SECTION 3

REDUCING CARBON EMISSIONS

It is crucial to rapidly reduce carbon emissions to address climate change. Section 3 includes an overview of climate science, Tualatin's carbon emissions inventory results, and actions the Tualatin community can take to reduce carbon emissions across four focus areas: buildings and energy, urban form and land use, transportation, and consumption.

Some emissions reduction strategies can have bigger impacts than others. Strategies were analyzed in terms of their carbon emissions reduction potential to help decision-makers and community members identify which strategies are likely to have the most impact. Kickoff opportunity timeframes for the actions that support each strategy were also identified, and were based on the the availability of technology and resources needed to implement each action. To reach Tualatin's emissions reduction goal, it is important to prioritize strategies that have a large carbon emissions reduction impact and can be taken on quickly. Co-benefits are also identified to help decision-makers prioritize which strategies and actions to take on first given capacity and budget constraints.

CLIMATE 101 – HOW DOES CLIMATE CHANGE HAPPEN?

This section explains the basics of the science behind climate change and how human activity has altered the climate rapidly over a very short time.

The greenhouse effect

The atmosphere is a thin layer that extends about 7 miles off the surface of earth – or the cruising height of most commercial jets. If the earth were the size of a basketball, the atmosphere would be about the size of a layer of plastic wrap around the ball. Light from the sun passes through the atmosphere. Some of that light is reflected back into space. The rest of the light is trapped as heat within the atmosphere by carbon dioxide and other greenhouse gases, warming the earth and the oceans.

The more carbon dioxide and other greenhouse gases in the atmosphere, the more heat is prevented from escaping the earth and the hotter things get. It should be noted that this is not the same as the ozone layer, which filters out ultraviolet radiation, but does not interact with heat in the same way.

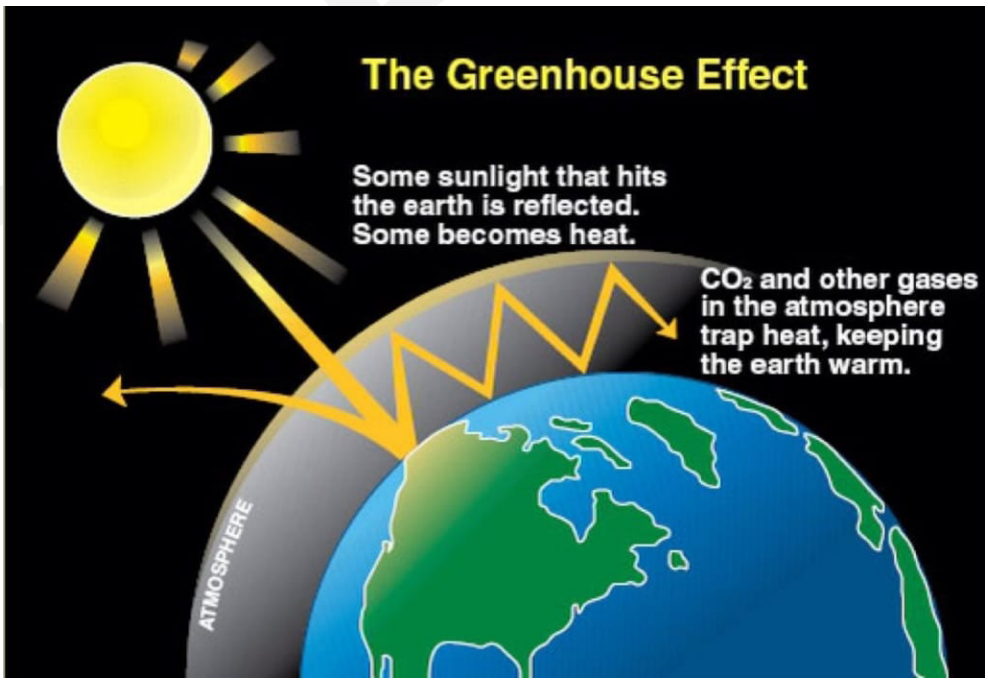


FIGURE 20: The greenhouse effect is a result of carbon dioxide (CO_2) and other greenhouse gases in the atmosphere trapping heat, which warms the earth over time (note: the atmosphere is not drawn to scale. The atmosphere is far thinner than is depicted here). Figure created by Aaman Kler.

WHAT ARE GREENHOUSE GAS EMISSIONS, CARBON EMISSIONS, AND CARBON POLLUTION?

Greenhouse gas emissions refer to the release of gases into the atmosphere that trap heat and contribute to the greenhouse effect. These gases include carbon dioxide, methane, nitrogen oxides, and fluorinated gases. Human activities such as burning fossil fuels, deforestation, and industrial processes are the primary sources of greenhouse gas emissions.

Carbon emissions specifically refer to the release of carbon dioxide (CO_2) and methane (CH_4) into the atmosphere. Carbon emissions are a significant contributor to greenhouse gas emissions. These are different than air toxins – which are regulated under the Clean Air Act, but have a local effect.

Carbon pollution is another term used to describe the release of carbon dioxide into the atmosphere. It is often used in the context of the negative environmental impacts of carbon emissions, particularly their contribution to climate change.

This plan uses these three terms interchangeably.

Causes of climate change

When coal, oil, gas, diesel or propane are burned, they release carbon that has been trapped underground for millions of years – increasing the concentration of carbon in the atmosphere far beyond the natural balance where the vegetation and oceans can reabsorb it at the same rate. The increase in the use of fossil fuels as the primary energy source since the industrial revolution has increased the concentration of carbon dioxide in the atmosphere quickly (Figure 21), leading to climate change.

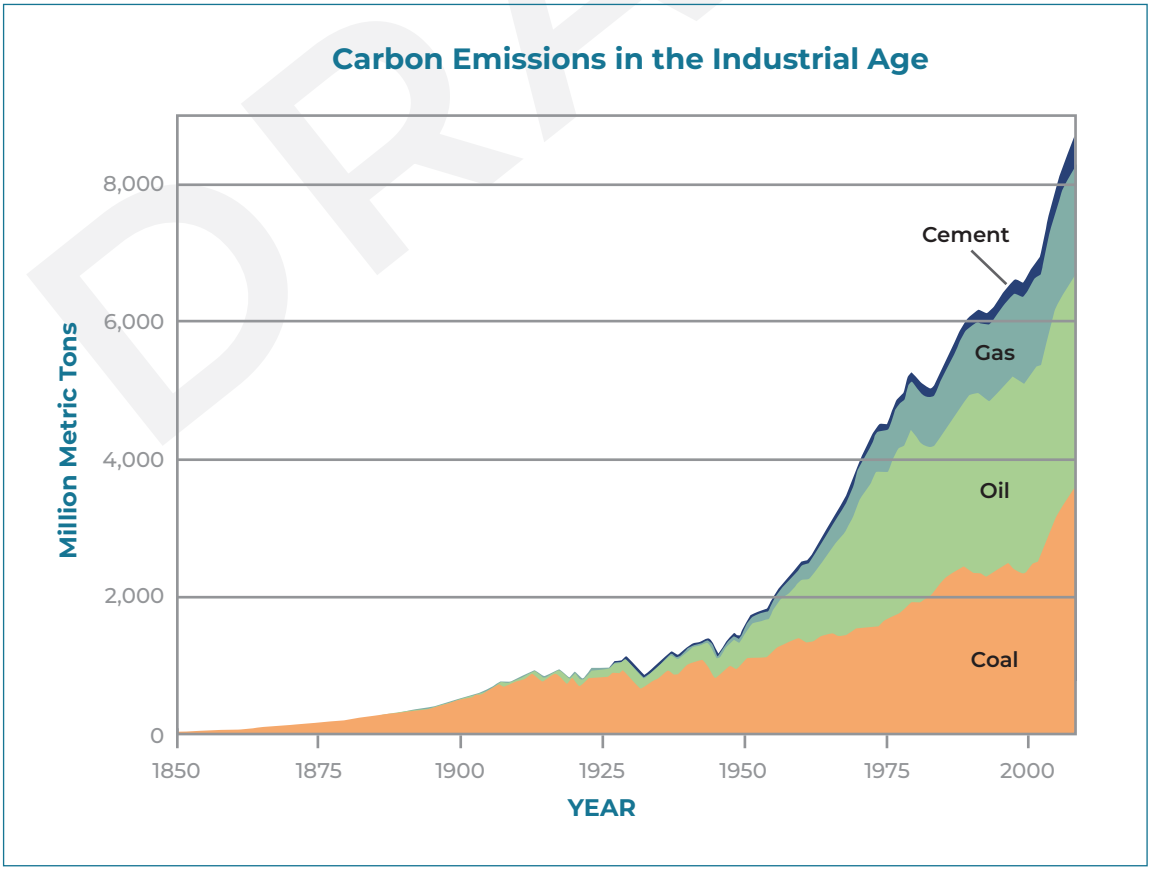


FIGURE 21: Increasing use of fossil fuels since the mid-19th century.

With dramatically more people burning fossil fuels, our atmosphere is rapidly filling with carbon pollution (Figure 22). The addition of carbon to the atmosphere is outpacing the ability of plants and trees to grow and reabsorb it. The imbalance between emissions and the natural carbon cycle is increasing the concentrations of carbon in the atmosphere and increasing the earth's temperature via the greenhouse effect. These carbon emissions are in a feedback loop with the increase in human population making climate change accelerate with population growth.

That said, per person emissions are not the same across the world. The average person in a developing nation will have a carbon footprint that is roughly 5% of an average person born and raised in a developed nation where wealth and consumption are higher, which yield more carbon emissions (Figure 23).

To learn more about the science behind climate change, see Appendix 1: Climate 101 Technical Reader.

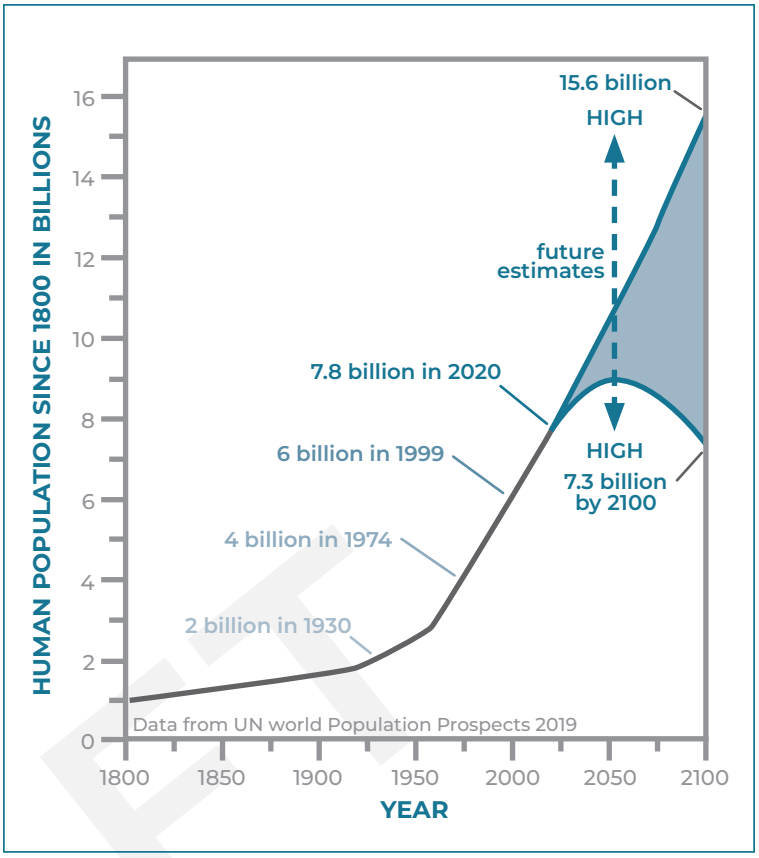


FIGURE 22: Increasing human population since the 19th century. Figure from Wikimedia Commons.

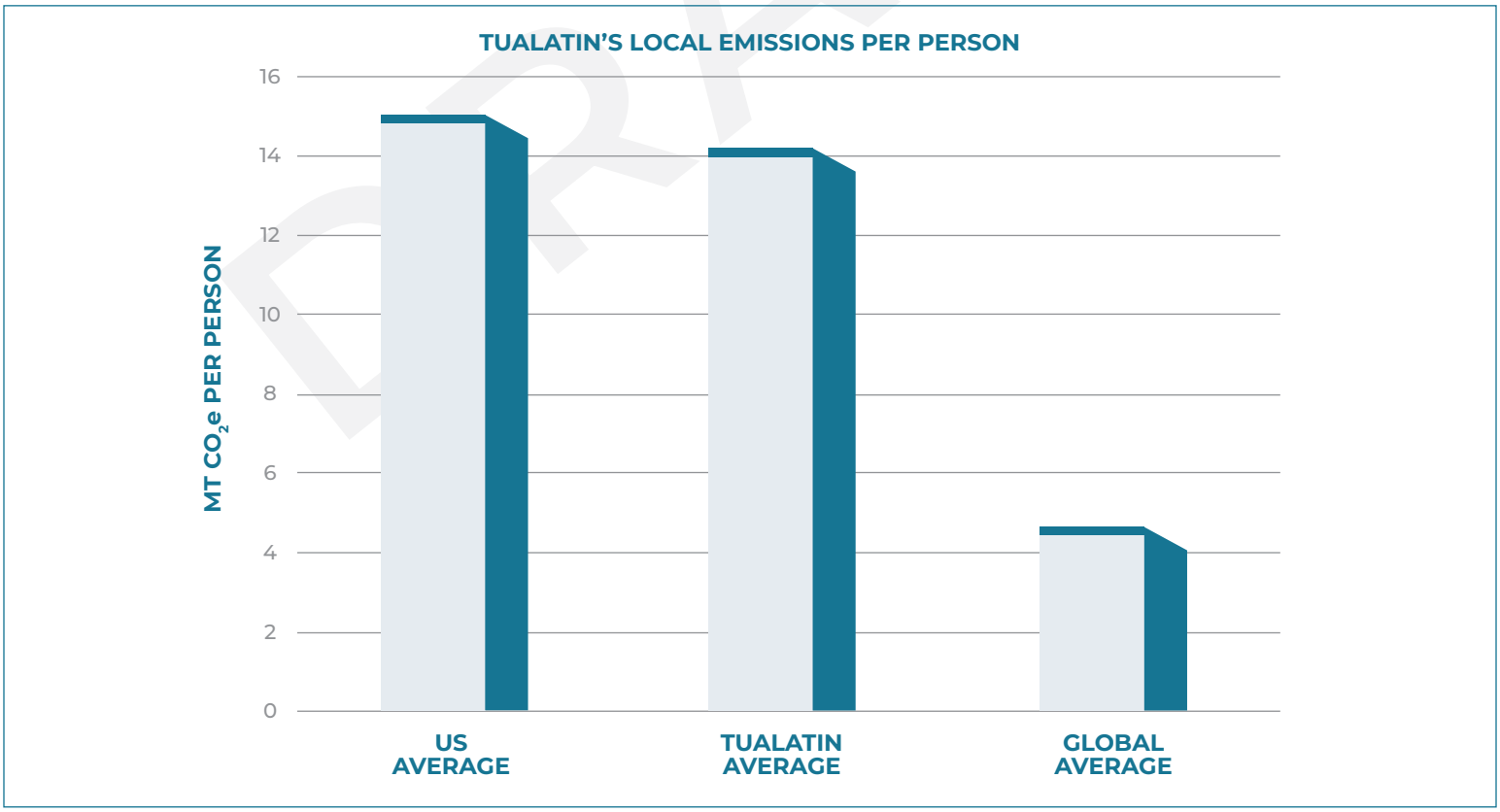


FIGURE 23: In 2019, the Tualatin community generated nearly 386,000 MT CO_2e of local emissions – about 14.2 MT CO_2e per resident. This is less than the U.S. average of 15.2 MT CO_2e per person and considerably greater than global average of 4.5 MT CO_2e per person. The term "local emissions" refers to emissions produced within the city limits from activities like heating or cooling buildings and driving cars.

Science-based goal

Tualatin knows that it is crucial to rapidly reduce carbon emissions to address climate change. Our emissions reduction goal is net zero by 2050, which is consistent with limiting planetary warming to 1.5 degrees Celsius. This goal was selected by the Climate Action Plan Steering Committee for a few reasons.

- If achieved in developed nations, this target prevents us from going over a planetary "tipping point" of no return (1.5 degrees Celsius), which will dramatically increase the impacts of climate change with potentially catastrophic consequences
- This target is the goal of the 2015 Paris Climate Agreement – the globally recognized standard for safety and well-being
- As a member of the Climate Mayors group, Mayor Bubenik signed a letter in 2017, alongside 465 other mayors from across the U.S., in support of upholding the Paris Climate Agreement target
- This target most commonly adopted by other cities who have completed climate action plans

For these reasons, this was the recommendation from the City's consultant and was agreed upon by our Climate Action Plan Steering Committee, consisting of two City Councilors and eight staff from five departments across the City that the plan set the roadmap to achieve net zero by 2050.

By switching to carbon-free electricity and fuels and employing strategies such as carbon sequestration to draw down the carbon pollution in the atmosphere, we can avoid the worst effects of climate change. If we act now, we can improve our quality of life now, and preserve our future.

TUALATIN'S CLIMATE GOAL:

Achieve net zero carbon emissions by 2050 to reduce Tualatin's contribution to climate change and limit the impacts of global warming.

A goal of "net zero" carbon emissions means that the city aims to achieve a balance between the amount of greenhouse gas emissions it produces and the amount of greenhouse gas emissions it removes from the atmosphere.

This is typically done by reducing emissions through various strategies such as transitioning to renewable energy, improving energy efficiency in buildings, promoting sustainable transportation using carbon free or human powered energy, and reducing overproduction and waste, among other measures. Any remaining emissions can then be offset by activities that remove carbon dioxide from the atmosphere, such as reforestation or carbon capture and storage.

