



CITY OF MILWAUKIE

Milwaukie Community Climate Action Plan



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1. Introduction

Why do we need a Climate Action Plan?

We—the Milwaukie community—have an opportunity to act on climate change.

Our rapidly changing climate and rising global temperatures impact our city and the entire planet. We're already witnessing more extreme weather and climate events in our region—hotter summers, more wildfires, increased flooding risk and more. Acting together early ensures that we are more empowered and prepared to preserve our health and quality of life for current and future generations.

Milwaukie's Climate Action Plan is our roadmap to mitigating and adapting to the effects of climate change. Co-created by residents and partners, the plan includes opportunities for City staff and people who live and work in Milwaukie to join together and address this challenge.

Each of us is a vital part of the community. Everyone has a role to play. Committing to climate action will allow us to create a stronger local economy, take care of those that might be struggling and preserve what is unique and special about Milwaukie. If we all do our part, we can show other, similar communities that towns like ours can be climate action leaders.

How to read this Climate Action Plan

Chapters 1 – 3 of this plan describe the planning process, why we must act on climate change, and our climate action goals. Chapter 4 sets out actions for us all to take to reach those goals. The plan includes three categories of actions:

- **City-led actions** – steps City leadership and staff can take to lead efforts, mobilize partners or support regional, collaborative efforts.
- **Household actions** – steps Milwaukie households can take to make a difference in their own homes.
- **Organizational actions** – steps Milwaukie businesses and groups can take to help us reach our goals.

Our Climate Action Plan will help us:

- Guide our efforts to reduce our emissions
- Plan infrastructure and land use projects
- Prioritize City actions and initiatives
- Advocate for coordinated change with our partners
- Educate our community about the impact of our habits
- Promote sustainable economic development

What does that mean?

For definitions and explanations of technical terms, please see the glossary in Appendix B.

Building on a strong foundation

Milwaukie City Council has declared climate action a key Council goal. Implementing this plan will require a dedicated staff person and the development of metrics to measure our progress. To ensure we stay on track, the City of Milwaukie specifically included funding for a Climate Action and Sustainability Coordinator in the 2018 City budget.

Before adopting this Climate Action Plan, the City had already taken significant strides toward reducing local emissions and preparing our community for climate change. The following list reflects some of the efforts already undertaken by the City that this Climate Action Plan builds upon:

Building Energy and Efficiency

- Purchase of 76.7% of the City's electricity through Portland General Electric's (PGE) [Clean Wind Tariff](#).
- Adoption of plans to retrofit the [City's Ledding Library](#) to use 1/6 of its former energy.
- Enrollment in the Energy Trust's [Strategic Energy Management](#) (SEM) Program, which teaches businesses and governments energy management best practices.
- Partnership with [Ameresco](#) to fund a contract to replace heating, ventilation and air conditioning (HVAC) controls and lighting in City facilities with more efficient systems.



Rendering of new Ledding Library



Electric vehicle charging station



Solarize Milwaukie logo

- Implementation of the [“Solarize Milwaukie”](#) program, including a goal to achieve 2.2 megawatts of rooftop solar energy by 2021.

Vehicles and Fuels

- Purchase of three electric vehicles to replace City administrative cars.
- Installation of a public electric vehicle charging station and a City fleet charging station.
- Partnership with PGE to construct an [“Electric Avenue”](#) charging station at the intersection of Southeast Jackson Street and Southeast McLoughlin Boulevard.

Land Use and Transportation Planning

- Implementation of a green building energy height bonus.
- Commitment of \$21 million to the [Safe Access for Everyone](#) (SAFE) program, including constructing 27.9 miles of sidewalks, four miles of bike lanes and 900 Americans with Disabilities Act (ADA) compliant ramps between 2019 and 2021.

Natural Resources

- Creation of a community [Tree Board](#) and commitment to increasing our tree canopy from 26% to 40% by 2035.

Planning process

City leadership hired a professional consulting team to guide the climate action planning process, convening people who live and work in Milwaukie as well as key implementation partners. The planning process included the following key steps:

1. **Community carbon footprint:** Calculation of our current and projected future community carbon footprint for Milwaukie, considering population growth and the impact of existing policies over time.
2. **Future physical conditions:** Research into what the future physical conditions in Milwaukie could be under different climate change scenarios.
3. **Climate Action Plan Committee (CAPC):** Formation of a committee composed of residents and key partners to advise the project team throughout the process.
4. **Implementation partner workshops:** Six workshops with major organizational and agency partners in Spring 2018 to determine priority strategies.
5. **Public engagement:** A robust community involvement strategy, including a climate action fair, community town hall, Spanish-language focus group and online survey.
6. **Scaling greenhouse gas reductions:** Modeling the projected reduction of greenhouse gases over time of each prioritized City-led mitigation strategy.
7. **Co-benefits analysis:** Modeling the potential of each City-led strategy to deliver additional benefits beyond emissions reductions.
8. **Strategy and plan development:** With the guidance of the CAPC, development of an implementation timeline for City-led strategies and preparation of the Climate Action Plan.



Community participants in the April 2018 Climate Action Summit



Public engagement

Public engagement and feedback were essential to developing a compelling, realistic and implementable Climate Action Plan. As part of the planning process, the City led a robust community engagement process to hear from as many residents and stakeholders as possible.



