and can range from an average of $15,000 to upwards of $50,000 per household depending on the scope of the project[6]. These investments are partly offset by lower energy bills over time. Rebates and tax incentives are currently available, but their future availability is uncertain and depends on federal priorities.

Commercial Energy Efficiency

Description

Total technical potential of GHG emissions reduction measures if all commercial buildings reduced fossil fuel use by maximizing efficiency through upgrades to systems, equipment, and operations over a 10-year period. Based on regional averages, this results in lower energy use, reduced GHG emissions, and decreased utility costs across the sector.

Assumptions

Potential savings were calculated using national analyses from the American Council for an Energy-Efficient Economy (ACEEE) and a local National Renewable Energy Laboratory (NREL) report that evaluated building performance opportunities in the region. Maximum efficiency savings are assumed at 40%, reflecting the combined effects of lighting, HVAC, controls, envelope

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[2] https://modernize.com/hvac/heating-repair-installation/heat-pump/ductless

[3] https://www.forbes.com/home-improvement/plumbing/heat-pump-water-heaters/

[4] https://homeguide.com/costs/washer-and-dryer-cost#:~:text=A%20new%20dryer%20costs%20%24800%20to%20%241%2C200%20on%20average.,%2D%20or%20electric%2Dpowered%20model.&text=*Not%20including%20installation.,-Washer%2Ddryer%20combo

[5] https://homeguide.com/costs/oven-or-stove-cost

[6] https://eta-publications.lbl.gov/sites/default/files/the_costs_of_home_decarbonization_9.13.22.pdf

improvements, and other energy-saving measures. This strategy represents average maximum potential savings across commercial building types and sizes, recognizing variation in baseline conditions, retrofit feasibility, and operational practices. Implementation is modeled over a 10-year phase-in period.

Costs

Typical upfront costs for commercial building energy-efficiency upgrades include approximately $3–$4 per square foot for LED lighting retrofits[7] (up to $8 for intensive industrial scenarios[8]), and $20–$33 per square foot for HVAC system upgrades, depending on building type[9]. Electrical system upgrades (e.g., wiring, panels) add $2–$12 per square foot[10], while lighting retrofit baseline studies estimate about $6.84 per square foot[11].

Solar Installation

Description

This strategy measures if rooftop solar was installed on all homes, businesses, and industrial facilities to maximize technical potential over a 10-year timeframe. It captures the full feasible capacity based on rooftop area, orientation, and solar resources, lowering grid electricity demand, cutting GHG emissions, and supporting long-term energy cost savings.

Assumptions

Solar generation potential was calculated using Google's Project Sunroof, which estimates rooftop photovoltaic (PV) capacity based on building footprint, roof orientation, shading, and solar irradiance. Maximum technical potential reflects the total feasible rooftop capacity across the City. Total reductions in grid-supplied electricity are estimated at 69%, with 419 MW DC of installed capacity across building types. These values represent technical potential only, not economic or policy-adjusted adoption rates, and assume full buildout of identified suitable rooftop area. Implementation is modeled over a 10-year timeframe.

Costs

Cost of installed rooftop solar systems average about $3/watt for residential and $2 per watt for commercial projects as reported by National Renewable Energy Laboratory (NREL).[12] For example:

- A 6-8 kW system might cost approximately $18,000-$24,000 before incentives.
- A 100kW system might cost approximately $200,000 pre-incentives.

[7] https://blog.feslighting.com/commercial-lighting-cost-per-square-foot

[8] https://deltawye.com/industrial-led-lighting-retrofit/

[9] https://www.businesshue.com/commercial-hvac-cost-per-square-foot/

[10] https://caudills.com/electrical-cost-per-square-foot-commercial-buildings/

[11] https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/lighting_measurement_evaluation_protocol.pdf

[12] https://www.nrel.gov/solar/market-research-analysis/solar-installed-system-cost

These costs can be significantly lowered with incentives—such as the federal Investment Tax Credit—potentially reducing net costs by up to 30%, but this incentive may disappear with current administration.[13]

Mode Shift & VMT Reductions

Description

This strategy reduces transportation emissions by shifting trips to walking, biking, and transit, and lowering vehicle miles traveled (VMT) through neighborhood design, transit improvements, and trip reduction programs.

Assumptions

Potential reductions were calculated using CAPCOA (California Air Pollution Control Officers Association) guidance, applying subsector maximums for neighborhood design actions, transit investments, and trip reduction programs. Cumulative reductions reflect the combined effect of these measures, with total maximum emissions reductions estimated at 25% of transportation sector emissions[14]. Implementation is modeled over a 10-year timeframe, with benefits accruing as neighborhood design (i.e., bike lanes and shared micromobility systems), transit infrastructure, and program participation scale up. These estimates represent the upper bound of achievable reductions, recognizing that real-world outcomes depend on local adoption, infrastructure investment, and behavioral shifts.