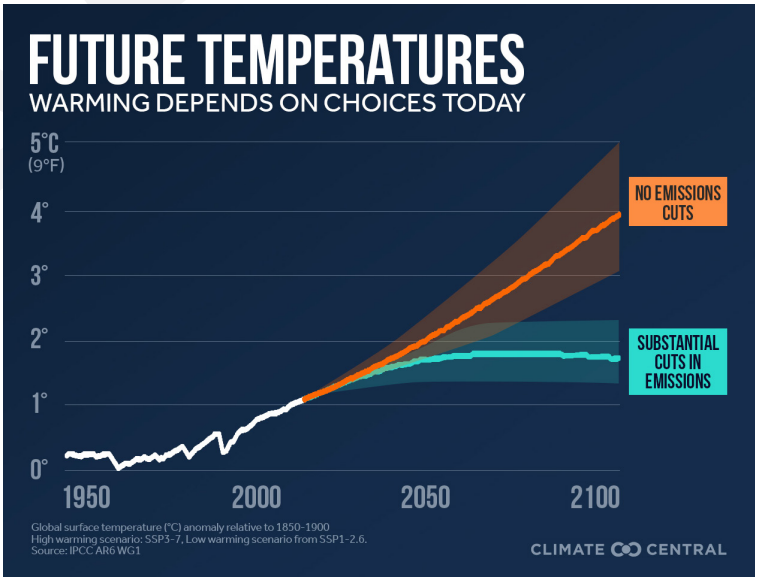


FIGURE 24: Climate action can lead to a better future. Graphic from Climate Central.

TUALATIN'S CARBON FOOTPRINT

The City of Tualatin completed a Community Greenhouse Gas Inventory to better understand sources of greenhouse gas emissions (i.e., climate pollution) to inform development of a community climate action plan. The inventory follows internationally recognized community greenhouse gas inventory protocols and accounts for all significant sources of greenhouse gas emissions driven by activities taking place within the City of Tualatin's geographic boundary (local emissions). Beyond protocol requirements, the inventory also measures consumption-based emissions (imported emissions).

Emissions inventory results

In 2019, Tualatin's local and imported emissions totaled nearly 677,000 metric tonnes of carbon dioxide equivalents (MT CO_2e).

The City of Tualatin's 2019 Community Greenhouse Gas Inventory includes the following emissions sources: building energy, transportation energy, waste and wastewater emissions, industrial processes and refrigerants, agriculture, forestry, land use, and consumption-based emissions.

Tualatin's largest source of local emissions is the building energy sector (42%), which includes emissions from electricity and natural gas, followed by transportation emissions (12%) from the burning of gasoline and traditional diesel. The largest sources of imported emissions in Tualatin are emissions from goods production (15%) like furniture and clothing, food production (13%), and fuel production (12%). Figure 25 shows Tualatin's emissions break down by sector.

LOCAL VS. IMPORTED EMISSIONS

Local emissions come from activities that take place within City limits, like heating and cooling buildings, cooking food, driving cars, disposing of waste, industrial processes like manufacturing, and leaked refrigerants from appliances that help to keep people and food cool.

Imported emissions come from things that are made outside of the city's geographic boundary but benefit the people within the geographic boundary who use those items or services. This includes things like the production of food and goods, and air travel.

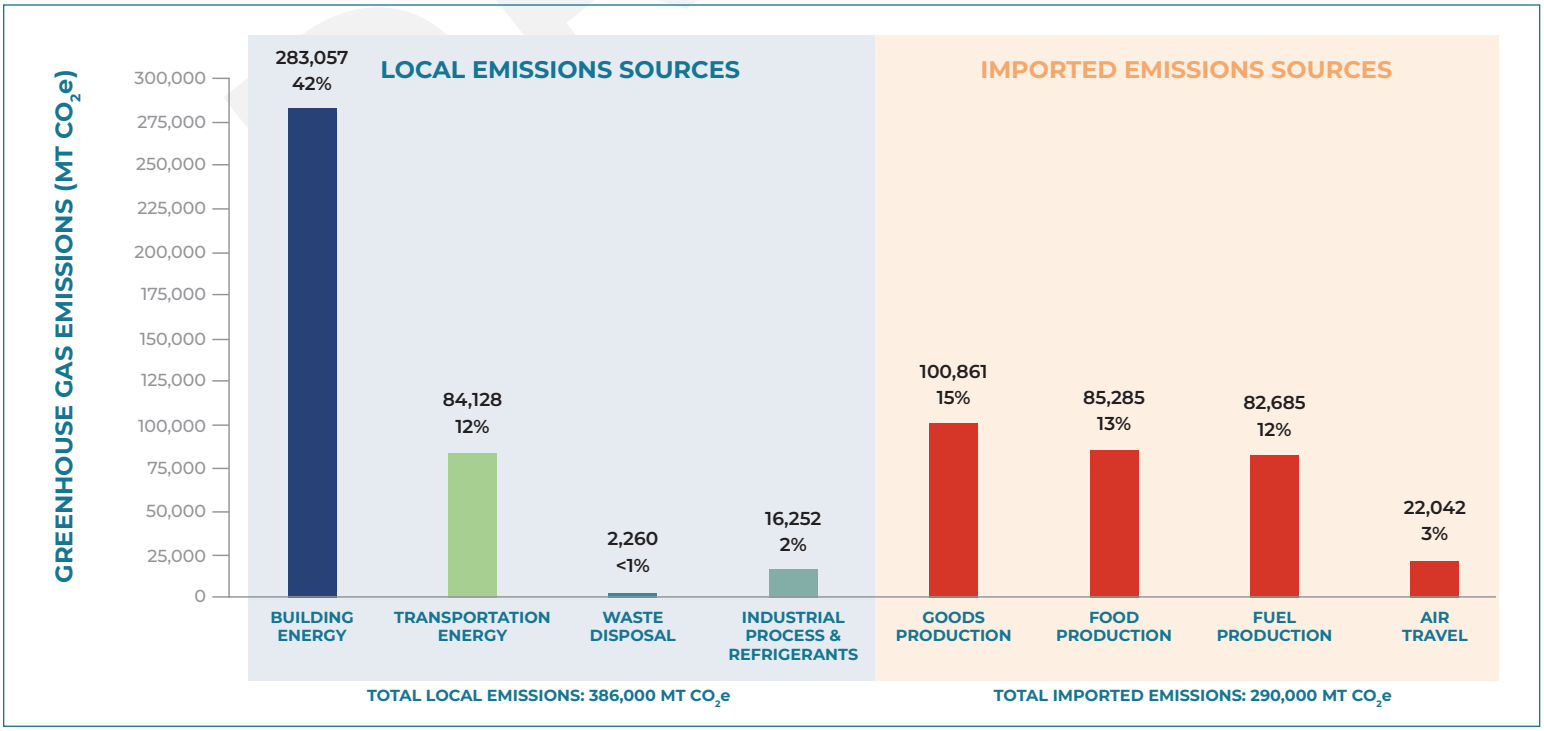


FIGURE 25: Tualatin's emissions sources

Emissions forecast

Local emissions in Tualatin are expected to decrease over time, primarily thanks to strong climate regulations from the State of Oregon in the stationary energy sector, which includes electricity generation and natural gas use. While emissions are estimated to decrease by 80% in 2050 compared to 2019 local emissions without additional mitigation actions, that is still not enough to hit our target of 100% greenhouse gas emissions mitigation to limit global warming to 1.5°C. The Climate Action Plan includes the additional strategies and actions that provide our best chance at reaching our ambitious goal of net zero by 2050.

Figure 26 shows forecasted emissions by sector (colored wedges) as compared to forecasted growth based on population growth only (solid red line) and the Paris Accord 1.5 degrees Celsius warming goal of net-zero emissions by 2050 (black dotted line). Tualatin will need to take further action to decrease emissions, primarily from transportation, but also from industrial processes and refrigerants, waste processing, and building energy to meet its goal of net zero by 2050.

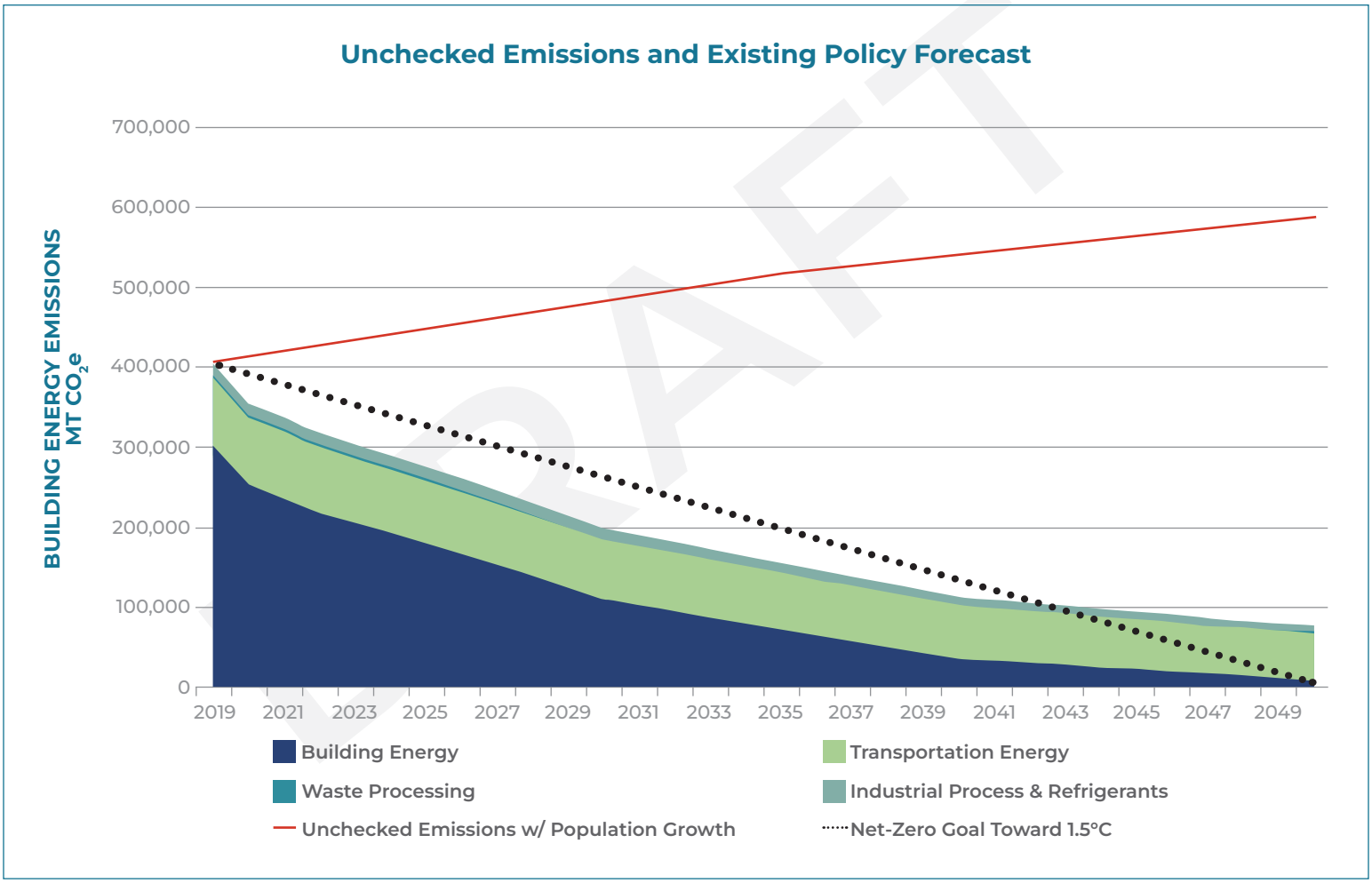


FIGURE 26: Tualatin's unchecked emissions forecast (solid red line, population growth with no policy interventions) with forecasted emissions based on existing state and federal policy, and a net-zero by 2050 trajectory (black dotted line). This graph tells us that Tualatin will need to take additional action to decrease emissions and meet its goal of net zero by 2050.

SECTION THREE: STRATEGIES AND ACTIONS

The Reducing Carbon Emissions section includes four focus areas and identifies strategies and actions the Tualatin community could pursue in order to meet its goal of reducing carbon emissions to net zero by 2050.

Some of these strategies were analyzed in terms of their emissions reduction potential (MT CO_2e) and their cost per MT CO_2e to help decision makers better understand the impacts and costs of different strategies. These strategies were analyzed because they have proven to be high-impact strategies in other communities taking climate action and/or because the data was available to complete the analysis. This is not to suggest that the strategies that were not analyzed are not important – all strategies and actions that lead to emissions reduction are valuable efforts towards reducing emissions—but with limited resources and time, it is critical to understand where to direct our efforts.

FOCUS AREA 4
BUILDINGS AND ENERGY

STRATEGY 4.1	Energy efficiency and conservation	11 Actions
STRATEGY 4.2	Transition to 100% carbon-free electricity supply	4 Actions
STRATEGY 4.3	Transition to 100% renewable natural gas (RNG) and clean hydrogen supply	4 Actions
STRATEGY 4.4	Electrification of space and water heating for new buildings	2 Actions
STRATEGY 4.5	Electrification of space and water heating for existing buildings	4 Actions
STRATEGY 4.6	Voluntary purchase of verified carbon offsets	3 Actions

FOCUS AREA 5
URBAN FORM AND LAND USE

STRATEGY 5.1	Dense future development resulting in reduced future vehicle miles traveled	7 Actions
STRATEGY 5.2	Urban/community forestry & carbon sequestration	7 Actions

FOCUS AREA 6

TRANSPORTATION – MODES AND FUEL SWITCHING

STRATEGY 6.1	Fuel switching - Electric vehicles (EVs), renewable diesel, biodiesel, ethanol and other low-emissions fuels	10 Actions
STRATEGY 6.2	Active transportation to reduce car miles and fossil fuel (gasoline) use	10 Actions
STRATEGY 6.3	Transit transportation to reduce car miles and fossil fuel (gasoline) use	4 Actions
STRATEGY 6.4	Remote work options to reduce car miles and fossil fuel (gasoline) use	2 Actions

FOCUS AREA 7

CONSUMPTION – FOOD AND GOODS

STRATEGY 7.1	Landfill diversion of organic materials (composting)	4 Actions
STRATEGY 7.2	Reduce emissions from food	4 Actions
STRATEGY 7.3	Reduce emissions from road materials	2 Actions
STRATEGY 7.4	Reduce consumption of new materials	5 Actions
STRATEGY 7.5	Responsible waste management	4 Actions
STRATEGY 7.6	Reduce emissions from landscaping	1 Actions
STRATEGY 7.7	Refrigerants Management (AIM Act)	1 Actions

FOCUS AREA 4: BUILDINGS AND ENERGY

Background

Carbon emissions from the buildings and energy sector come from the combustion of natural gas and from electricity generated from fossil fuels to heat water and power buildings. Building energy use by residential, commercial, and industrial buildings and facilities represents a large source (283,057 MT CO_2e, or 42%) of community emissions. Small quantities of combusted propane and other fuels are also included. Additionally, a fraction of natural gas is lost due to leaks during local distribution; natural gas (aka methane) is also a greenhouse gas, and is 25 times more potent than CO_2.

Electricity use in commercial buildings makes up the largest portion of carbon emissions from the buildings and energy sector. However, electricity use in residential and industrial buildings and natural gas use in all buildings also contribute to Tualatin's building emissions (Figure 27).

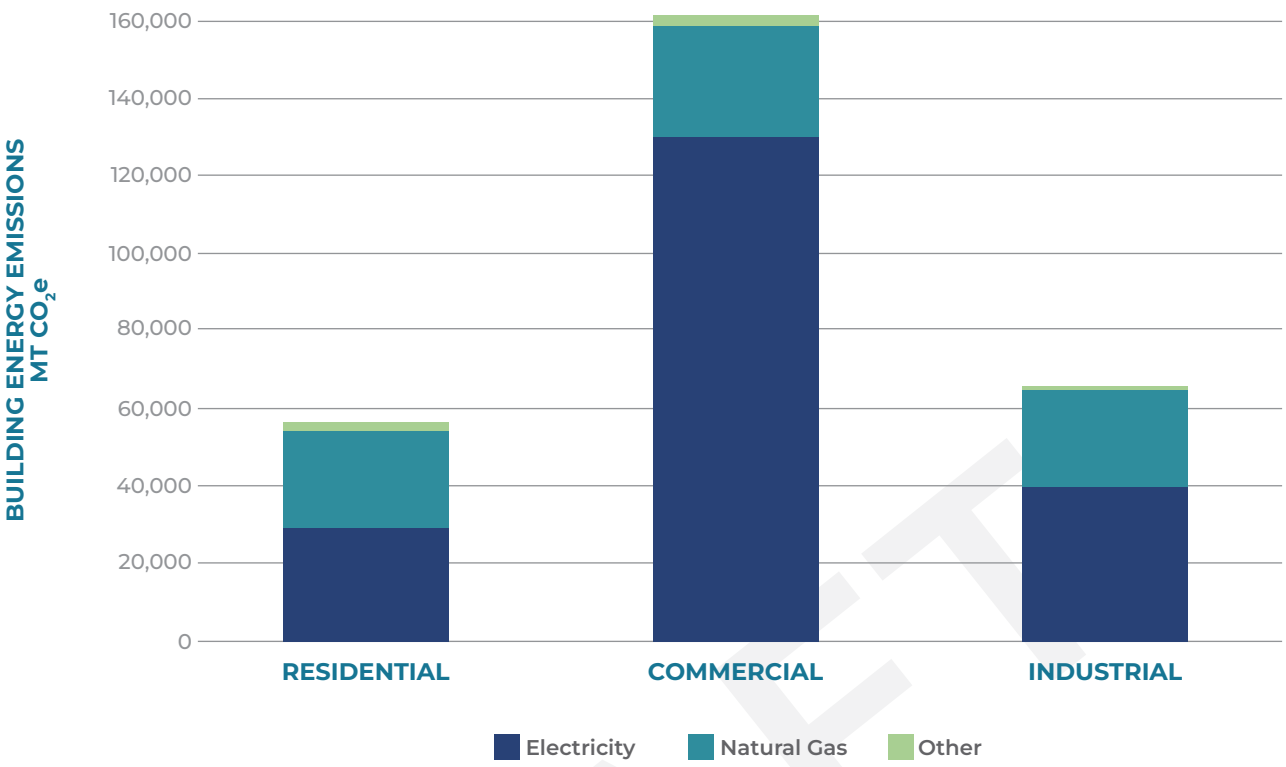


FIGURE 27: Building energy by type and energy source.