What we learned: Our community wants to see urgent action!

Over two hundred community members engaged in the climate action planning process. Key takeaways from this engagement include:

- Milwaukie is already experiencing the impacts of climate change—we need to make a change quickly.
- Milwaukians want to be a leader in this space, inspiring other communities to follow suit.
- Community members have ideas for translating strategies into meaningful action. They want to be a part of this community-wide effort.
- People who live and work in Milwaukie need support to make these changes part of their daily routine. This support includes:
 - Education and awareness-raising
 - Accessible, easy to understand implementation resources
 - Demonstration projects and modeled behavior
 - Cost assistance
 - Community projects to make buy-in and implementation easier
 - Support groups, networks and trusted liaisons

Community engagement – by the numbers

17

CAPC members

51

Implementation partner workshop attendees

14

Spanish language focus group attendees

75

Climate Action Fair and Summit attendees

101

Valid survey responses

Read more about community engagement online →

Equity and climate action

Milwaukie's [“All Aboard” Community Vision](#) declares that we are an inclusive, diverse community that honors our differences and shared similarities; provides opportunities for all; and makes all residents feel empowered to engage and share ideas. These goals apply directly to climate action. To make real progress on climate, all Milwaukie community members must see themselves in this community strategy and have access to the resources they need.

Equity is woven through this Climate Action Plan in the following ways:

- City staff and the consulting team assessed each City-led strategy according to its potential to reduce disparities within the community. The results of this equity co-benefit scoring are summarized in the topic-specific chapters.
- Household-level strategies and associated resources are identified in each chapter to make climate action accessible for all Milwaukians.
- The plan also acknowledges that climate impacts are disproportionately created by those with more means, while the impacts are borne more by the people with fewer means. This strategy encourages those that have more means to take extra care to reduce their carbon footprints so that others in our community and around the world can lead healthier and safer lives.

Equitable engagement around climate action must continue. As the City implements this plan, staff and implementation partners must consider the following:

- As Milwaukie grows more diverse, what resources are needed for residents of different backgrounds, income levels, ages and abilities to take action on climate change?
- How can climate action resources be made more accessible?
- What existing, trusted communication networks and channels can be used to raise awareness of the need for climate action?
- How are we measuring the impact of climate action strategies on our more vulnerable community members?









Mayor Mark Gamba speaks at a Climate Action Plan Committee meeting

Co-benefits: Helping achieve Milwaukie's Community Vision

In preparing this plan, the project team identified and ranked the “co-benefits” of each City-led mitigation and adaptation strategy. This co-benefit analysis recognizes that these climate actions are not stand-alone requests to serve one purpose; rather they each have the potential to help our community achieve the objectives set out in the [Community Vision](#) and move forward other City goals. Table 1 shows the scoring criteria assigned to the six selected co-benefits.

Table 1. Co-benefits scoring criteria

Co-benefits	Co-benefit scoring criteria		
	1	2	3
 Addresses Milwaukie Superactions: How well does the action support progress on the superactions defined in Milwaukie's Community Vision?	Action addresses 1 superaction	Action addresses 2-3 superactions	Action addresses 4-5 superactions
 Opportunity for Social Equity: How well does the action result in an equitable outcome for Milwaukie community members and improve social equity?	Serves some but not all	Serves all equally	Addresses inequities
 Mitigates and Adapts in One Action: Does the action reduce the impact of climate change while also preparing us for changing future physical conditions?	Does only one	Does only one better than the other	Does both well
 Revenue Generation or Cost Avoidance: Will the City spend or save money to implement this action?	Action is a net cost	Action is roughly break even	Action is a net profit or savings
 Leverages Existing Efforts: Does this action build upon already adopted policies and strategies?	Needs funding and/or policy approval	Existing plans support	Already planned or underway
 Community Support: How much community support is there for implementing this action?	Less than 25% likely to support	25-50% likely to support	Over 50% likely to support

The first co-benefit relates to how many “superactions” from Milwaukie’s vision each climate action addresses. Figure 1 summarizes Milwaukie’s six superactions.

Figure 1: Milwaukie community superactions



CARBON NEUTRAL

Carbon neutral refers to offsetting or sequestering as much carbon as we emit.

Plan to action: What success looks like

This Climate Action Plan is meant to catalyze action. Our City, community, businesses, and regional partners must take urgent action—together—to address the threat of climate change.

The actions and strategies set out in this plan will put us on a path to achieving our climate action goal: **by 2040, Milwaukie’s buildings will have no net emissions, and by 2050, we will be a fully carbon neutral city.** Chapter 3 explains these goals in more detail and what it will take to meet these targets.

To achieve our goals, we must develop a process to monitor our progress and continue planning as our community grows and new technologies emerge. This is a living document: formal reviews of the plan will occur every five years, and revisions may be made as new information and resources become available. Milwaukie will employ a Climate Action and Sustainability Coordinator to manage implementation and monitoring of this plan. [Appendix E](#) includes metrics for each strategy proposed in this plan.

We can—and we must—act urgently to protect our planet, our community and our future. This Climate Action Plan gives us the tools to begin doing so, and in the process, help realize our community vision.