Costs

Mode shift and VMT reduction strategies range from low-cost to high-capital investments. Telework and trip reduction programs are relatively inexpensive, relying on incentives or employer policies. Transit expansion (e.g., bus rapid transit, new routes, extended service) requires significant capital and operating costs, while neighborhood design measures like bikeways and pedestrian improvements fall in the middle, with moderate but durable benefits. In addition to emissions reductions, these strategies generate direct savings for households that drive less or not at all, lowering transportation costs while improving safety, access, and mobility options.

Electric Vehicle (EV) Adoption

Description

This strategy reduces transportation emissions by replacing all gasoline-powered vehicles with electric vehicles by 2035.

Assumptions

This strategy estimated the emissions savings of EV adoption by using baseline fuel use which was estimated using Wenatchee Community GHG Inventory data including VMT for passenger vehicles. Then, projecting future vehicle totals using the average annual growth rate (AAGR) from Chelan County GMA. Then current share of EV vehicles is assumed to increase linearly between 2025 and

[13] https://www.energysage.com/solar/solar-tax-credit-explained/

[14] https://caleemod.com/documents/handbook/ch_3_transportation/chapter_3_transportation.pdf

2035 to demonstrate a maximum technical potential if all passenger vehicles became 100 EVs by 2035, considering the increase in VMT due to population growth. These estimates represent the upper bound of achievable reductions, recognizing that real-world outcomes depend on local adoption, EV affordability, infrastructure investment in charging stations, and behavioral shifts.

Costs

This strategy involves higher upfront vehicle purchase costs, with EVs currently averaging $5,000–$12,000 more than comparable gasoline vehicles[15]. However, lower fuel and maintenance needs generate significant savings, with drivers saving about $1,750–$2,200[16][17] per year and $6,000–$21,000 over a vehicle's lifetime[18][19], offsetting initial costs and often leading to net savings.

Heavy Duty On-Road Fuel Switch

Description

This strategy transitions all on-road heavy-duty vehicles from using petroleum diesel to R99 renewable diesel (R99) over a 10-year period, cutting fossil fuel use and reducing lifecycle GHG emissions.

Assumptions

This strategy was modeled as a complete replacement of all on-road heavy-duty diesel consumption with R99 renewable diesel, phased in linearly over a 10-year schedule. Baseline fuel use was estimated using Wenatchee Community GHG Inventory data including VMT for heavy-duty vehicles. Emissions reductions were calculated by applying the difference in tailpipe carbon intensity between conventional diesel and R99. This scenario assumes sufficient renewable diesel supply to meet regional demand, no changes in heavy-duty vehicle miles traveled, and that renewable diesel is compatible with the existing heavy-duty fleet. Total reductions represent the maximum technical potential from full adoption of renewable diesel by year 10 (2035).

Costs

Purchasing R99 typically costs $0.20–$0.50 more per gallon than petroleum diesel[20]. Because R99 is fully compatible with existing engines and fueling systems, transition costs are limited to the fuel premium, partly offset by Washington's Clean Fuel Standard, estimated to increase fuel prices by less than 1 cent in 2023, up to 4 cents by 2025[21]. Other lower-carbon alternative fuels such as hydrogen can offer deeper long-term decarbonization but are far more expensive today and require new vehicles and fueling infrastructure, making it a higher-cost, longer-term option compared to R99's near-term readiness.

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15 https://www.energysage.com/electric-vehicles/evs-vs-fossil-fuel-vehicles/

16 https://coltura.org/ev-savings-report/

17 https://home.treasury.gov/news/press-releases/jy2403

18 https://advocacy.consumerreports.org/press_release/new-analysis-from-cr-finds-that-the-most-popular-electric-vehicles-cost-less-to-own-than-the-best-selling-gas-powered-vehicles-in-their-class/

19 https://home.treasury.gov/news/press-releases/jy2403

20 https://afdc.energy.gov/fuels/prices.html

21 https://ecology.wa.gov/getattachment/22790fe6-fc3a-414d-b3ba-036af0975258/20220512CfsCba.pdf

Reduced Consumption of New Goods

Description

Consumption-related emissions are lowered by reducing demand for new goods, shifting toward reuse, repair, and shared use.

Assumptions

The analysis includes measuring a 25% reduction of specifically the imported emissions associated with the purchase categories clothing, electronics, appliances, furnishings and supplies, and other manufactured goods as identified in the Berkeley CoolClimate Calculator[22]. Emissions reductions were estimated by applying lifecycle carbon intensity factors for each product category. This scenario assumes reductions occur over a 10-year timeframe, with changes in consumption patterns driven by increased reuse, repair, and sharing programs. Total reductions reflect average per-household savings, recognizing variation in purchasing behavior.

Costs

This strategy reduces household spending by lowering demand for new goods. Shifting toward reuse, repair, and sharing leads to net cost savings for consumers. Costs will predominantly come from programs or outreach that help to curb behavior change.

[22] https://coolclimate.berkeley.edu/calculator