Strategies & actions

Tualatin has identified the following strategies and actions to reduce carbon emissions from the building and energy sector. Combined, these strategies could help Tualatin reduce its carbon footprint by about 9.6 million MT CO_2e, or by 78%.

Strategy 4.1 Energy efficiency and conservation

The energy efficiency and conservation strategy is estimated to avoid 1,530,000 MT CO_2e. It is a cost neutral strategy since up-front investments in energy efficiency and conservation tend to result in energy savings over time.

STRATEGY	GHG BENEFIT (MT CO_2e AVOIDED)	COST PER MT CO_2e REDUCED
4.1	LOW MED HIGH	$ cost neutral (-$10 to $10/MT)

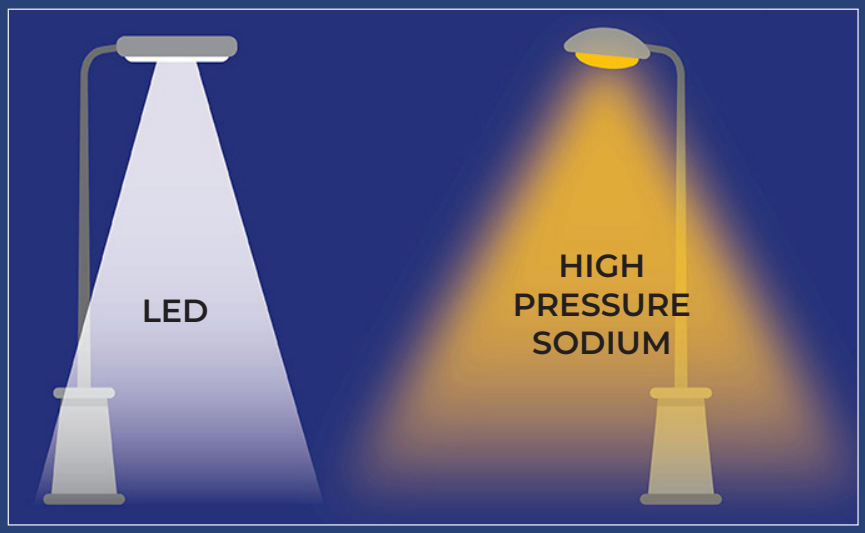
Energy efficiency and conservation refer to practices that reduce the amount of energy needed to perform a specific task or function. Energy efficiency refers to using less energy to perform the same task or produce the same result, while conservation involves reducing overall energy use by avoiding unnecessary energy consumption. Energy efficiency and conservation are important because they help to reduce greenhouse gas emissions by reducing the amount of energy needed – especially if it is fossil energy. In addition to reducing emissions, energy efficiency and conservation can also help to save money and improve air quality.

As Tualatin continues to experience more extreme weather, energy efficiency measures can provide the added benefit of helping people stay comfortable indoors by using less energy to heat or cool buildings.

The Energy Trust of Oregon estimates that 71% of residential customers, 49% of commercial customers, and 62% of industrial customers in Tualatin have participated in an energy efficiency program that has resulted in savings.

TUALATIN'S LED STREETLIGHT CONVERSION PROGRAM

The City of Tualatin is upgrading its streetlights to more energy-efficient, dark sky friendly lights. The project, in coordination with Portland General Electric (PGE), is converting all of the City's streetlights from High-Pressure Sodium (HPS) to Light Emitting Diode (LED) lights. The project began in late 2019 and has resulted in a 58% reduction in average monthly street light energy use and associated costs, saving the city thousands of dollars by significantly reducing its energy use.

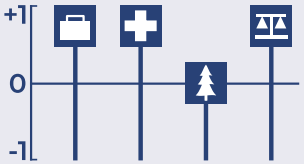
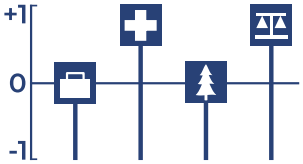


Key

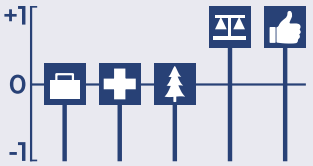
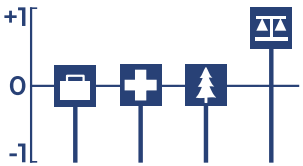
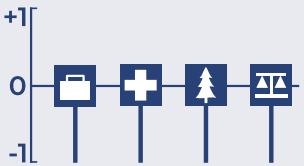
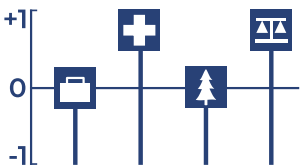
Low (0-399,999 $MTCO_2e$) | Medium (400,000-1,799,999 $MTCO_2e$) | High (1,800,000-8,000,000 $MTCO_2e$)

$$$	$$	$	$$	$$$
significant savings (>$100/MT)	savings ($10-100/MT)	cost neutral (-$10 to $10/MT)	cost ($10-100/MT)	significant cost (>$100/MT)

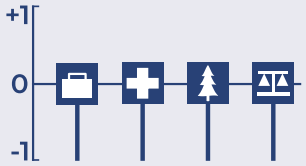
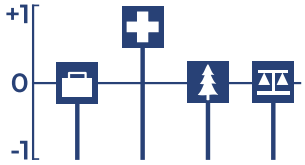
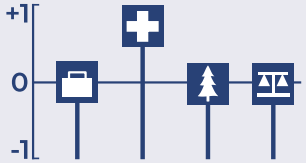
Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.1.1 Upgrade building envelopes, including roofs, walls, windows, doors, and foundations, to improve barriers between exterior and internal environments in buildings and increase efficiency. Examples of building envelope upgrades could include adding insulation, installing draft protection for doors and windows, or installing white or green roofs.	**STAKEHOLDERS** • City of Tualatin Community Development Department • Energy Trust of Oregon (ETO) • Community Action **PROGRAMS** • ETO Residential Incentives program • ETO Oregon Cash Incentives for businesses program • ETO Strategic Energy Management program		 • Environmental		
4.1.2 Incentivize builders, consumers, and contractors to build to the Oregon Building Codes Division's "Built Energy Smart" residential and commercial reach codes. State Executive Order 20-04 directs state agencies to reduce emissions by at least 45 percent below 1990 emissions levels by 2035 and at least 80 percent below 1990 levels by 2050. As a result, the Oregon Building Codes Division updated the residential and commercial reach codes to provide guidelines on improving energy efficiency, upgrading building envelopes, and supporting electrification.	**STAKEHOLDER** • City of Tualatin Community Development Department **POLICY DOCUMENTS** • Municipal code • Development code		 • Environmental		

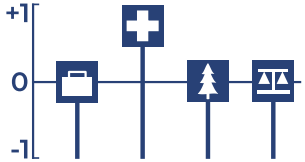
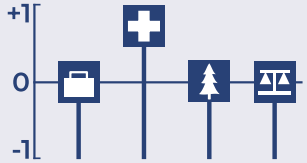
Key

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.1.3 Replace high-pressure sodium (HPS) lightbulbs with light-emitting diode (LED) bulbs. LED bulbs last longer and are significantly more energy efficient than HPS bulbs.	STAKEHOLDER • Energy Trust of Oregon (ETO) PROGRAMS • ETO Lighting Incentives for residents • ETO Business Lighting trade ally program for businesses		 • Environmental		
4.1.4 Replace appliances and electronics with certified energy efficient appliances and electronics, such as EnergyStar-certified appliances.	STAKEHOLDER • Energy Trust of Oregon (ETO) PROGRAMS • ETO DIY Resources + Cash Incentives for residents • ETO Oregon Cash Incentives for businesses		 • Environmental		
4.1.5 Require home energy scores to be completed at point of sale for homes.	STAKEHOLDERS • Energy Trust of Oregon (ETO)		 • Connected, Informed, Engaged • Environmental		
4.1.6 Partner with the Community Energy Project to make the Home Energy Score program available for free to lower income home sellers in Tualatin. This program offers free home energy scores to home sellers at or below 80% median income.	STAKEHOLDER • Community Energy Project PROGRAM • Home Energy Score Program		 • Environmental		

Key

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.1.7 Establish citywide water conservation program. This program could inlcude incentives for reducing indoor and outdoor water use and community education. Lower water use results in less energy used to pump water throughout the system.	STAKEHOLDER • City of Tualatin Public Works and Finance Departments		 • Environmental		
4.1.8 Enroll in the Strategic Energy Management (SEM) program. SEM provides the tools and education to start saving energy today and continue saving over time. SEM participants learn how their businesses use energy and identify where waste is happening. Program participants have the opportunity to share best practices with a cohort of peers, learn to increase employee engagement and monitor the progress of their energy savings work.	STAKEHOLDER • Energy Trust of Oregon (ETO) PROGRAM • Strategic Energy Management program		 • Environmental		
4.1.9 Advocate that the State adopt stronger building codes to require upgraded building envelopes, energy efficiency measures, and other factors needed to support electrification. Oregon Department Of Energy will work with the Building Codes Division to adopt building efficiency goals for 2030 for new residential and commercial construction. Municipalities are required to adopt the Oregon Structural Specialty Code (OSSC) at a minimum.	STAKEHOLDERS • City of Tualatin Community Development Department • Oregon Department of Energy (ODOE) • Oregon Building Codes Division		 • Environmental • Neighborhoods		

Key

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.1.10 Complete a voluntary home energy assessment or obtain a Home Energy Score to identify ways to improve the energy efficiency, comfort, and health and safety of your home. Home Energy Score systems help homeowners, homebuyers, and renters better understand a home's energy use, and how even small improvements can make a big difference in energy savings.	**STAKEHOLDERS** • Energy Trust of Oregon (ETO) **PROGRAM** • Home Assessment program		 • Environmental		
4.1.11 Install smart heating, ventilation, and air conditioning (HVAC) controls, such as smart thermostats, in buildings to optimize energy efficiency.	**STAKEHOLDER** • Energy Trust of Oregon (ETO) **PROGRAMS** • ETO Residential Incentives • PGE Smart Thermostat Program and Rebates		 • Environmental		

Key

M MITIGATION ACTIONS
A ADAPTATION ACTIONS
S SEQUESTRATION ACTIONS
IMPLEMENT
CONVENE
SUPPORT/ADVOCATE
QUICK START
0-5 YRS
6-10 YRS
10+ YRS
YES, POLICY DECISION
JOBS
HEALTH & SAFETY
ECOSYSTEM & WILDLIFE HEALTH
OPPORTUNITY FOR EQUITY
COMMUNITY ACCEPTANCE
ALIGNMENT WITH COUNCIL VISION (0-7)

Strategy 4.2 // Transition to 100% carbon-free electricity supply

The transition to 100% carbon-free electricity supply strategy is the most impactful from an emissions reduction standpoint. It is estimated to avoid 7,881,000 MT CO_2e. This strategy is predicted to result in a cost of $10-35/MT CO_2e reduced because this strategy relies on investment into increasing renewable energy generation from energy sources like wind and solar.

STRATEGY	GHG BENEFIT (MT CO_2e AVOIDED)	COST PER MT CO_2e REDUCED
4.2	 LOW MED HIGH	$$ cost ($10-100/MT)

Even though the State of Oregon's Climate Protection Act requires that Portland General Electric (PGE) decrease its emissions to zero by 2040, the Tualatin community can still take meaningful, immediate action to reduce its largest source of emissions: electricity. Residents and businesses in Tualatin can help to support carbon-free energy projects that would not otherwise have funding to get built by purchasing renewable energy credits (RECs). Portland General Electric offers two programs for its customers to purchase RECs and support renewable energy generation in the Pacific Northwest.

- The Green Future Choice Renewable Power program is available to households and small businesses that choose to enroll for an additional $7-12 per month
- The Green Future Enterprise program is available to large commercial and industrial business customers who choose to enroll

WHAT ARE RENEWABLE ENERGY CREDITS (RECS)?

With the purchase of renewable energy credits, you will not have electricity from a specific generation facility delivered directly to your home, but the amount of electricity you consume will be replaced in the Northwest power grid by renewable resources.

Portland General Electric (PGE) offers renewable energy credits through its Green Future Choice program. This program allows PGE customers to purchase 100% renewable energy that is validated by a third party for $7-12 extra per month.

Key


Low (0-399,999 $MTCO_2e$)


Medium (400,000-1,799,999 $MTCO_2e$)


High (1,800,000-8,000,000 $MTCO_2e$)

$$$ significant savings (>$100/MT)

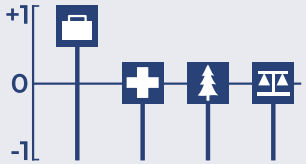
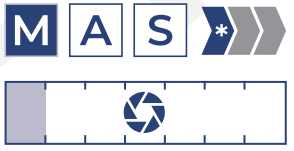
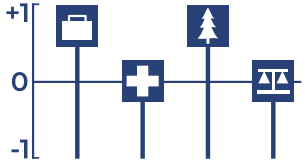
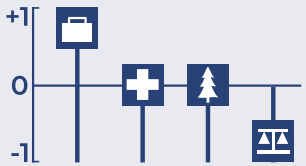
$$ savings ($10-100/MT)

$ cost neutral (-$10 to $10/MT)

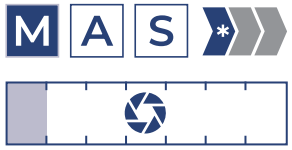
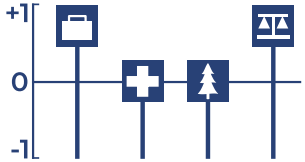
$$ cost ($10-100/MT)

$$$ significant cost (>$100/MT)

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.2.1 Participate in the SolSmart program. SolSmart is a free program that provides technical assistance to local governments to reduce barriers to installing solar in their communities. The City can earn bronze, silver, or gold designation by meeting a set of criteria.	**STAKEHOLDER** • City of Tualatin Community Development Department **PROGRAM** • SolSmart		 • Neighborhoods • Environmental		
4.2.2 Enroll in PGE's Green Future Choice or Green Future Enterprise Renewable Power program(s) to match 100% of electricity use with renewable energy and help build more renewable energy projects in Oregon.	**STAKEHOLDER** • Portland General Electric (PGE) **PROGRAMS** • Green Future Choice (for individual and small business customers) • Green Future Enterprise (for commercial/industrial customers)		 • Environmental		
4.2.3 Install rooftop solar. Solar panels typically provide cost savings over time, reduce emissions, and increase grid resiliency. Rebate programs exist to help property owners offset the upfront costs of installing rooftop solar. Request a free quote through Energy Trust of Oregon's Solar Program.	**STAKEHOLDERS** • Oregon Department of Energy (ODOE) **PROGRAM** • Oregon Solar and Storage Rebate Program		 • Environmental		

Key

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.2.4 Enroll in the Oregon Community Solar Program. The Oregon Community Solar Program gives thousands of Oregonians new opportunities to go solar without needing to own a home, have a sunny roof, or make upfront payments. Community Energy Project connects income qualified customers to the program.	STAKEHOLDER • **Community Energy Project** PROGRAM • **Oregon Community Solar program**		 • Environmental		

Key

- M MITIGATION ACTIONS
- A ADAPTATION ACTIONS
- S SEQUESTRATION ACTIONS
- IMPLEMENT
- CONVENE
- SUPPORT/ADVOCATE
- * QUICK START
- 0-5 YRS
- 6-10 YRS
- 10+ YRS
- YES, POLICY DECISION
- ALIGNMENT WITH COUNCIL VISION (0-7)
- JOBS
- HEALTH & SAFETY
- ECOSYSTEM & WILDLIFE HEALTH
- OPPORTUNITY FOR EQUITY
- COMMUNITY ACCEPTANCE

Strategy 4.3 Transition to 100% renewable natural gas (RNG) and clean hydrogen supply

The transition to 100% renewable natural gas (RNG) and clean hydrogen supply strategy is estimated to avoid 1,704,750 MT CO_2e. This strategy is estimated to cost $15-75/MT CO_2e reduced, in part because supplies of renewable natural gas and clean hydrogen are still limited.

STRATEGY	GHG BENEFIT (MT CO_2e AVOIDED)	COST PER MT CO_2e REDUCED
4.3	LOW MED HIGH	$$ cost ($10-100/MT)

Unlike standard natural gas, which is gathered by drilling and hydraulic fracturing (or "fracking), renewable natural gas is a carbon-neutral resource produced from local, organic materials like food, dairy, forestry waste, wastewater, or landfills. As these materials decompose, they produce methane. That methane can be captured, conditioned to pipeline quality, and delivered in the existing pipeline system to homes and businesses where it can be used in existing appliances and equipment. This process closes the loop on waste and provides a renewable energy option for the natural gas system, in the same way that wind and solar are used to generate renewable electricity. This gas is currently available in limited quantities, but should be encouraged for use as it becomes more accessible.

Hydrogen fuel holds promise as a climate solution due to its potential to provide clean energy in various sectors. Hydrogen can be produced through a variety of methods, as reflected by the hydrogen "colors" shown in Figure 28. When produced using renewable sources like wind, nuclear, or solar power through a process called electrolysis, hydrogen generates zero greenhouse gas emissions. Green, yellow, and pink hydrogen are produced from renewable sources. The hydrogen can then be used as a versatile energy carrier for applications such as fuel cell vehicles, industrial processes, and energy storage. This can help to reduce reliance on fossil fuels and mitigate climate change by decreasing carbon emissions across multiple sectors of the economy.