2. Why must we change?

Greenhouse effect

Climate change is a continuous and evolving condition caused by air emissions that are created from combustion and from gases that escape into the atmosphere. When these emissions (called greenhouse gases or GHGs for short) enter the atmosphere, they act as a glass greenhouse reflecting heat back to the Earth, which does not allow the warmth to release into space (see Figure 2). As the planet warms, climate conditions change around the world. In some areas the changes are and will be dire, making them ultimately uninhabitable due to heat or flooding from expanding warmer water and melting arctic ice.

While Figure 2 shows a large band around the planet reflecting heat back towards the Earth, the atmosphere actually is a lot thinner. It starts at the Earth's surface and only extends about seven miles high (Figure 3). This is roughly the height where commercial jets fly. The sky may appear to go on forever, but in reality, our atmosphere is an amazingly vulnerable layer around our planet.

The average American family emits about 80 metric tonnes (2,200 lbs compared to the American ton, which is 2,000 lbs) of greenhouse gases each year from our cars, electricity, heat, air travel and the materials we buy. Figure 4 shows how much volume a metric tonne of greenhouse gases actually fills (this volume is averaged for all locations on Earth throughout all times of year as pressure and volume of gases varies by elevation and with the daily weather). With 126.22 million households in the United States alone, these emissions add up quickly to fill the atmosphere.

Figure 2. Greenhouse gas effect - NOAA

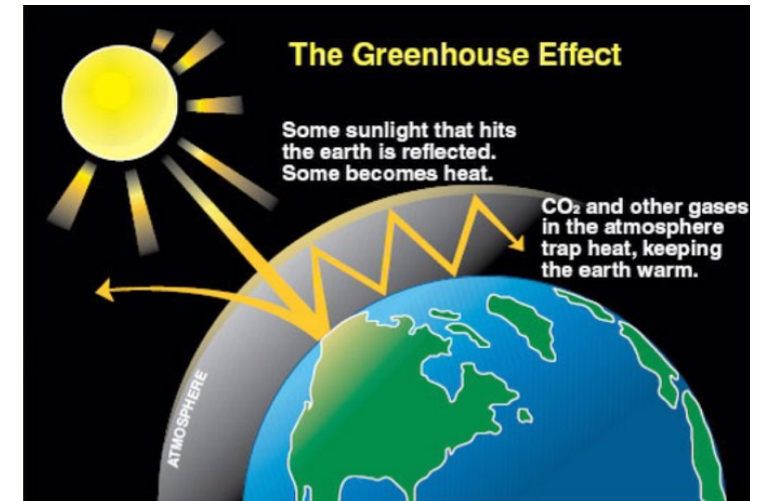


Figure 3. The Earth's atmosphere - NASA



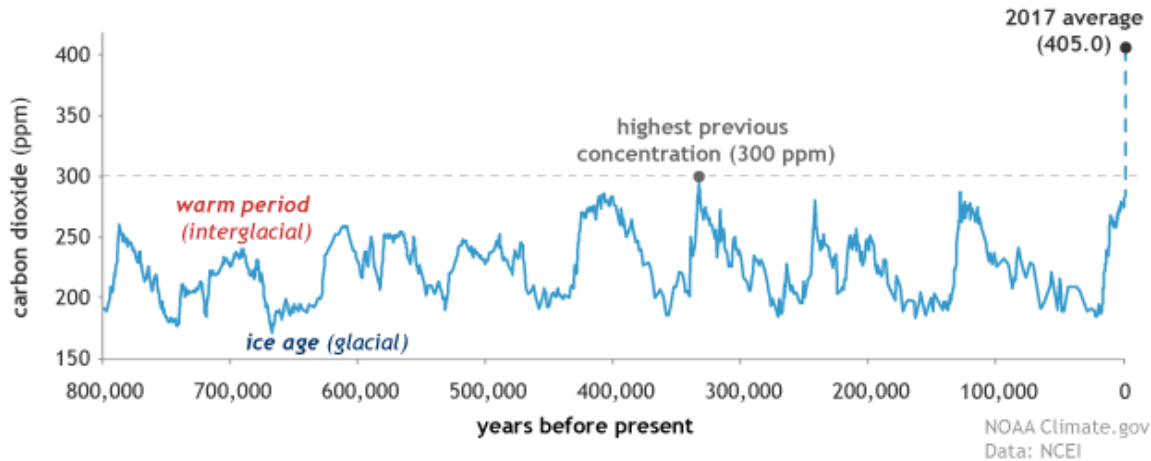
Figure 4. Volume of one metric tonne of greenhouse gases – carbonvisuals.com



Figure 5 shows the increase atmospheric CO₂ concentrations over time. For 650,000 years, atmospheric CO₂ stayed below 300 parts per million (ppm). As population began to skyrocket into the 20th century, the atmospheric CO₂ concentration increased exponentially. In 2017, the average concentration was 405 ppm. If all greenhouse gases are considered, this number rises to about 490 ppm.

Figure 5. Increase in atmospheric CO₂ concentrations over time - NOAA, 2018

CO₂ during ice ages and warm periods for the past 800,000 years



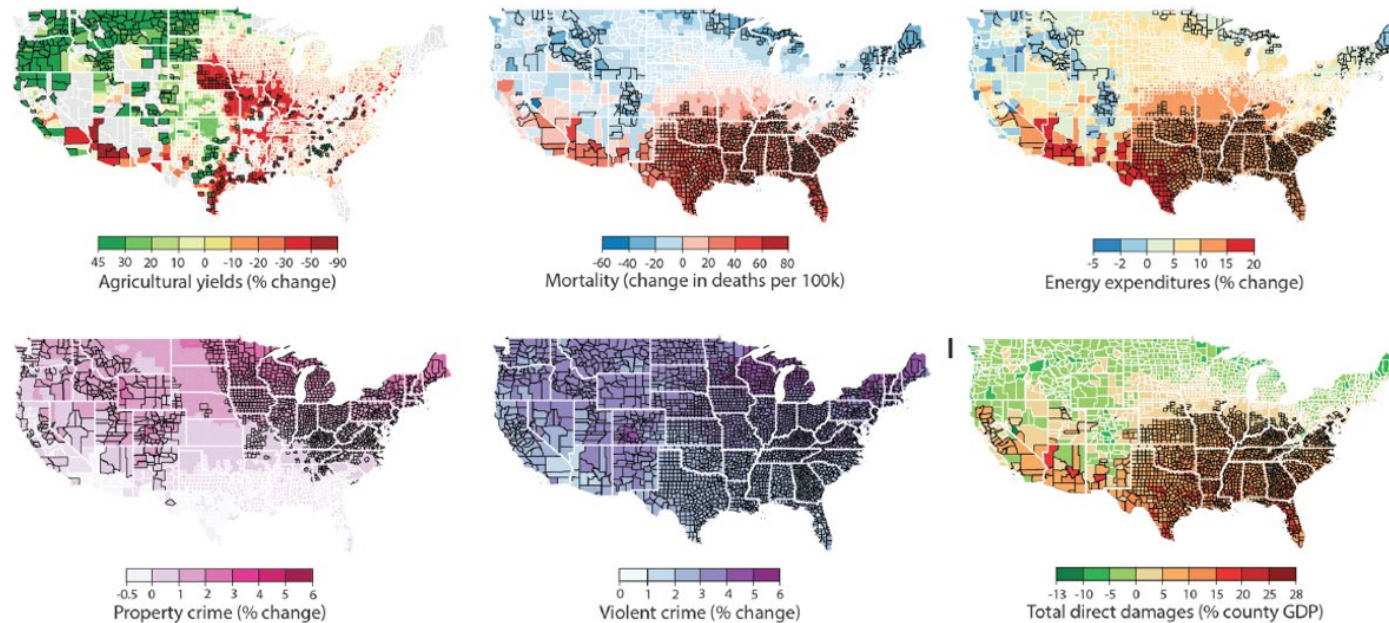
Smoky conditions in Milwaukee, 2018

How will climate change affect the United States?

If climate change is not slowed or reversed, the United States will experience many significant impacts by the end of this century. Coastal areas and tidal rivers will be affected the most due to rising sea levels. Conditions will get hotter throughout the country, with already hot places becoming nearly uninhabitable, causing plants and other creatures to go extinct or migrate north. Crop shortages will send price shockwaves through our population and will threaten the wellbeing of the poorest people.

A 2017 study estimated economic benefits and damages county by county related to climate change by 2090, aggregating estimates from several other studies (Figure 6).¹ Figure 6 shows southern states bearing much of the burden of climate change, while some trends like property and violent crime increase in the northern states (likely due to migration and population increase). Northern states are generally expected to experience economic growth while southern states experience economic damages.

Figure 6. Economic damages from climate change in the United States - Hsiang et al. 2017



Data shown for counties without black lines around them have an 85% confidence rate, and data shown for counties with a black outline have a 95% confidence level.

¹ "Estimating economic damages from climate change in the United States" - Hsiang et al., *Science* 356, 1362–1369 (2017) 30 June 2017.

Beyond weather changes: The "social cost" of carbon

Every metric tonne of greenhouse gases emitted damages society in many ways—from changes in agricultural productivity, to increased infrastructure expenses, to stress on public health. This cost to society is referred to as the "social cost of carbon." The United States National Academies of Science estimate the social cost of carbon to be \$42 per tonne of greenhouse gases.

Considering Milwaukee's 2016 greenhouse gas inventory, the cost to our community is over \$21.8 million a year!

Learn more [→](#)

How will climate change affect Milwaukie?