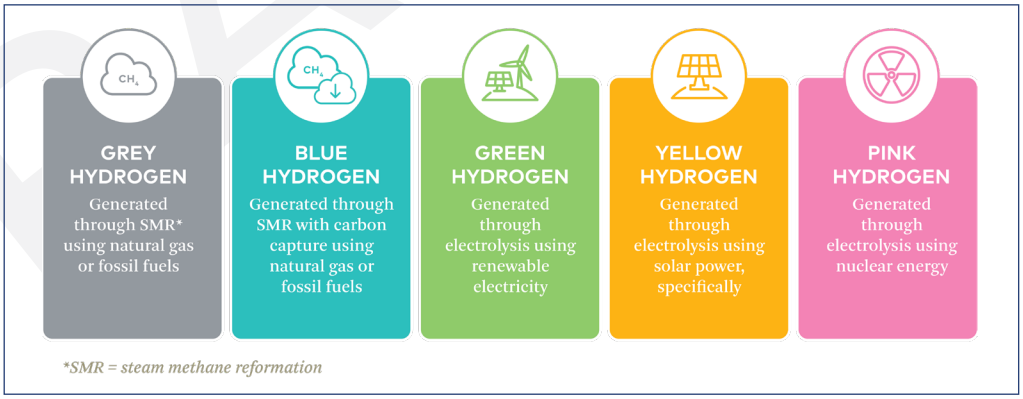


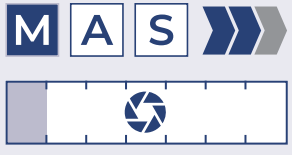
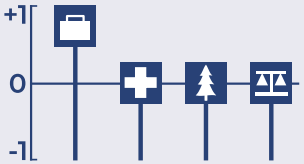
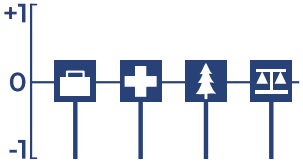
FIGURE 28: Green, yellow, and pink hydrogen are climate-friendly options produced from renewable resources like wind, solar, and nuclear power. Grey and blue hydrogen are less climate-friendly options as they are produced using fossil fuels.

Key

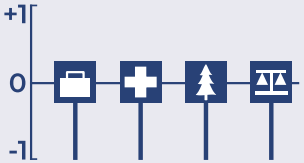
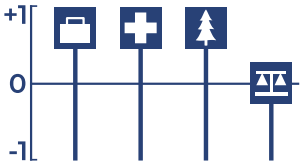
Low (0-399,999 MTCO$_2$e) | Medium (400,000-1,799,999 MTCO$_2$e) | High (1,800,000-8,000,000 MTCO$_2$e)

$$$	$$	$	$$	$$$
significant savings (>$100/MT)	savings ($10-100/MT)	cost neutral (-$10 to $10/MT)	cost ($10-100/MT)	significant cost (>$100/MT)

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.3.1 Purchase renewable natural gas (RNG) directly from Northwest Natural if available. Senate Bill 98 (SB 98) passed the Oregon legislature in 2019. SB 98 allows for RNG to be distributed system-wide. As of spring 2023, 2-3% of Northwest Natural's natural gas supply comes from RNG sources and SB 98 allows Northwest Natural to increase their purchase of RNG sources by 5% every 5 years. Northwest Natural filed with the Public Utility Commission, and is awaiting a docket date for a RNG tariff that would allow customers to opt-in to purchase additional RNG to cover all or a portion of their usage.	**STAKEHOLDER** • Northwest Natural **PROGRAM** • Northwest Natural is developing a program				
4.3.2 Advocate for state and federal level financial and political support to increase the number of on-site hydrogen electrolyzers or thermal mass-based resistance boiler retrofits at sites that have large, industrial heat loads. Electrolysis of hydrogen is a promising option for carbon-free hydrogen production from renewable and nuclear resources. Electrolysis is the process of using electricity to split water into hydrogen and oxygen.	**STAKEHOLDER** • City of Tualatin City Manager's Office, Economic Development				

Key

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.3.3 Advocate for increased production of renewable natural gas (RNG). Existing supplies of RNG are limited. Advocating for increased supply of RNG will help Tualatin offset its emissions from natural gas use.	STAKEHOLDERS • City of Tualatin City Manager's Office • Northwest Natural				
4.3.4 Advocate for policies to ensure that production, transportation, storage, and use of clean hydrogen is done safely. Clean hydrogen has the potential to reduce emissions in hard-to-decarbonize sectors, increase the reliability of renewable energy, foster innovation, create jobs, and contribute to a sustainable and resilient energy future.	STAKEHOLDERS • City of Tualatin City Manager's Office • Northwest Natural				

Key

Strategy 4.4 Electrification of space and water heating for new buildings

The electrification of space and water heating for new buildings strategy is estimated to be relatively low, avoiding 76,700 MT CO_2e. This is in part because much of Tualatin is already built out, with minimal space available for new development in 2023. However, this strategy would likely result in cost savings of $50/MT CO_2e reduced since it is cheaper to electrify space and water heating from the outset than to retrofit existing systems.

STRATEGY	GHG BENEFIT (MT CO_2e AVOIDED)	COST PER MT CO_2e REDUCED
4.4	LOW MED HIGH	$$ savings ($10-100/MT)

Electrification refers to the process of replacing non-electric power sources with electricity as the primary source of energy. It involves transitioning from traditional fuel-based systems, such as coal, oil, and gas, to electric power for various applications, including transportation, heating, and industrial processes. By embracing electrification, societies can reduce greenhouse gas emissions, improve energy efficiency, and foster sustainable development.

For new builds, electric appliances are a significant cost saver compared to natural gas heating and separate air conditioning. Electric heat pumps are all-in-one, energy efficient climate control units that are capable of both heating and cooling buildings and can be powered from renewable electricity. As our peak energy demand slowly shifts from a winter and heat demanding load to a summer and cooling demanding load, heat pumps manage the transition without needing to be replaced.

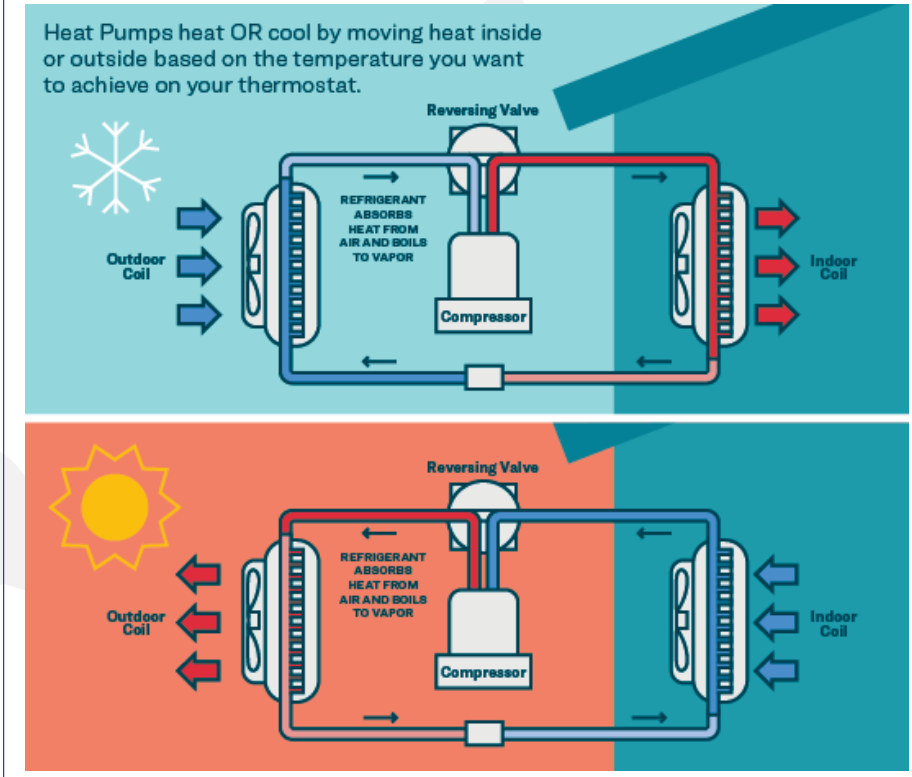


FIGURE 29: Heat pumps are an energy efficient way to heat or cool buildings. Image from the Sierra Club.

Key

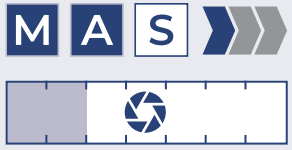
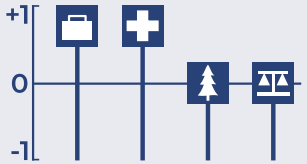
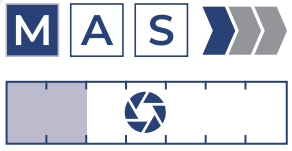
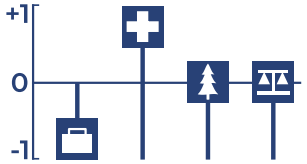
Low (0-399,999 $MTCO_2e$)

Medium (400,000-1,799,999 $MTCO_2e$)

High (1,800,000-8,000,000 $MTCO_2e$)

$$$	$$	$	$$	$$$
significant savings (>$100/MT)	savings ($10-100/MT)	cost neutral (-$10 to $10/MT)	cost ($10-100/MT)	significant cost (>$100/MT)

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.4.1 Require electric water heaters and electric heat pumps in new buildings. Electric water heaters and heat pumps are more efficient than gas-powered water heaters and furnaces and can be powered by renewable energy sources instead of fossil fuels.	**STAKEHOLDERS** • City of Tualatin Community Development Department • Energy Trust of Oregon (ETO) • Oregon Department of Energy (ODOE) **PROGRAMS** • ETO residential and commercial water heater incentives • ODOE Rental Home Heat Pump program		 • Neighborhoods • Environmental		
4.4.2 Ban natural gas hookups in new single family and commercial buildings. This action only impacts new buildings. Potential benefits of this action include reducing carbon emissions, increasing the energy efficiency of buildings, promoting clean energy sources, and reducing the indoor air quality hazards associated with natural gas stoves. Potential drawbacks of this action include concerns about electrical grid capacity, short-term energy affordability, and reducing energy choice.	**STAKEHOLDERS** • City of Tualatin Community Development Department • Northwest Natural		 • Neighborhoods • Environmental		

Key

Strategy 4.5 Electrification of space and water heating for existing buildings

The electrification of space and water heating for existing buildings strategy is estimated to result in a medium emissions reduction benefit at 708,350 MT CO_2e. This strategy is estimated to cost up to $50/MT CO_2e, due to the fact that it is typically more expensive to retrofit existing systems than it is to electrify from the outset.

STRATEGY	GHG BENEFIT (MT CO_2e AVOIDED)	COST PER MT CO_2e REDUCED
4.5	LOW MED HIGH	$$ cost ($10-100/MT)

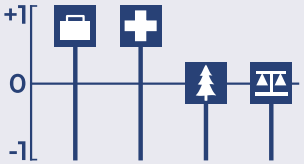
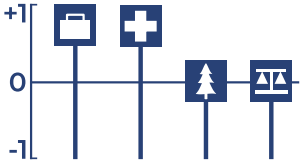
Electrification for existing buildings may be cost prohibitive in the short term. However, substantial savings are expected in the longer-term as equipment prices decrease, natural gas supply costs increase, and additional financial incentives become available through the Oregon Department of Energy (the Community Heat Pump Deployment Program and the Oregon Rental Home Heat Pump Program) and the IRS (the Energy Efficient Home Improvement Credit and the Residential Clean Energy Property Credit). This is especially likely given the additional need for air conditioning due to hotter summers in the future.

Key

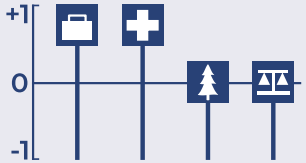
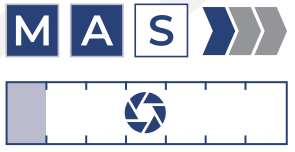
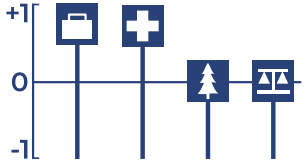
Low (0-399,999 MTCO$_2$e) | Medium (400,000-1,799,999 MTCO$_2$e) | High (1,800,000-8,000,000 MTCO$_2$e)

$$$	$$	$	$$	$$$
significant savings (>$100/MT)	savings ($10-100/MT)	cost neutral (-$10 to $10/MT)	cost ($10-100/MT)	significant cost (>$100/MT)

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.5.1 Replace existing gas furnaces with heat pumps to heat and cool homes and buildings. Financial incentives may be available through the Oregon Department of Energy's Community Heat Pump Deployment Program and Oregon Rental Home Heat Pump Program, and through the IRS's Energy Efficient Home Improvement Credit and Residential Clean Energy Property Credit.	**STAKEHOLDERS** • Northwest Natural • Oregon Department of Energy (ODOE) **PROGRAMS** • ODOE Community Heat Pump Deployment Program • ODOE Rental Home Heat Pump program		 • Environmental		
4.5.2 Replace existing gas water heaters with electric water heaters. Water heating accounts for 20% of the average home's energy use. An energy efficient water heater can save hundreds of dollars per year in energy costs.	**STAKEHOLDERS** • Northwest Natural • Oregon Department of Energy (ODOE) • Energy Trust of Oregon (ETO) **PROGRAMS** • ODOE Community Heat Pump Deployment Program • IRS Energy Efficient Home Improvement Credit • IRS Residential Clean Energy Property Credit		 • Environmental		

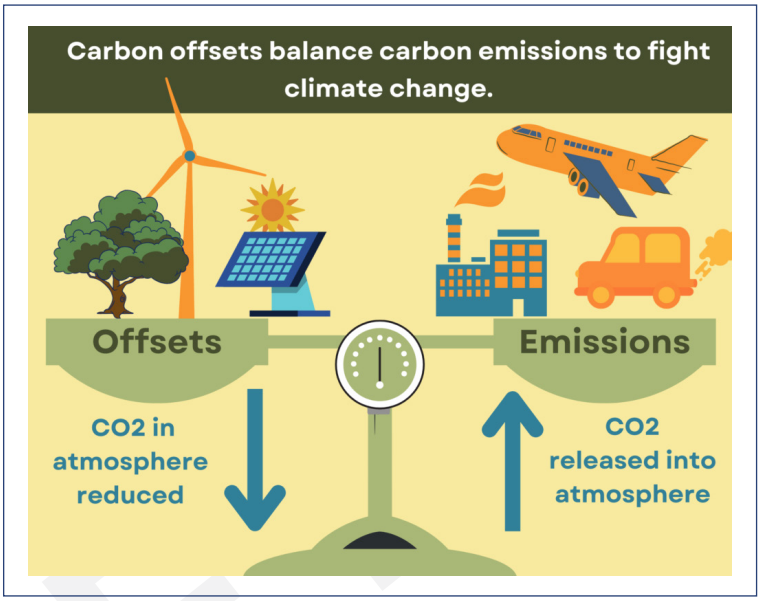
Key

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.5.3 Require replacing gas furnaces with heat pumps when they fail. Heat pumps provide both heating and cooling capabilities, are highly energy-efficient, and are more environmentally-friendly option compared to fossil fuel-based furnaces.	**STAKEHOLDERS** • City of Tualatin Community Development Department • Northwest Natural • Energy Trust of Oregon (ETO) • Oregon Department of Energy (ODOE) **PROGRAMS** • ETO Heating Solutions Incentives • ODOE Rental Home Heat Pump program				
4.5.4 Require replacing gas water heaters with electric water heaters when they fail. Heat pump water heaters are highly energy-efficient, can deliver significant energy savings, offer both heating and cooling capabilities, and result in less carbon emissions compared to gas water heaters as the electricity grid continues to decarbonize.	**STAKEHOLDERS** • City of Tualatin Community Development Department • Northwest Natural • Energy Trust of Oregon (ETO) **PROGRAM** • ETO Water Heater Incentives				

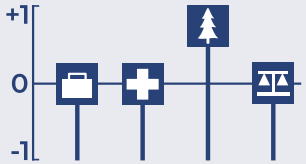
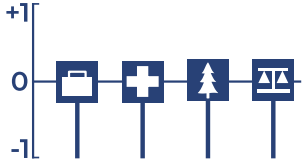
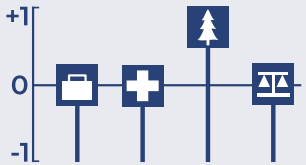
Key

Strategy 4.6 Voluntary purchase of verified carbon offsets

Not all activities have an available decarbonization option at the pace required to reach science-based emissions reduction targets. Some activities face technological limitations, and others may be cost-prohibitive. For those activities that cannot be decarbonized or entirely avoided in the near term (like air travel), the purchase of carbon offsets can help to reach decarbonization goals. With sound vetting, carbon offsets can be an important tool to decrease global carbon emissions while providing useful co-benefits such as job programs, poverty alleviation, and habitat conservation.



Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
4.6.1 Enroll in Northwest Natural's Smart Energy program to offset emissions from natural gas use in homes and commercial and industrial buildings that use natural gas. Carbon offsets are financial instruments that represent the reduction, avoidance, or removal of greenhouse gas emissions from one source to compensate for emissions occurring elsewhere.	STAKEHOLDERS • Northwest Natural PROGRAM • Northwest Natural's Smart Energy program		 • Environmental		
4.6.2 Educate the community about high-quality, reliable carbon offsets. It is important to identify and promote high-quality and reliable offset options because carbon offsets can be difficult to accurately measure and verify, run the risk of being double-counted, and may have negative social and environmental impacts.	STAKEHOLDERS • City Communications Team		 • Connected, Informed, Engaged • Environmental		
4.6.3 Purchase verified carbon offsets for unavoidable emissions, such as air travel and industrial processes. Carbon offsets can help to balance out unavoidable emissions by removing carbon dioxide from the atmosphere.			 • Environmental		

Key

FOCUS AREA 5: URBAN FORM AND LAND USE

Background

Urban form refers to the physical structure of a city, including its layout, building density, transportation networks, and public spaces. Land use refers to the way in which a piece of land is used, including residential, commercial, industrial, and agricultural uses. Together, urban form and land use shape the built environment of a city and influence its social, economic, and environmental outcomes. The relationship between urban form and land use determines the accessibility, livability, and sustainability of a city, and is a key consideration in urban planning and design.

Changes to Tualatin's development code that affect urban form and land use can help to create a more climate-friendly Tualatin by increasing density, making alternative transportation modes more accessible, and allowing mixed-use development so that residents can access goods and services closer to home.

Strategies & actions

Tualatin has identified the following strategies and actions focused on decreasing carbon emissions by addressing urban form and land use in Tualatin.

Strategy 5.1 // Dense future development resulting in reduced future vehicle miles traveled

The dense future development resulting in reduced vehicle miles traveled strategy is estimated to result in a relatively low emissions reduction benefit at 33,100 MT CO_2e. Cost savings of $500/MT CO_2e reduced are associated with this strategy because fewer vehicle miles traveled should result in savings on gasoline and car maintenance.

STRATEGY	GHG BENEFIT (MT CO_2e AVOIDED)	COST PER MT CO_2e REDUCED
5.1	LOW MED HIGH	$$ savings ($10-100/MT)

Increased population density can reduce vehicle miles traveled (VMT) by fostering shorter commute distances. In denser areas, people often live closer to work, schools, and amenities, reducing the need for long car journeys. Additionally, improved public transportation and infrastructure for walking and biking in densely populated regions encourage alternative modes of travel, further diminishing VMT. This synergy of proximity and accessible transportation options can lead to a more sustainable and less car-dependent urban environment.

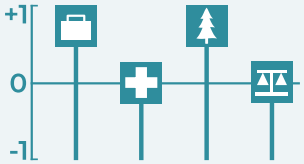
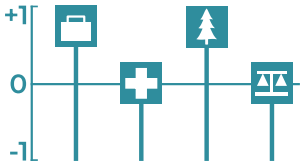
In addition to the climate benefits associated with reducing vehicle miles traveled, there are several benefits of increased density in cities. These benefits include efficient use of land and resources, smaller environmental impacts in terms of lower carbon emissions, less air pollution, and less damage to ecosystems, better public health outcomes as community members rely more heavily on active transportation instead of cars, and greater social cohesion, resiliency, and mental health outcomes.

Key

Low (0-399,999 $MTCO_2e$) | Medium (400,000-1,799,999 $MTCO_2e$) | High (1,800,000-8,000,000 $MTCO_2e$)

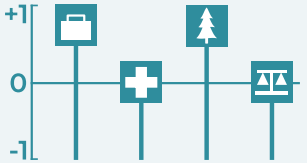
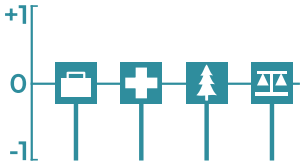
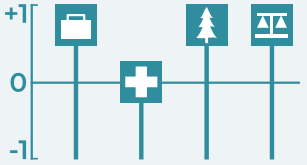
$$$	$$	$	$$	$$$
significant savings (>$100/MT)	savings ($10-100/MT)	cost neutral (-$10 to $10/MT)	cost ($10-100/MT)	significant cost (>$100/MT)

Actions

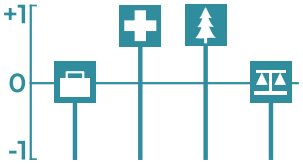
ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
5.1.1 Reduce barriers to compact urban development in the downtown/ town center(s), transit corridors. This could include identifying and reducing regulatory barriers, flexible uses within industrial and commercial zones, reducing financial obstacles, restructuring System Development Charges (SDCs) for smaller additional incentives, offering flexible land use codes, and ensuring the transportation system can support planned densities.	STAKEHOLDERS • City of Tualatin Community Development and Public Works Departments		 • Economy • Gathering Places • Transportation • Neighborhoods • Environmental		
IN PROGRESS **5.1.2 Expand housing variety and choice by incentivizing and/or prioritizing the building of smaller, clustered, and attached housing, accessory dwelling units (ADUs), and other multifamily housing.** Actions includes strategies like providing flexibility in land use, removing land use code and permitting process barriers, supporting affordable housing developments, and offering new incentives like eliminating or reducing SDCs and attached housing loans. Increased housing variety may help reduce the number of residents who commute from out of town (currently 93%) to work in Tualatin.	STAKEHOLDERS • City of Tualatin Community Development, Public Works, Finance, and Parks Departments		 • Economy • Gathering Places • Transportation • Neighborhoods • Environmental		

Key

- M MITIGATION ACTIONS
- A ADAPTATION ACTIONS
- S SEQUESTRATION ACTIONS
- IMPLEMENT
- CONVENE
- SUPPORT/ADVOCATE
- QUICK START
- 0-5 YRS
- 6-10 YRS
- 10+ YRS
- YES, POLICY DECISION
- ALIGNMENT WITH COUNCIL VISION (0-7)
- JOBS
- HEALTH & SAFETY
- ECOSYSTEM & WILDLIFE HEALTH
- OPPORTUNITY FOR EQUITY
- COMMUNITY ACCEPTANCE

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
5.1.3 Build walkable neighborhoods where residents can meet most of their daily needs without the use of a car. This includes identifying opportunity areas to apply flexible zoning practices to enable nonconforming land uses, improving transportation infrastructure to promote active transit, pursuing transit-orientated development, increasing access to parks and open space, and providing incentives for mixed-use development.	STAKEHOLDERS • City of Tualatin Community Development and Parks Departments		 • Economy • Gathering Places • Transportation • Neighborhoods • Environmental		
5.1.4 Identify opportunities for increased density. Identify areas in town that would support higher density, including community support and political will to densify, barriers to densification, and geographic opportunities that could support density.	STAKEHOLDER • City of Tualatin Community Development Department		 • Inclusive Community • Neighborhoods • Environmental		
5.1.5 Increase dense development in areas identified in action 5.1.4. To accomplish this, reduce barriers and provide incentives to encourage more high density development near downtown, transit, and other areas identified in 5.1.4. This could include removing or reducing parking minimums, reviewing current parking use, acquiring property for development, and financial incentives. This action should also align with and support housing types and densities identified in the Housing Needs Analysis.	STAKEHOLDER • City of Tualatin Community Development Department		 • Inclusive Community • Neighborhoods • Environmental		

Key

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
5.1.6 Develop a decision matrix to consider alternatives to roadway widening to ease traffic congestion. Road widening is not always the best solution to reducing traffic congestion. Reducing traffic congestion will require a multi-pronged approach including things like investing in bicycle and pedestrian infrastructure and public transit or supporting more complimentary land use types that result in shorter travel distances. These alternatives and their likely outcomes and climate impact should be evaluated.	**STAKEHOLDERS** • City of Tualatin Community Development and Public Works Departments **PLANNING/POLICY DOCUMENT** • Transportation System Plan		 • Transportation • Environmental		
5.1.7 Reduce traffic speeds in neighborhoods, the downtown and Bridgeport areas, and in other high bike/pedestrian traffic areas to increase safety. Reduced vehicle speeds decrease the likelihood of a pedestrians severe injury or death. Lower speeds also make streets more welcoming to non-car users, helping increase alternative modes of transportation by being designed to be and feel safe. Measures such as restriping streets, reducing speed limits, improved street design and streetscaping, road diets, and other traffic calming measures are ways to accomplish this. Programs such as Vision Zero are excellent tools to help advance this action.	**STAKEHOLDERS** • City of Tualatin Community Development and Public Works Departments		 • Transportation • Environmental		

Key

Strategy 5.2 Urban/community forestry & carbon sequestration

The urban/community forestry & carbon sequestration strategy is estimated to have a relatively low emissions reduction benefit at 171,700 MT CO_2. However, there are additional adaptation benefits from shade and cooling that are not captured in this number. This strategy is estimated to cost $15-100/MT CO_2e reduced since it can be costly to plant and maintain trees.

STRATEGY	GHG BENEFIT (MT CO_2e AVOIDED)	COST PER MT CO_2e REDUCED
5.2	LOW MED HIGH	$$ cost ($10-100/MT)

Given that Tualatin is a relatively small municipality, the opportunity for large-scale carbon sequestration is low. While trees and plants do help to sequester carbon, maintaining existing trees, and planting new ones, provides an abundance of community benefits by removing climate pollution from the atmosphere and providing shade to provide natural cooling and reduce energy needs. The City of Tualatin manages trees in the planter strip and maintains list of approved street tree species for different width strips and proximity to powerlines.

Key

Low (0-399,999 $MTCO_2e$)

Medium (400,000-1,799,999 $MTCO_2e$)

High (1,800,000-8,000,000 $MTCO_2e$)

$$$	$$	$	$$	$$$
significant savings (>$100/MT)	savings ($10-100/MT)	cost neutral (-$10 to $10/MT)	cost ($10-100/MT)	significant cost (>$100/MT)

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
5.2.1 Increase canopy cover in response to tree canopy study from action 1.1.3 to equitably increase shade in Tualatin. While there is limited opportunity for carbon sequestration in Tualatin, trees do pull carbon dioxide out of the air and provide shade, an important adaptation benefit.	STAKEHOLDERS • City of Tualatin Parks and Public Works Departments		 • Gathering Places • Transportation • Environmental		
5.2.2 Update street tree list with climate adapted and/or drought resistant tree options. Consider including large shrubs to increase biodiversity and reduce impacts on infrastructure. The street tree list was last updated in 2019. Revisiting the list every 5 years can help the City be responsive to changing climate conditions.	STAKEHOLDERS • City of Tualatin Parks and Public Works Departments PROGRAM • Sidewalk/Street Tree program		 • Environmental		
IN PROGRESS **5.2.3 Continue to partner with Friends of Trees to plant trees in Tualatin.** The City of Tualatin has partnered with Friends of Trees for 25 years and currently offers three tree planting events per year. These events focus on stream shading. The City could explore options to partner with Friends of Trees to plant street trees and/or trees in stormwater treatment facilities.	STAKEHOLDERS • City of Tualatin Volunteer Services staff and Parks Department • Friends of Trees PROGRAMS • Friends of Trees volunteer program • City of Tualatin Volunteer Services		 • Connected, Informed, Engaged • Gathering Places • Environmental		

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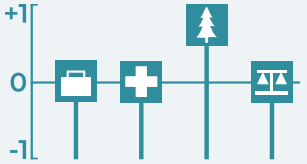
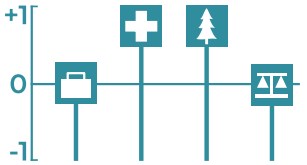
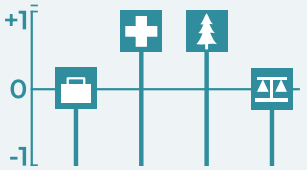
- ECOSYSTEM & WILDLIFE HEALTH
- OPPORTUNITY FOR EQUITY
- COMMUNITY ACCEPTANCE
- ALIGNMENT WITH COUNCIL VISION (0-7)

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
5.2.4 Strengthen tree removal regulations (TDC Ch. 33) to encourage tree preservation during redevelopment and landscaping on private property. This action supports Strategy 1.1.	STAKEHOLDER • City of Tualatin Community Development Department POLICY DOCUMENTS • City of Tualatin Development Code		 • Neighborhoods • Environmental		
5.2.5 Actively enforce the City's tree codes. Private trees are subject to TDC Ch. 33 and street trees are subject to TDC Ch. 74. The City could educate and communicate about tree code requirements and/or "fix it tickets" to encourage retaining and replanting tress. A "fix it ticket" refers to a correctable violation of the code where the fee would be waived once the citation is fixed. This action supports Strategy 2.1.	STAKEHOLDER • City of Tualatin Police, Community Development, and Parks Departments POLICY DOCUMENTS • City of Tualatin Development Code		 • Neighborhoods • Environmental		
5.2.6 Update code to increase the planter width to a minimum of 5 feet wide for street trees. Wider planter strips can help prevent damage to underground infrastructure, resulting in less tree removal.	STAKEHOLDERS • City of Tualatin Community Development, Public Works, and Parks Departments PLANNING/POLICY DOCUMENTS • City of Tualatin Development Code • Transportation System Plan		 • Transportation • Neighborhoods • Environmental		

Key

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
5.2.7 Encourage tree preservation during development. Evaluate establishment and enforcement of replanting requirements. Provide guidance to ensure that the right trees are planted in the right places.	**STAKEHOLDER** • City of Tualatin Community Development Department **POLICY DOCUMENTS** • City of Tualatin Development Code		 • Transportation • Neighborhoods • Environmental		

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FOCUS AREA 6: TRANSPORTATION – MODES & FUEL SWITCHING

Background

Transportation energy, particularly on-road vehicle transportation of passengers and freight, also represents a large portion of community carbon emissions (84,128 MT CO_2e, or 12%). Transportation emissions are generated at the tailpipe by combustion of gasoline, diesel, other liquid and gas fuels, or from non-renewable electricity generation for electric vehicles.

The majority of Tualatin's transportation emissions come from passenger cars. Air travel, freight, and commercial vehicles also contribute significantly to Tualatin's transportation-related emissions (Figure 30).

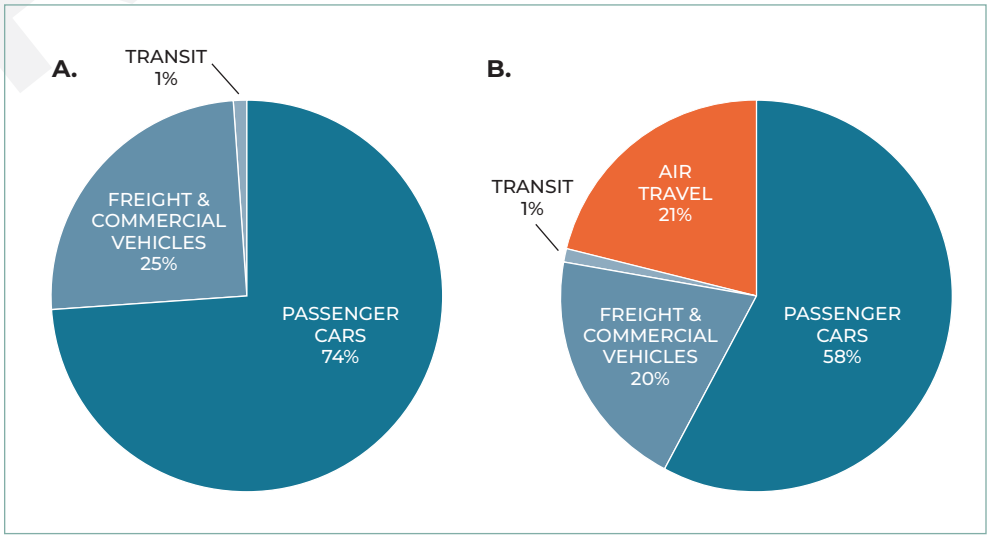


FIGURE 30: Tualatin's transportation emissions breakdown: A: excluding air travel, B: including air travel.

Strategies & actions

Tualatin has identified the following strategies and actions to reduce carbon emissions from the transportation sector. Together, these strategies can help Tualatin reduce its carbon footprint by nearly 120,000 MT CO_2e in a single year, or 20% of the emissions reductions needed to meet the goal of net zero in 2050. Between now and 2050, this is expected to add up to 1.7 million MT CO_2e.

Strategy 6.1 // Fuel switching - Electric vehicles (EVs), renewable diesel, biodiesel, ethanol, and other low-emissions fuels

The fuel switching strategy is estimated to result in a medium emissions reduction benefit at 2,184,685 MT CO_2e. This strategy is likely to result in cost savings or be cost-neutral over time because, while there are upfront costs to purchase EVs and install charging infrastructure, savings in fuel and maintenance costs even out over time. Additionally, renewable diesel costs roughly the same as fossil fuel-based diesel due to rules under Oregon's Clean Fuel Program.

STRATEGY	GHG BENEFIT (MT CO_2e AVOIDED)	COST PER MT CO_2e REDUCED
6.1	 LOW MED HIGH	$$ savings ($10-100/MT)

Increasing adoption of electric vehicles or another low-greenhouse gas fossil gasoline substitute could help reduce Tualatin's carbon emissions by about 1.6 million MT CO_2e by 2050, about 12% of the emissions reductions needed to meet Tualatin's goal of net zero by 2050.

As of late 2022, the Oregon Department of Environmental Quality's Advanced Clean Cars II rulemaking prohibits the sale of new gasoline powered passenger vehicles after 2035 and requires 10% sales of EV's each year stepped from 2025-2035. This, along with recent federal legislation and pledges by car manufacturers, is predicted to lower prices and increase supply of electric vehicles across the spectrum of automotive consumers. Prices for electric vehicles vary across models, but in general, new EVs can be bought at roughly similar price to new conventional cars.

EVs shift the ongoing cost burden from gasoline to electricity. A recent study analyzed the cost burden for EVs versus gasoline cars for each US census tract. The study found that on average, EV owners in Oregon would pay significantly less for their EV fueling than for a conventional car's gasoline. The study noted a decrease of between 50% and 85% in fueling costs for EV owners in Oregon.

EVs have drawbacks such as limited driving range on a single charge, longer recharging times compared to traditional vehicles, and variable charging infrastructure availability. Environmental concerns include the environmental impacts of battery production, including habitat disruption and resource depletion, as well as challenges related to battery disposal and recycling. Additionally, EVs' environmental benefits can be reduced if they rely on electricity from fossil fuels instead of renewable energy sources.