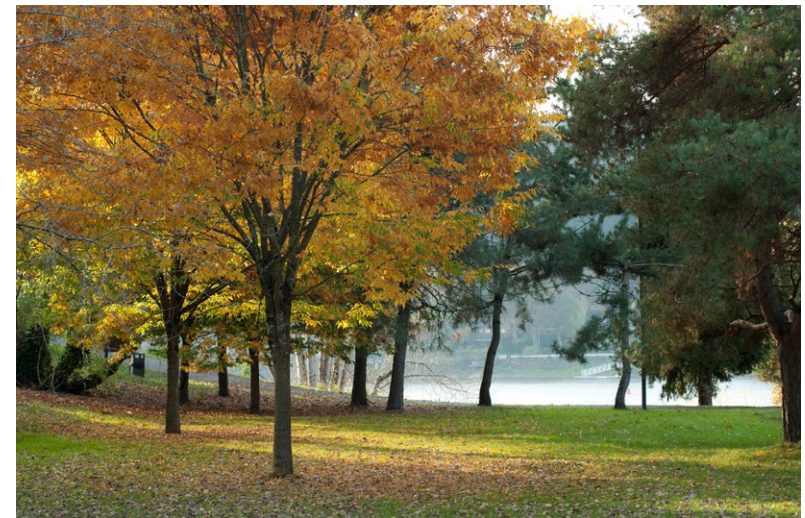
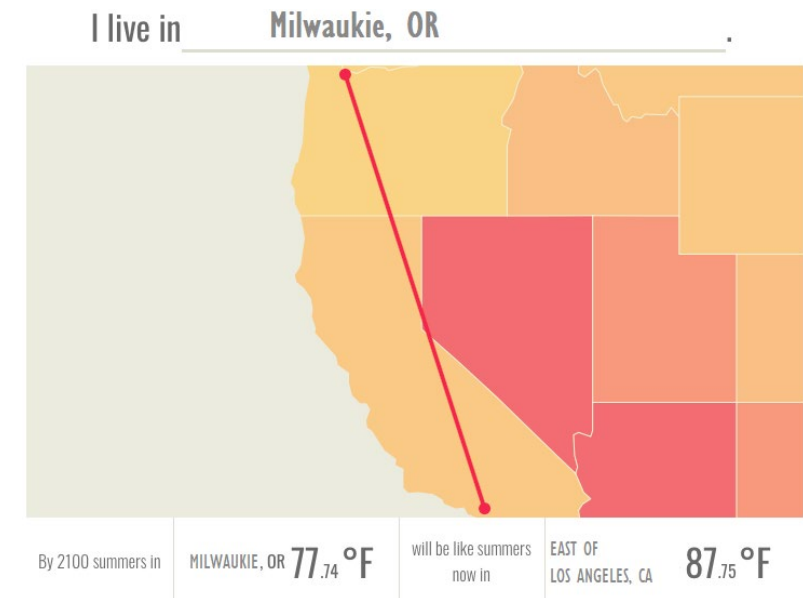
Population shift

Due to Milwaukie's location and expected climate, the city can expect continued population growth as people migrate to places where water is not scarce and temperatures in the summer are bearable. This population growth will challenge government structures to provide services for more people and put pressure on our school, housing and transportation systems. That said, the maps in Figure 6 also show climate change could lead to agricultural and economic growth in our region. How that opportunity is apportioned to different segments of the population, however, is unknown.

Warm dry season

By 2100 in the Portland metro area, we can expect that our summer average temperature, currently 78°F, will be more like the average summer in cities just east of Los Angeles, California (Figure 7). In the past ten years, we generally have experienced one day above 100°F annually, but by 2100, we can expect 22 days that exceed triple digits.² While the average temperatures may seem bearable, keep in mind that the two to three-week periods we experience today when temperatures reach into the high 90s°F will in the future be hovering around 110°F.

Figure 7. Forecasted summer temperatures in 2100 – Climate Central, 2014

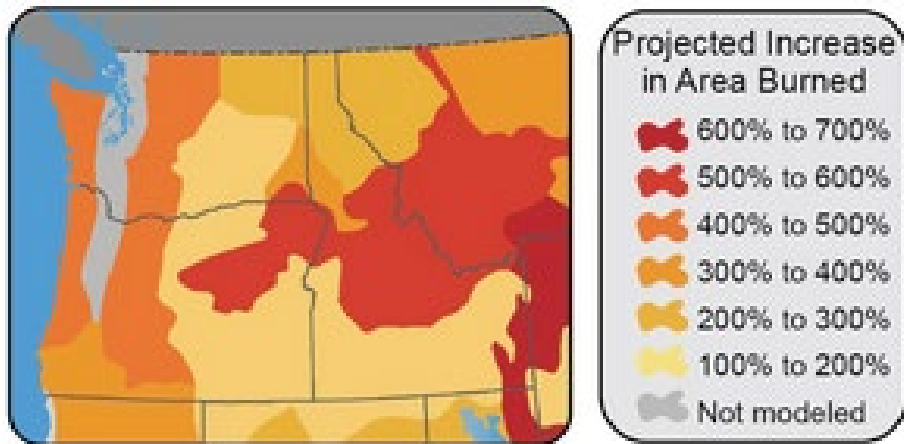


² Climate Central. 2014. 1001 Blistering Summers. <http://www.climatecentral.org/news/summer-temperatures-co2-emissions-1001-cities-16583>. (Modified for this document).

Regional wildfire risk

The Portland metro region is fairly safe from direct burning due to wildfires, although the wildland-urban interface (transition zone between human development and wild areas) is susceptible. In the past few years, however, we have experienced more wildfire in the Pacific Northwest, a condition that will increase over the next few decades. Oregon State University's Oregon Climate Change Research Institute's (OCCRI) analysis has projected the likely scenarios of increased burning in the Northwest. Figure 8 shows the projected increase in fire disturbance. By 2040, we can anticipate a 400% to 500% increase in the number of acres burned.³ In 2017, Oregon wildfires burned approximately 46,000 acres. That area is roughly 15 times the acreage of Milwaukie. The expansion of that fire area to 500% is roughly 230,000 acres, or 74 "Milwaukies," worth of land area.

Figure 8. Increase in wildfire surface area burned by 2040 - OCCRI



Smoky conditions in Milwaukie in 2018

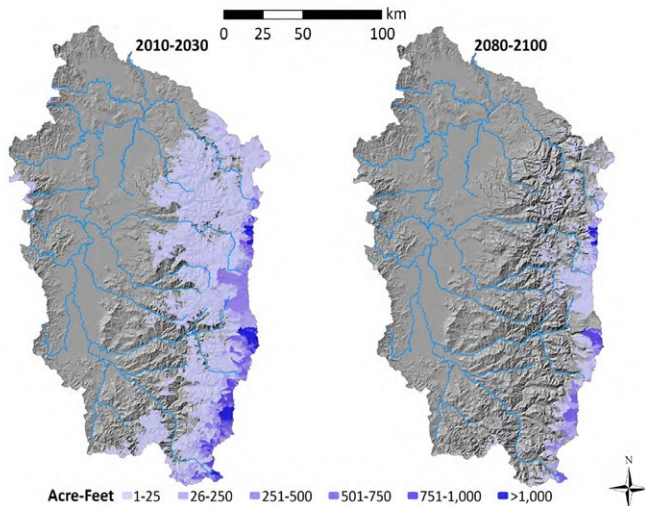
Milwaukie residents will experience significant air quality impacts as surrounding regions burn during the summer months. In the summers of 2017 and 2018, the Portland metro area suffered when winds brought smoke from over 100 fires in British Columbia and then multiple Oregon and Washington fires, including the Eagle Creek Fire in the Columbia Gorge National Scenic Area.

³ OCCRI, 2014. Originally presented in Portland General Electric. [2016 Integrated Resource Plan](#).

Water source risk

One of the most significant changes we are already experiencing is the shift in precipitation from snow to rainfall in the winter months. Figure 9 shows the retreat of the snowpack in the Willamette Valley between 2010-2030 (left) and 2080-2100 (right). The volume of water stored as snow is measured in acre-feet.⁴

Figure 9. Change from snow-dominant to rain-dominant precipitation by 2100 - Jaeger, et. al., 2017



Learn more
about harmful
algal blooms →

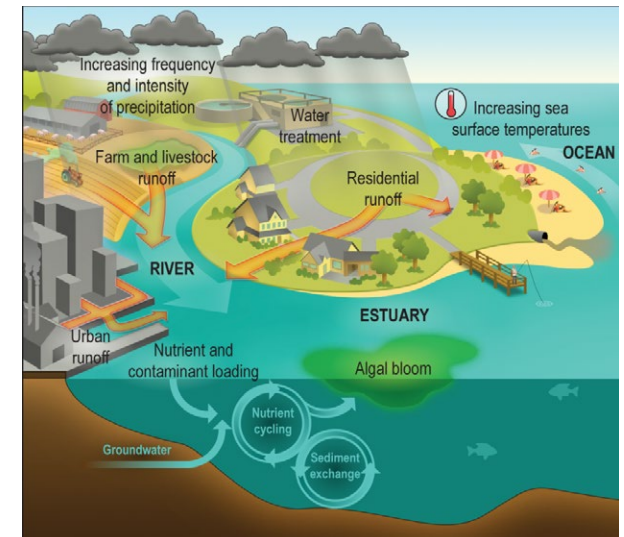
Historically, Milwaukie's wet season precipitation has been primarily rain, but the winter snow in the Cascades serves as storage for our rivers, streams, and groundwater. The reduction in snowfall means our rivers and streams will not have the same quantities of flowing water from the melting snow in summer months. This lower volume of water increases risks to our drinking water supply; agricultural irrigation; habitat for fish species like salmon, sturgeon and trout; hydroelectric power generation; and some of our favorite water recreations such as swimming, boating, fishing and rafting. In the summer of 2018, Oregon had a significant set of toxic algae blooms that posed a health hazard to swimmers and drinking water due to the warmer water. This is likely to become more frequent and more intense over time and will affect our creeks, lakes and ponds (Figure 10).⁵

Ultimately, this water is the life source for us and nature. As we experience climate change, we will need to learn to become more mindful of our collective use and reuse of this resource.

⁴ W. Jaeger et. al. 2017. "Water, economics and climate change in the Willamette Basin, Oregon." Oregon State University Extension

⁵ Trtanj, J., et. al, 2016: *Ch. 6: Climate Impacts on Water-Related Illness. The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. U.S. Global Change Research Program, Washington, DC, 157-188.*

Figure 10. Precipitation and temperature changes affect water quantity and quality - Trtjani, J. et. al, 2016



Dead fish on the Milwaukie waterfront

Wet season

Flood risk from precipitation

Milwaukie has experienced flooding in the past, and previously flooded sites are the most susceptible to flood again. In February 1996, three-quarters of Clackamas County's residents were affected by a major flood, and the County represented one-third of all claims filed statewide for the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program. The Christmas Flood of 1964 and floods in 1861 and 1890 each exceeded 100-year flood marks. Most recently, Milwaukie experienced significant flooding in December 2015 (see photos below). Flood risk in Milwaukie is focused on areas where rivers and streams are adjacent to land, such as around Johnson Creek, Kellogg Creek and the Willamette River. In 2014, damages to the Kellogg Creek Bridge cost more than \$2 million to repair.