Key

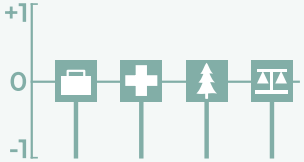
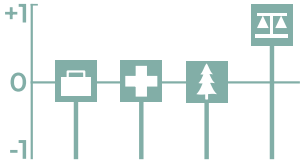
Low (0-399,999 MTCO$_2$e)

Medium (400,000-1,799,999 MTCO$_2$e)

High (1,800,000-8,000,000 MTCO$_2$e)

$$$	$$	$	$$	$$$
significant savings (>$100/MT)	savings ($10-100/MT)	cost neutral (-$10 to $10/MT)	cost ($10-100/MT)	significant cost (>$100/MT)

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
6.1.1 Establish parking and charging infrastructure requirements for electric vehicles (EVs) at new developments. Oregon Senate Bill 1044 sets zero emission vehicle (ZEV) targets for the state of Oregon. Under SB 1044, at least 90% of new vehicles sold annually will be EVs by 2035. Establishing EV parking and infrastructure requirements for new developments will make EV charging more available now while paving the way for the near future when EVs become more common.	STAKEHOLDERS • City of Tualatin Community Development Department • Oregon Department of Land Conservation and Development PROGRAMS • City municipal code update POLICY DOCUMENTS • City of Tualatin Municipal Code • Climate Friendly and Equitable Communities rulemaking • DLCD - Climate Friendly and Equitable Communities rulemaking		 • Transportation • Neighborhoods • Environmental		
6.1.2 Promote programs to help fund installation of EV chargers at new and existing affordable housing and multifamily complexes. Prioritize multifamily housing and workplaces.	STAKEHOLDERS • City of Tualatin Finance Department and City Manager's Office • Portland General Electric (PGE) PROGRAMS • PGE Transportation Matching Fund Program • PGE Drive Change Fund		 • Inclusive Community • Transportation • Neighborhoods • Environmental		

Key

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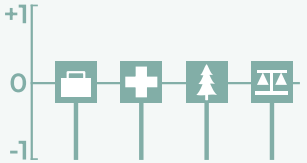
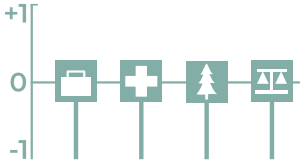
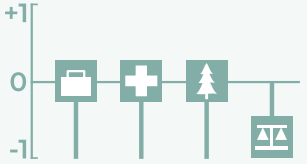
JOBS
HEALTH & SAFETY
ECOSYSTEM & WILDLIFE HEALTH
OPPORTUNITY FOR EQUITY
COMMUNITY ACCEPTANCE

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
6.1.3 Develop policies and priorities around installation of publicly accessible charging stations in the right-of-way, including electric vehicle charging. Perform a study to determine needs and preferred locations for charging infrastructure.	STAKEHOLDERS • City of Tualatin Public Works and Community Development Departments, and the City Manager's Office PLANNING DOCUMENTS • Transportation System Plan (TSP)		M A S • Transportation • Neighborhoods • Environmental		
6.1.4 Increase the number of events promoting electric vehicles. For example, 'EV Rodeos' can help increase community members' familiarity and comfortability with EVs.	STAKEHOLDER • Portland General Electric (PGE) • Forth Mobility		M A S • Connected, Informed, Engaged • Transportation • Environmental		
6.1.5 Set targets for community electric vehicle (EV) adoption to encourage community usage of electric vehicles. In 2019, Oregon Senate Bill 1044 outlined new Zero Emission Vehicle (ZEV) adoption targets through 2035. Tualatin will set targets to support the wider statewide EV adoption goals and periodically report on progress.			M A S • Connected, Informed, Engaged • Transportation • Environmental		

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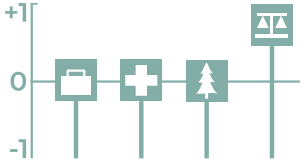
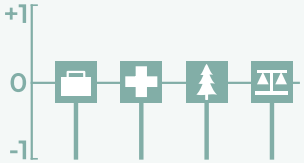
ECOSYSTEM & WILDLIFE HEALTH
OPPORTUNITY FOR EQUITY
COMMUNITY ACCEPTANCE

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
6.1.6 Conduct an electric car share pilot program at low income or high equity needs residential areas in Tualatin. EV car share pilot programs can help increase community members' familiarity and comfortability with EVs while providing a low-cost, low emissions way for community members to get around town.			 • Inclusive Community • Transportation • Environmental		
6.1.7 Advocate to ODOT, Metro, and/ or other regional partners to bring *corridor* chargers to Tualatin. EV corridor charging involves installing charging stations along highways to create a network for long-distance travel, reducing range anxiety and providing convenient charging infrastructure for EVs on major routes. It aims to facilitate intercity and interstate travel by allowing EV drivers to charge their vehicles at regular intervals during long trips.	STAKEHOLDERS • City of Tualatin Community Development and Economic Development Departments • Oregon Department of Transportation (ODOT) PROGRAM • ODOT's state National Electric Vehicle Infrastructure (NEVI) plan		 • Transportation • Environmental		

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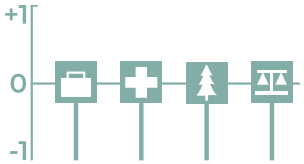
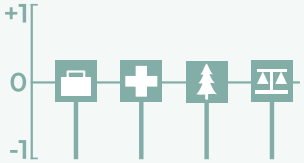
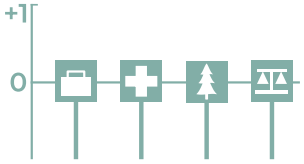
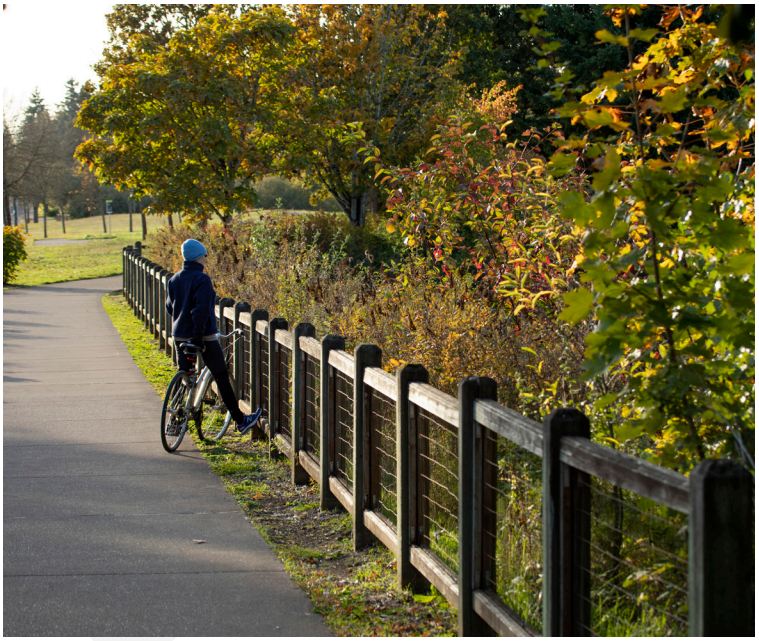
ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
6.1.8 Install publicly-accessible community EV chargers in Tualatin. Community charging focuses on installing charging infrastructure in local areas like residential neighborhoods and commercial districts, typically in parking lots, shopping centers, or other public spaces, to provide convenient charging options for EV owners who primarily use their vehicles for daily commuting or short-distance travel within the community. As of June 2023, the City of Tualatin is partnering with Forth Mobility to pursue a Charging and Fueling Infrastructure (CFI) grant.	STAKEHOLDERS • City of Tualatin Community Development and Economic Development Departments • US Department of Transportation (US DOT) • Oregon Department of Transportation (ODOT) • Forth Mobility PROGRAM • US DOT's Charging and Fueling Infrastructure (CFI) grant program				
6.1.9 Provide community education around the benefits of R99 diesel. Identify and prioritize reaching out to employers with large vehicle fleets in Tualatin.					
6.1.10 Require gas stations within City limits to transition to R99 diesel. See Chapter 16.60 of the City of Portland's code for a local example of a similar policy.	STAKEHOLDERS • Gas stations located in Tualatin				

Key

Strategy 6.2 // Active transportation to reduce car miles and fossil fuel (gasoline) use

Active transportation, including walking, biking, and rolling, can help to reduce carbon emissions by reducing the number of cars on the road. Research suggests that use of active transportation modes is dependent on individual factors like demographics and medical conditions, social factors like coworker or spouse beliefs and behaviors or community support for bicyclists and pedestrians, and physical factors like bicycle lanes or the speed and volume of traffic along a route. Offering safe and enjoyable routes for pedestrians and cyclists can help to make active transportation options more appealing. Fewer cars on the road also improves air quality and can result in positive health outcomes due to increased physical activity, safety, social connections, and more time spent outside.



MICROMOBILITY IN TUALATIN

Micromobility refers to transportation using lightweight vehicles such as bicycles or scooters, and electric micromobility refers to things like electric bicycles (e-bikes) or scooters (e-scooters). Typically, micromobility options can be borrowed as part of a self-service rental program in which people rent vehicles for short-term use within a town or city.

Tualatin's e-scooter pilot program kicked off in August 2022 and became permanent a year later. As of September 2023, over 3,000 community members have used the scooters to make over 14,900 trips totaling over 17,000 miles and saving over 14,900 pounds of carbon dioxide. That's equivalent to taking 3,315 gasoline-powered cars off the road for one year!

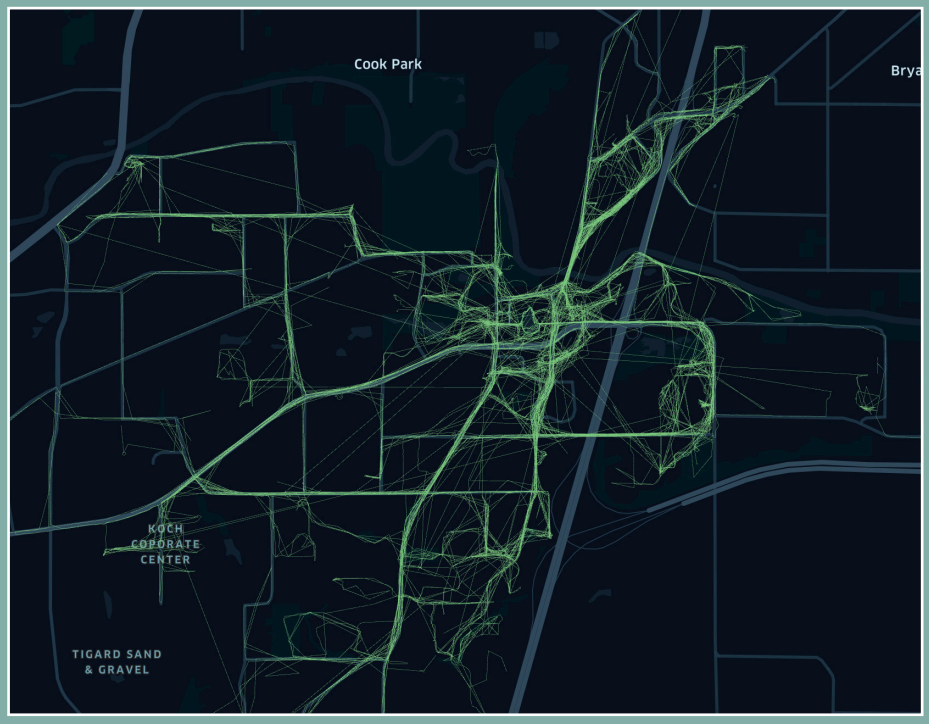
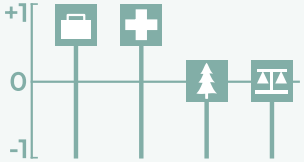
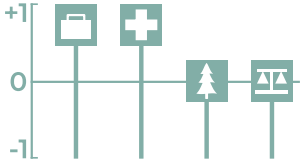


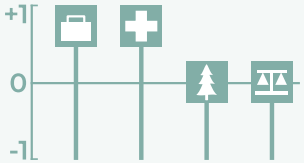
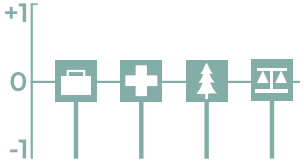
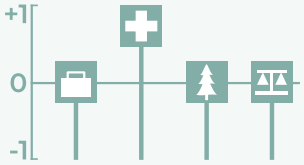
FIGURE 31: Heat map showing Lime scooter rides in Tualatin.

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
6.2.1 Update the Transportation System Plan (TSP) to increase the use of active transportation options, including any human-powered transportation such as walking, cycling, or using non-motorized modes of transportation. Embed active transportation modes throughout the entire plan and focus on making walking or rolling an easy and accessible option to move throughout the City. IN PROGRESS	STAKEHOLDERS • City of Tualatin Community Development Department POLICY DOCUMENT • Transportation System Plan		 • Economy • Transportation • Neighborhoods • Environmental		
6.2.2 Update the Transportation System Plan (TSP) to increase the use of electric micromobility options such as e-bikes, e-scooters, and electric skateboards. Embed electric micromobility modes throughout the plan and focus on making these options a viable option to move throughout the City. Electric micromobility modes offer many of the same benefits as active transportation but are worthy of independent consideration given charging needs, potential safety concerns and conflicts with non-motorized active transit users. IN PROGRESS	STAKEHOLDER • City of Tualatin Community Development Department POLICY DOCUMENT • Transportation System Plan		 • Economy • Transportation • Neighborhoods • Environmental		

Key

- M MITIGATION ACTIONS
- A ADAPTATION ACTIONS
- S SEQUESTRATION ACTIONS
- IMPLEMENT
- CONVENE
- SUPPORT/ADVOCATE
- QUICK START
- 0-5 YRS
- 6-10 YRS
- 10+ YRS
- YES, POLICY DECISION
- ALIGNMENT WITH COUNCIL VISION (0-7)
- JOBS
- HEALTH & SAFETY
- ECOSYSTEM & WILDLIFE HEALTH
- OPPORTUNITY FOR EQUITY
- COMMUNITY ACCEPTANCE

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
6.2.3 Prioritize building and completing transportation projects that enhance bicycle, pedestrian, and transit access in Tualatin included in the updated Transportation System Plan.	STAKEHOLDERS • City of Tualatin Community Development and Public Works Departments POLICY DOCUMENT • Transportation System Plan		 • Economy • Transportation • Neighborhoods • Environmental		
6.2.4 Promote transportation options programs like Get There Oregon to help commuters and employers shift commute habits and work practices. Get There Connect allows users to compare commute options, find a carpool, participate in challenges, and track statistics like reduced carbon emissions, money saved, and more.	STAKEHOLDER • Oregon Department of Transportation (ODOT) PROGRAM • Get There Oregon		 • Transportation • Environmental		
6.2.5 Provide education and support programs to encourage the use of active transportation.	STAKEHOLDERS • Oregon Department of Transportation (ODOT) • Tigard Tualatin School District (TTSD) PROGRAMS • ODOT's Get There Oregon program • TTSD's Safe Routes to School program • Safe Routes to Parks		 • Connected, Informed, Engaged • Transportation • Environmental		

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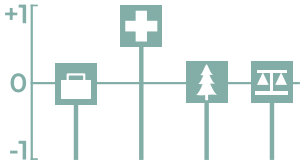
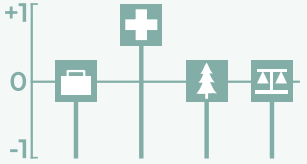
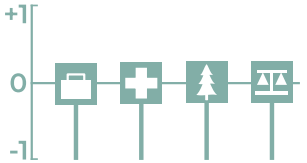
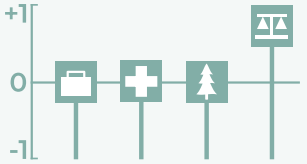
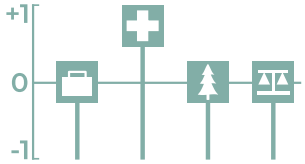
JOBS
HEALTH & SAFETY
ECOSYSTEM & WILDLIFE HEALTH
OPPORTUNITY FOR EQUITY
COMMUNITY ACCEPTANCE

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
6.2.6 Develop a Complete Street Policy. This policy informs future public improvements on streets and shared paths. Complete Streets are an approach to planning, designing, building, operating, and maintaining streets that are designed to be safe and feel safe for everyone. They are designed for speeds that reduce the chance of death or serious injury and give priority to the needs of those who are most vulnerable, including pedestrians, bicyclists, and transit riders, making it easier and safer for people to move along and across the street. This policy can guide future Transportation System Plan (TSP) updates and future transportation projects.	STAKEHOLDERS • **City of Tualatin Community Development and Public Works Departments** POLICY DOCUMENT • **Transportation System Plan (TSP)**		 • Economy • Gathering Places • Transportation • Neighborhoods • Environmental		
6.2.7 Increase funding for Neighborhood Transportation Safety Program (NTSP) for sidewalk and bike infrastructure infill, improving connectivity to schools, parks, shopping, and important community resources to make roads streets safer for non-car users. Programs such as Safe Routes to School, Safe Routes to Parks, and other programs that aim to reduce serious crashes are excellent tools to help advance this action.	STAKEHOLDERS • **City of Tualatin Community Development, Public Works, and Finance Departments** PROGRAM • **City of Tualatin's Neighborhood Transportation Safety program**		 • Transportation • Neighborhoods • Environmental		

Key

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
6.2.8 Explore public electric micromobility charging options. Perform a study to determine needs and preferred locations for charging infrastructure.	STAKEHOLDER • City of Tualatin Public Works Department		 • Transportation • Environmental		
6.2.9 Provide financial incentives for electric micromobility options like e-bikes and/or e-scooters, especially for low-income people and people with disabilities.	STAKEHOLDER • Portland General Electric (PGE) POTENTIAL PROGRAM • PGE Drive Change Fund		 • Inclusive Community • Transportation • Environmental		
6.2.10 Increase Safe Routes to School programming for Tualatin schools by partnering with TTSD's Safe Routes to School coordinator. Prioritize schools in higher equity need and/or high traffic areas in Tualatin.	STAKEHOLDERS • City of Tualatin Community Development Department • Tigard-Tualatin School School District (TTSD) PROGRAM • TTSD's Safe Routes to School program		 • Transportation • Neighborhoods • Environmental		

Key

Strategy 6.3 // Transit transportation to reduce car miles and fossil fuel (gasoline) use

Transit transportation through Ride Connection and TriMet bus and WES services can help to reduce carbon emissions by reducing the number of cars on the road.

Tualatin currently lacks frequent and reliable transit service that connects community members to the places where they live, work, and have fun. Many transit stops in Tualatin are unsheltered, making travel by transit less appealing during times of extreme weather. Additionally, many community members indicated that taking transit feels unsafe to them. Increasing efforts to ensure safety on transit service is an important step to increasing ridership.

WHAT WE HEARD

Stakeholders, particularly large employers, shared that transit service in Tualatin is underutilized by employees because it does not take them where they need to go, it does not run frequently enough to be considered reliable, and/or the hours of transit operation do not match up with employee commuting hours.

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
IN PROGRESS **6.3.1 Advocate for increased transit service coverage, frequency, and safety.** Robust and reliable transit service can increase the appeal of taking transit over driving and create greater mobility for the entire community.	STAKEHOLDERS • City of Tualatin City Manager's Office, Community Development Department • TriMet • Ride Connection		M A S • Inclusive Community • Transportation • Environmental	+1 0 -1	
6.3.2 Educate employers about opportunities to supply employees with transit passes or incentives. TriMet offers flexible transportation programs like the Universal Annual Pass Program, Annual Pass Program, and Monthly Pass Program.	STAKEHOLDERS • City of Tualatin Economic Development • TriMet PROGRAMS • TriMet Universal Annual Pass program • TriMet Annual Pass program • TriMet Monthly Pass program		M A S • Economy • Transportation • Environmental	+1 0 -1	

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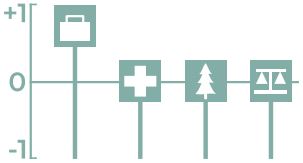
6-10 YRS
10+ YRS
YES, POLICY DECISION
ALIGNMENT WITH COUNCIL VISION (0-7)
JOBS
HEALTH & SAFETY
ECOSYSTEM & WILDLIFE HEALTH
OPPORTUNITY FOR EQUITY
COMMUNITY ACCEPTANCE

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
6.3.3 Convene large businesses in Tualatin to lobby TriMet to expand transit service to destinations with large employee populations.	STAKEHOLDERS • Large employers in Tualatin • TriMet • Chamber of Commerce		 • Economy • Transportation • Environmental		
IN PROGRESS **6.3.4 Increase micromobility access through programs like the e-scooter program in Tualatin.** Micromobility options like e-scooters and e-bikes help to support low-carbon transportation, particularly for first and last-mile travel.	STAKEHOLDER • City of Tualatin Public Works PROGRAM • E-Scooter program		 • Economy • Transportation • Environmental		

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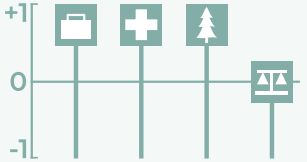
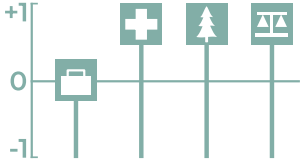
Strategy 6.4 // Remote work options to reduce car miles and fossil fuel (gasoline) use

Remote work can significantly reduce car miles and emissions by allowing employees to work from home when feasible. This reduces the need for daily commutes, leading to fewer cars on the road and decreased traffic congestion. This lowers the overall carbon footprint associated with transportation, benefiting both the environment and air quality.

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
IN PROGRESS **6.4.1 When possible and appropriate, provide remote work options to employees.** Reducing commuter trips results in fewer emissions and contributes to improved air quality.			 • Inclusive Community • Economy • Transportation • Environmental		
IN PROGRESS **6.4.2 Provide virtual meeting options.** Reducing travel for meetings results in fewer emissions and contributes to improved air quality. Providing virtual meeting options also increases access for people who are unable to join meetings in person.			 • Inclusive Community • Connected, Informed, Engaged • Economy • Transportation • Environmental		

Key

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- ECOSYSTEM & WILDLIFE HEALTH
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- COMMUNITY ACCEPTANCE
- ALIGNMENT WITH COUNCIL VISION (0-7)

FOCUS AREA 7: CONSUMPTION – FOOD & GOODS

Background

Consumption-based emissions are generated outside of the community during the production of goods, food, fuels, and service products consumed by residents, like air travel. Consumption-based emissions presented here are estimated (see Appendix 2 for more information) and therefore the results have a greater level of uncertainty compared to other sources of emissions.

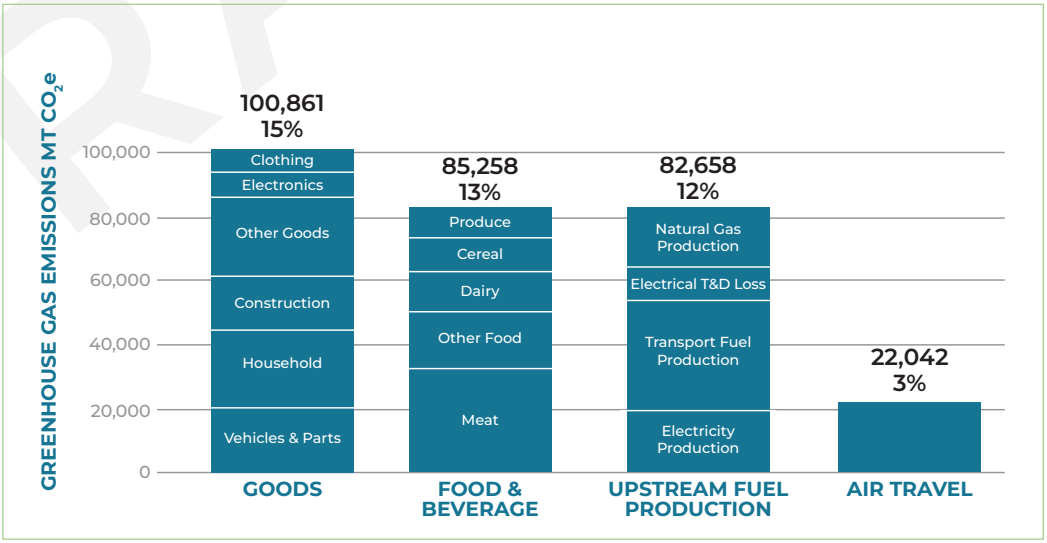


FIGURE 32: Breakdown of Tualatin's consumption-based emissions.

Goods, like household goods, clothing, and electronics, make up 100,861 MT CO_2e (or 15%) of Tualatin's emissions. Food and beverage production accounts for 85,258 MT CO_2e (13%) of Tualatin's emissions. It is worth noting that some foods produce more carbon emissions than others. For example, within the meat category, beef and lamb contribute significantly more to climate change than chicken or fish.

Producing the fuels that people consume also result in carbon emissions. In Tualatin, upstream fuel production, including the production of electricity, natural gas, and transportation fuels, accounts for 82,658 MT CO_2e (12% of Tualatin's carbon emissions). Air travel accounts for 22,042 MT CO_2e, or 3% of Tualatin's overall emissions.

Strategies & actions

Tualatin has identified the following strategies and actions to reduce carbon emissions from the consumption of food and goods in Tualatin. According to the Oregon Department of Environmental Quality, "Since the late 1980s, recycling and composting have captivated the public's attention as a solution to environmental problems associated with solid waste. But the State of Oregon and many other organizations recognize that there's an even higher priority than recycling and composting: waste prevention. In fact, Oregon law defines waste prevention as the number one priority method for managing solid waste in Oregon.

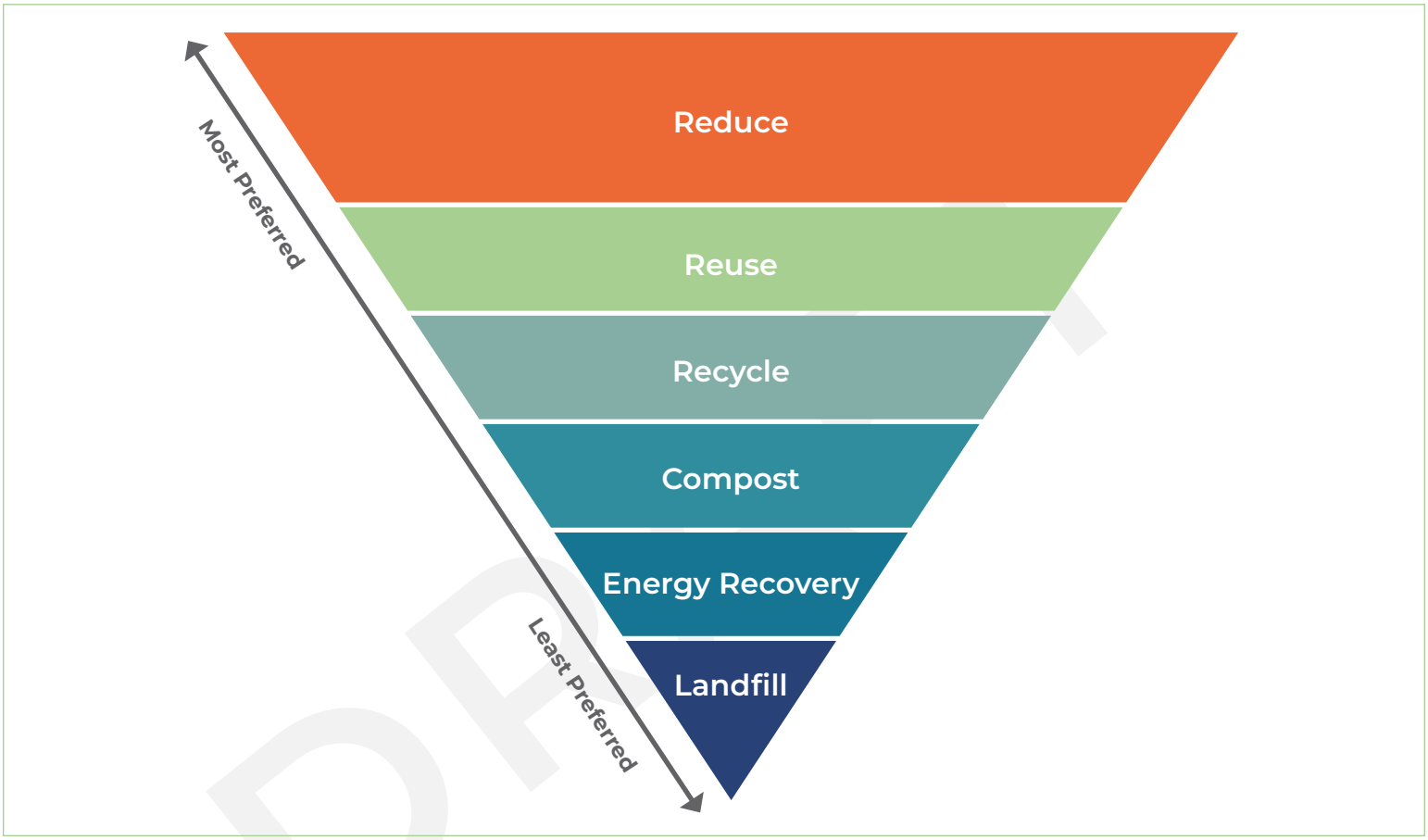


FIGURE 33: Materials management pyramid from Oregon DEQ.

Strategy 7.1 // Landfill diversion of organic materials (composting)

The landfill diversion of organic materials (composting) strategy is estimated to have a low emissions reduction benefit at 21,140 MT CO_2e. There are far more emissions associated with producing food than there are with disposing of kitchen scraps, the most impactful way to reduce landfill emissions is to reduce unnecessary consumption. This strategy is categorized as cost neutral.

STRATEGY	GHG BENEFIT (MT CO_2e AVOIDED)	COST PER MT CO_2e REDUCED
7.1	LOW MED HIGH	$ cost neutral (-$10 to $10/MT)

In communities across the state, the local waste utility picks up kitchen scraps along with the yard waste in the curbside bin. These scraps are then composted along with the yard waste. The inclusion of kitchen scraps in the yard waste bin decreases the need for landfill-bound garbage collection, allowing some customers to downsize their garbage collection bins, possibly saving money over all.

Tualatin will offer a curbside composting (also known as residential organics) pilot program so residents can put food waste into yard debris bins. The pilot program will run from July 1, 2023 to December 2023. After that, the City Council will decide whether or not to add this additional service into the regular garbage rates.

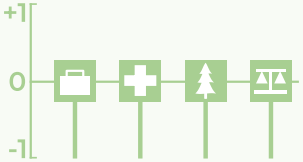
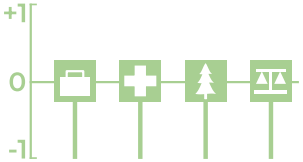
Increasing the rate of landfill diversion of organic materials (composting) could help reduce Tualatin's carbon emissions by about 21,000 MT CO_2e by 2050, representing about 0.002% of the emissions reductions needed to meet Tualatin's goal of net zero by 2050.

Key

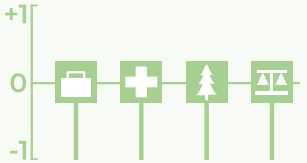
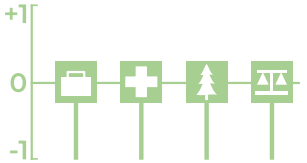
Low (0-399,999 MTCO$_2$e) | Medium (400,000-1,799,999 MTCO$_2$e) | High (1,800,000-8,000,000 MTCO$_2$e)

$$$	$$	$	$$	$$$
significant savings (>$100/MT)	savings ($10-100/MT)	cost neutral (-$10 to $10/MT)	cost ($10-100/MT)	significant cost (>$100/MT)

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
7.1.1 Require curbside composting at multifamily housing sites. The City of Tualatin is conducting a residential organics (curbside composting) pilot program with Republic Services from July to December 2023. Tualatin residents who live in in single-family, duplex, triplex, or fourplex homes will be able to include food scraps in their green yard debris curbside carts.	STAKEHOLDERS • City of Tualatin Public Works Department • Republic Services PROGRAM • Residential Organics (Curbside Composting) pilot program				
IN PROGRESS **7.1.2 Educate community members about best practices for curbside composting to support the curbside composting programs.** The City of Tualatin is conducting a residential organics (curbside composting) pilot program with Republic Services from July to December 2023. Tualatin residents who live in in single-family, duplex, triplex, or fourplex homes will be able to include food scraps in their green yard debris curbside carts.	STAKEHOLDERS • City of Tualatin Public Works Department • Republic Services PROGRAM • Residential Organics (Curbside Composting) pilot program				

Key

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
IN PROGRESS **7.1.3 Support Washington County's commercial and industrial composting program.** Currently, the City supports the program by sharing information and assisting with compliance, if needed. In 2019, the City adopted Ordinance 1420-19 to reinforce the goals of the program.	STAKEHOLDERS • City of Tualatin Public Works Department • Washington County • Republic Services PROGRAM • Commercial Compost Collection program				
7.1.4 Work with Republic Services to incentivize reduced food waste. Look to Eugene's "Love Food Not Waste" program as a model.	STAKEHOLDERS • City of Tualatin Public Works Department • Republic Services				

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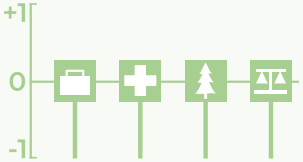
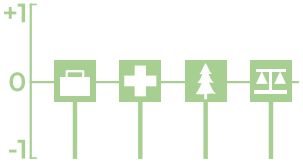
Strategy 7.2 // Reduce emissions from food

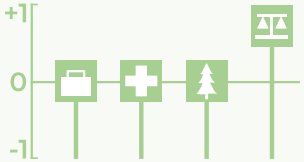
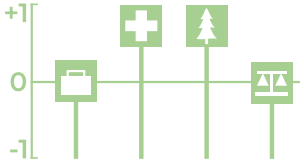
Producing food produces emissions, but not all foods are produced equally. Reducing emissions from food will require changes in dietary choices, as well as reducing food waste. Some foods, like meat and dairy, result in more emissions than others, like produce and cereals. For example, beef and lamb products are particularly high in emissions compared to other protein sources. The choices we make about what foods to buy and how much food to buy matter.

It is estimated that about 40% of all food in the United States is wasted. Growing and raising food sources is a resource-intensive process that requires inputs like water, fertilizer, labor, use of tools and machinery, and ultimately transportation to deliver food products from where they are grown or processed to where they will be bought and sold. All of these inputs result in some carbon emissions and contribute to climate change.

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
7.2.1 Participate in annual Food Waste Prevention Week educational campaign. This campaign aims to educate and inspire real cultural change around food waste in order to help families save money, reduce the negative impact of food waste on the environment, and address hunger in our communities. Oregon DEQ convenes a group of sponsors and partners to coordinate this campaign each spring. IN PROGRESS	STAKEHOLDERS • City of Tualatin Public Works Department • Oregon Department of Environmental Quality (ODEQ) PROGRAM • ODEQ's Don't Let Good Food Go Bad campaign		 • Connected, Informed, Engaged • Environmental		
7.2.2 Provide education about climate impacts related to food consumption. Food consumption has significant climate impacts. The production and transportation of food contribute to greenhouse gas emissions, deforestation, and water scarcity. Shifting towards sustainable and plant-based diets can help reduce these climate impacts and promote a more environmentally friendly food system.	STAKEHOLDER • City of Tualatin Public Works Department		 • Connected, Informed, Engaged • Environmental		

Key

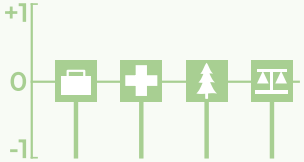
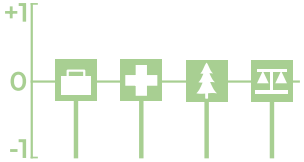
ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
7.2.3 Reduce food waste from food processors. Edible food waste can be donated to food banks. Inedible food waste like food scraps can be turned into compost, animal feed, etc.					
7.2.4 Buy locally-sourced food. Locally-produced food travels fewer miles from the farm to your table, reducing emissions from transporting food (also known as "food miles traveled").					