Flood risk from sea level rise through the tidal effects on the Willamette River

The Columbia River is influenced by the tides up-river until it meets the Bonneville Dam complex. This tidal effect also occurs in the Willamette River upstream until it meets Willamette Falls. The tidal effect of the river will generate flooding as the sea level rises, independent of precipitation in the wet months (Figure 9). Figure 9 shows the local impact of projected sea level rise by 2100 in four different scenarios related to approximate atmospheric concentrations of greenhouse gases. Each concentration number correlates with a global average annual temperature increase: 400 ppm (1.5°C); 450 ppm (2°C); 700 ppm (3°C) and 900 ppm (4°C). The 900 ppm scenario assumes we continue emitting at our current levels with population growth. In all scenarios, the water level rises, but under the 900 ppm scenario, Milwaukie Bay Park, the entire Kellogg Wastewater Treatment Center and the OR-224/99-E interchange would be flooded by 2100.



Severe flooding in 2015



Car stranded in a flood in 2015



Wind damage from severe storms in 2015



Storm drain surcharge in 2015

Figure 10. Tidal effects on the Willamette River from sea level rise under different temperature scenarios ranging from 400 ppm / 1.5°C to 900 ppm - 4°C – www.Climatecentral.org



The science is

undeniable: we must act quickly to avoid catastrophic changes from climate change and prepare for changes we're already experiencing. Avoiding the worst effects requires swift action by all of us. How much do we have to change? Chapter 3 describes our climate action goals and the rate of change required to achieve them.

3. Our climate action goal

The science behind our climate action goals

The United Nations International Panel of Climate Change (IPCC) has set a goal to keep global average temperature increases below 2°C (3.6°F) above pre-industrial conditions—often referred to as the “guardrail goal.” This correlates to keeping atmospheric CO₂ concentrations roughly around 450 ppm. **As of July 2018, the Earth’s atmospheric CO₂ was 411 ppm.⁶ If we keep emitting at the same rate we are today (2018), by 2100, the atmospheric concentration of CO₂ will be 900 ppm, far beyond the guardrail goal.**

To achieve the guardrail goal and avoid devastating climate impacts, the IPCC states we must aim to be “carbon neutral” by 2050 and become “carbon negative” for the following 50 years – requiring us to pull greenhouse gases out of the atmosphere into our soils, vegetation on land and in our oceans, and through technologies that have yet to be tried at scale.

Milwaukie’s climate action goal—informed by the IPCC and advice from other climate experts—is for **all Milwaukie buildings to have no net emissions by 2040, looking ahead to being a fully carbon neutral city by 2050**. What does this mean for us? Progress on all of these goals must be made—starting today. Along the way, we will meet these key benchmarks:

- By 2035, Milwaukie’s buildings will have **no net emissions from electricity**.
- By 2040, Milwaukie’s buildings will have **no net emissions from onsite combustion of fuels** (gas, oil and propane).
- By 2050, Milwaukie will be fully “**carbon neutral**,” meaning we will reduce or offset our carbon emissions entirely, including those from our buildings, our vehicles and production in our community.



GUARDRAIL GOAL

A goal identified by the IPCC to avoid catastrophic, irreversible impacts from climate change. The goal equates to keeping the level of CO₂ in the atmosphere below 450 ppm.

Our goal:

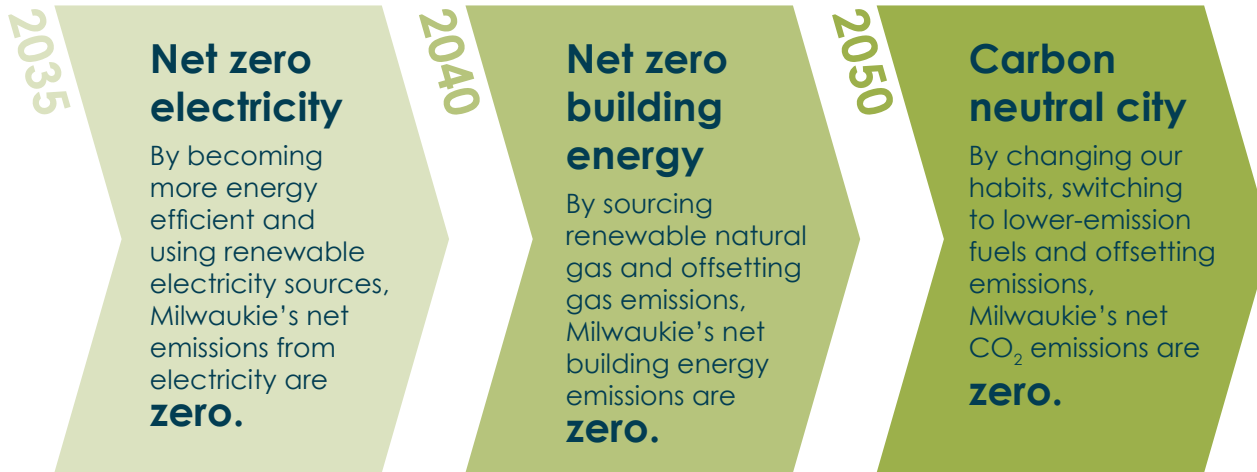
By 2040, Milwaukie’s buildings will have no net emissions, and by 2050, we will be a fully carbon neutral city.