Key

Strategy 7.3 // Road materials management

Road construction can result in a lot of carbon emissions. There are low-emission concrete and asphalt mixes available on the market to use in road construction. Additionally, Environmental Product Declarations (EPDs) and other certifications provide credible environmental performance data for a variety of products on the market. There are also opportunities to increase the reuse and recycling of materials following the demolition of roads and other public infrastructure.

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
7.3.1 Update Public Works construction code to require low emission concrete and asphalt materials. These could include warm mix asphalt (WMA), supplementary cementitious materials (SCMs) for portland cement, etc	STAKEHOLDERS • City of Tualatin Public Works and Community Development Departments				
7.3.2 Determine the most effective policy and program pathway(s) to require construction and demolition waste materials to be sorted for reusable or recyclable materials. Sorting materials out for reuse and recycling can help to reduce demand for raw materials. This helps to reduce the carbon intensity of construction materials.	STAKEHOLDER • City of Tualatin Public Works Department • Republic Services				

Key

Strategy 7.4 // Reduce consumption of new materials

According to DEQ's materials management pyramid, reducing consumption, particularly of new materials, is the most preferred way to reduce waste. Reducing consumption of new materials can be achieved through prioritizing the repair of broken items instead of buying new and sharing materials with family, friends, and neighbors.

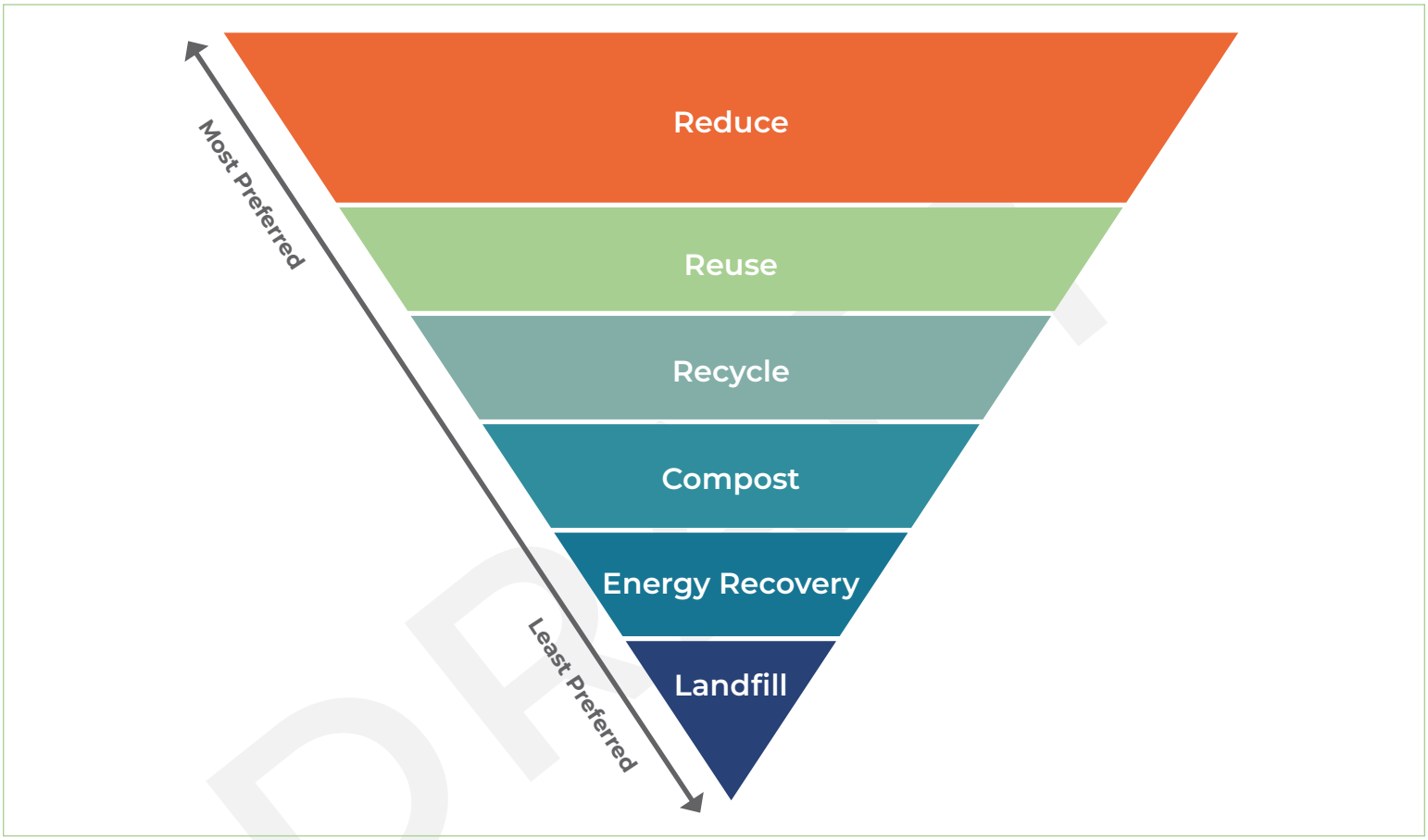
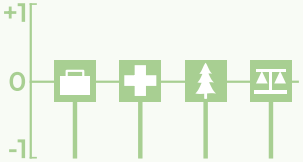
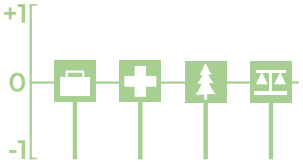


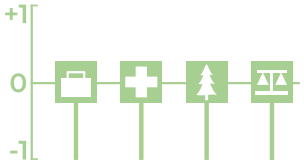
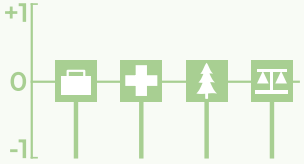
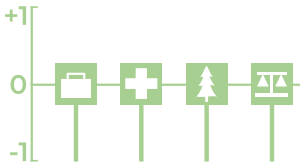
FIGURE 34: Materials management pyramid from Oregon DEQ.

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
7.4.1 Host and promote Repair Fairs to help consumers repair goods and instruct participants how to make their own repairs. Repair Fairs help consumers avoid purchasing more goods. Repair services are available for a variety of products, including small appliances such as lamps and toasters, tools, clothing and textiles, small electronics, home and garden tools, furniture, and toys. IN PROGRESS	STAKEHOLDERS • City of Tualatin Public Library • Washington County Health & Human Services (HHS)		 • Connected, Informed, Engaged • Environmental		
7.4.2 Expand Library of Things offerings to increase community access to minimal-use items (such as power tools, home appliances, entertainment, etc.). Communicate about Library of Things offerings to increase public awareness of this resource. Consider expanding to a "tool library" model to increase access to useful tools. IN PROGRESS	STAKEHOLDER • City of Tualatin Public Library PROGRAM • Library of Things		 • Environmental		

Key

M MITIGATION ACTIONS
A ADAPTATION ACTIONS
S SEQUESTRATION ACTIONS
IMPLEMENT
CONVENE
SUPPORT/ADVOCATE
QUICK START
0-5 YRS
6-10 YRS
10+ YRS
YES, POLICY DECISION
JOBS
HEALTH & SAFETY
ECOSYSTEM & WILDLIFE HEALTH
OPPORTUNITY FOR EQUITY
COMMUNITY ACCEPTANCE
ALIGNMENT WITH COUNCIL VISION (0-7)

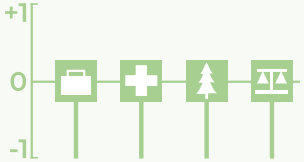
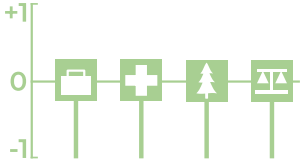
ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
IN PROGRESS **7.4.3 Join Tualatin's "Buy Nothing" group on Facebook.** The Buy Nothing project aims to "empower each of us to keep even more items in use, while we build strong communities and sustainable livelihoods for the makers, fixers, and others who transform old into new, over and over again."	PROGRAM • **Buy Nothing Tualatin**		 • Connected, Informed, Engaged • Environmental		
7.4.4 Conduct an educational campaign to increase awareness about the impacts of consumer choices on emissions. Consumer goods can have large or small carbon footprints depending on where and how they are made, and what they are made out of.			 • Connected, Informed, Engaged • Environmental		
7.4.5 Create a directory of repair services near Tualatin. Repairing broken items instead of buying new can help community members save money and reduce their emissions from new goods.			 • Connected, Informed, Engaged • Environmental		

Key

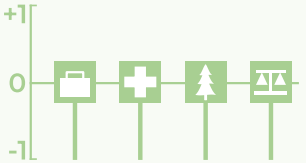
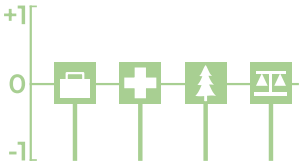
Strategy 7.5 // Responsible waste management

Does this go in the trash, the recycling, or the compost bin? The responsible waste management strategy seeks to empower community members to understand how to manage waste appropriately to reduce their environmental impact.

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
7.5.1 Develop a simple and comprehensive waste and consumption public educational campaign touching on topics such as recycling, food waste, and low-impact consumption practices. Simplifying the information into a one-stop-shop for waste prevention and management can help community members think about the life cycle of the goods they buy and empower them to make informed consumer decisions.	STAKEHOLDERS • Washington County Solid Waste & Recycling • Metro		 • Connected, Informed, Engaged • Environmental		
7.5.2 Educate students about recycling and composting best practices. If students learn about how to recycle and compost and school, they are more likely to share that information with their families and practice those habits at home.	STAKEHOLDERS • Tigard-Tualatin School District (TTSD) • Metro PROGRAM • Metro resource conservation and recycling education classroom presentations		 • Environmental		

Key

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
7.5.3 Share educational information about the Recycling Modernization Act. This law updates Oregon's outdated recycling system by building on local community programs and leveraging the resources of producers to create an innovative system that works for everyone. The Oregon legislature passed the Recycling Modernization Act (SB 582) during the 2021 legislative session. The new law became effective Jan. 1, 2022 and recycling program changes will start in July 2025.	STAKEHOLDER • Oregon Department of Environmental Quality (ODEQ) PROGRAM • ODEQ Recycling Modernization Act educational videos		 • Connected, Informed, Engaged • Environmental		
7.5.4 Increase recycling options at multifamily housing. State and regional agencies are reviewing refuse service standards to better serve multifamily housing communities in all areas of solid waste, recycling, and organics disposal. The City may need to consider code updates to increase the size of containment areas.	STAKEHOLDERS • City of Tualatin Public Works and Community Development Departments • Republic Services • Oregon Department of Environmental Quality • Oregon Metro		 • Environmental		

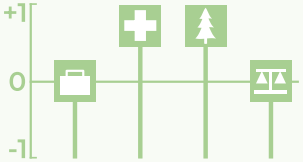
Key

- M MITIGATION ACTIONS
- A ADAPTATION ACTIONS
- S SEQUESTRATION ACTIONS
- IMPLEMENT
- CONVENE
- SUPPORT/ADVOCATE
- * QUICK START
- 0-5 YRS
- 6-10 YRS
- 10+ YRS
- YES, POLICY DECISION
- ALIGNMENT WITH COUNCIL VISION (0-7)
- JOBS
- HEALTH & SAFETY
- ECOSYSTEM & WILDLIFE HEALTH
- OPPORTUNITY FOR EQUITY
- COMMUNITY ACCEPTANCE

Strategy 7.6 // Reduce emissions from landscaping

Gas-powered landscaping tools, like mowers and leaf blowers, are sources of carbon emissions. Switching to electric or battery-powered tools can reduce emissions and have the added bonus of operating more quietly than their gas-powered counterparts.

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
7.6.1 Ban small-motor, gasoline-powered landscaping equipment, like leaf blowers, lawn mowers, etc. According to the Environmental Protection Agency, gasoline-powered lawn and garden equipment accounts for a major portion of nonroad gasoline emissions. They also emit pollutants that are harmful to human health.					

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- OPPORTUNITY FOR EQUITY
- COMMUNITY ACCEPTANCE

Strategy 7.7 Refrigerants Management (AIM Act)

The refrigerants management strategy is estimated to have a relatively low emissions reduction benefit at 323,800 MT CO_2e. It is categorized as cost neutral and refrigerants will be regulated by the EPA.

STRATEGY	GHG BENEFIT (MT CO_2e AVOIDED)	COST PER MT CO_2e REDUCED
7.7	LOW MED HIGH	$ cost neutral (-$10 to $10/MT)

Refrigerants are extremely potent greenhouse gases that are used in appliances, like refrigerators, and systems, like air conditioning, that we use every day. The American Innovation and Manufacturing (AIM) Act was enacted by Congress on December 27, 2020 to reduce emissions from refrigerants. The AIM Act directs EPA to address hydrofluorocarbons (HFCs) by phasing down production and consumption, maximizing reclamation and minimizing releases from equipment, and facilitating the transition to next-generation technologies through sector-based restrictions.

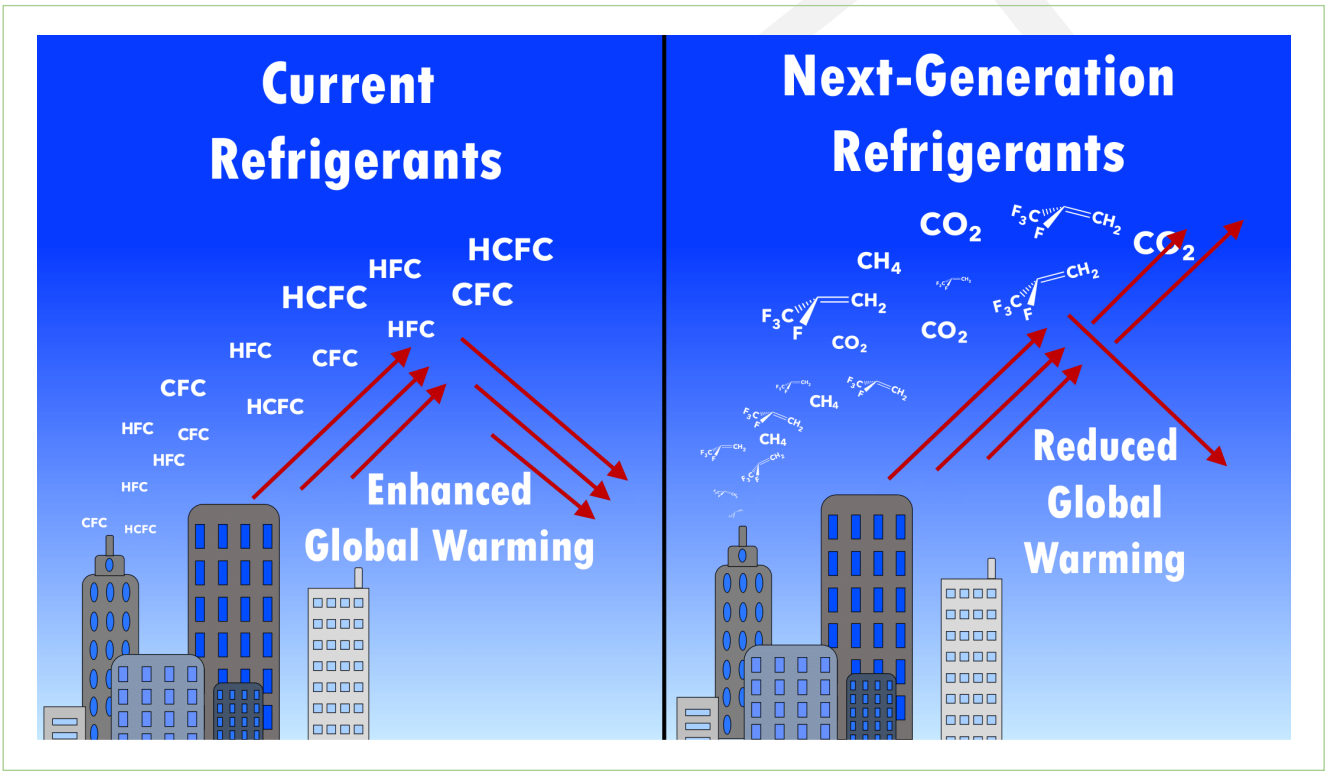


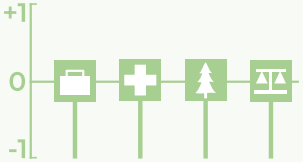
FIGURE 35: Current refrigerants are made up of greenhouse gases, like HFCs, that are highly effective at trapping heat in the atmosphere. Next-generation refrigerants will be engineered to trap less heat, contributing less to global warming.

Key

Low (0-399,999 MTCO$_2$e) | Medium (400,000-1,799,999 MTCO$_2$e) | High (1,800,000-8,000,000 MTCO$_2$e)

$$$	$$	$	$$	$$$
significant savings (>$100/MT)	savings ($10-100/MT)	cost neutral (-$10 to $10/MT)	cost ($10-100/MT)	significant cost (>$100/MT)

Actions

ACTION	STAKEHOLDERS, PROGRAMS, & PLANNING/POLICY DOCUMENTS	CITY ROLE	CHARACTERISTICS	CO-BENEFITS	POLICY DECISION
7.7.1 Incentivize smaller supermarkets and restaurants to upgrade their refrigeration systems as low-carbon refrigerants become standard and high-carbon refrigerants are phased out. The American Innovation and Manufacturing (AIM) Act authorizes the Environmental Protection Agency to address carbon emissions from refrigerants by phasing down their production and consumption, maximizing reclamation and minimizing releases from equipment, and facilitating the transition to next-generation technologies through sector-based restrictions.	STAKEHOLDER • Small supermarkets and restaurants		 • Economy • Environmental		

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