Track our atmospheric CO₂ concentration:

Visit [CO2.earth](https://co2.earth) for the latest figures →

⁶The annual peak usually is in May. Atmospheric concentrations vary seasonally throughout the year and increase in the spring with the winter thaw and release of methane. Concentrations tend to decrease toward the end of summer as a result of accumulated photosynthesis.

Figure 11. Milwaukie's climate action goals



Milwaukie's carbon footprint

In 2016, Milwaukie generated approximately 262,574 metric tons CO₂e of local emissions. Local (“sector-based”) emissions are those that are generated inside of the community’s geographic boundaries, including combustion emissions, emissions from electricity generation that serves the community and gasses that escape into the atmosphere, so-called “fugitive emissions,” such as leaks from gas lines or refrigerants for cooling.

Milwaukie’s local emissions are similar in many ways to other communities around Oregon. The emissions shown in Figure 12 come primarily from combustion of natural gas and electricity use in buildings (green slices of the pie) as well as gasoline and diesel combustion in vehicles to move people and goods (red slices of the pie). Relatively small sources of emissions come from City government operations, landfill disposal of community solid waste, treatment of water and



CARBON FOOTPRINT

The total inventory of greenhouse gas emissions within a geographic area.

Calculate your own carbon footprint!

Use the Oregon Department of Environmental Quality (DEQ) online carbon calculator to estimate your household's carbon footprint. →

What does “no net emissions” or “net zero” mean?

“No net emissions” means overall, Milwaukie’s buildings will either offset or reduce their greenhouse gas emissions completely. In other words, our community’s homes, businesses and structures will emit no more greenhouse gases than they consume, either through energy efficiency, using renewable sources or by purchasing emission offsets. Like a bank account, the “net balance” of greenhouse gas emissions at the end of the year will be zero across all of Milwaukie’s buildings.

By 2035, Milwaukie’s buildings will have no net emissions from electricity. We’ll achieve this by partnering with PGE, our electricity provider, to become more energy efficient and use renewable electricity sources.

By 2040, Milwaukie’s buildings will have no net emissions from all fuels, including gas, oil and propane. We’ll achieve this by buying offsets from source reducing projects first, such as those capping leaking gas wells, sealing distribution system leaks, using bio-methane from wastewater treatment plants and dairy operations, and producing renewable hydrogen as substitutes for traditional methane.

wastewater, and refrigerant gas loss from buildings and vehicles. Milwaukie's industrial sector represents a larger fraction of local emissions compared to other Oregon communities of similar size due to its large employment base, its energy intensive nature (as opposed to an office) and represents an opportunity for emissions reductions.

The greenhouse gas inventory (carbon footprint) only considers items that we can measure or estimate now. The City will endeavor over the coming years to find better data and estimations for our community's emissions and mitigating actions. There are two specific areas to note:

1. Corporate and organizational consumption of materials and the "imported" emissions associated with those are not in our current inventory. These include all the materials that organizations buy that are produced outside of the area such as grain, metal fiber, etc. To date, there is no way to estimate the scale of this due to the variety of entity types and scales.
2. There is currently no accurate way to track the reduction in consumption emissions of households over time without extensive surveying and in-home studies.

As methodologies emerge, Milwaukie will deploy them to be more comprehensive and act on what we learn.

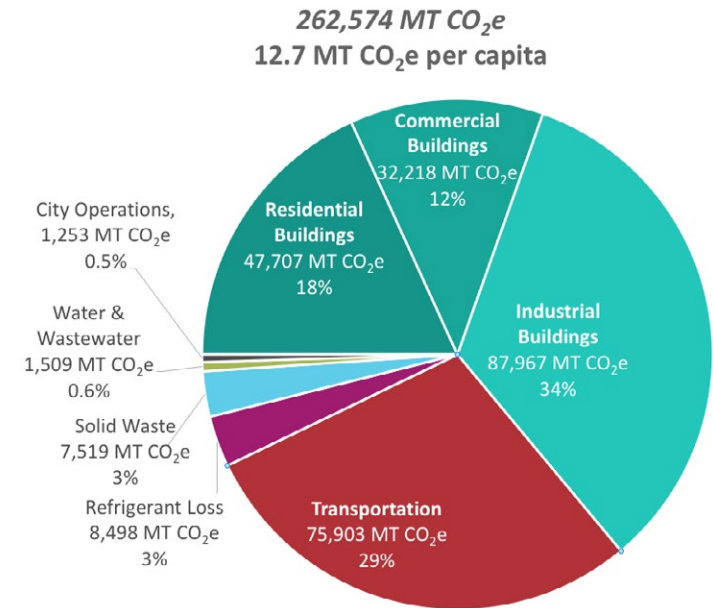
Read more about our community carbon footprint online →



CO₂e

"Carbon dioxide equivalent" - The unit of measurement used to standardize the impact of other greenhouse gases to carbon dioxide

Figure 12. Milwaukie's local greenhouse gas emissions by sector



Emissions definitions

Building emissions include CO₂e from combustion of natural gas and fuels to generate electricity.

Transportation emissions include CO₂e from cars, buses, planes, trains and upstream emissions during the production of vehicle fuels.

Refrigerants are lost from transportation and building cooling systems.

Solid waste includes emissions from disposal in landfills.

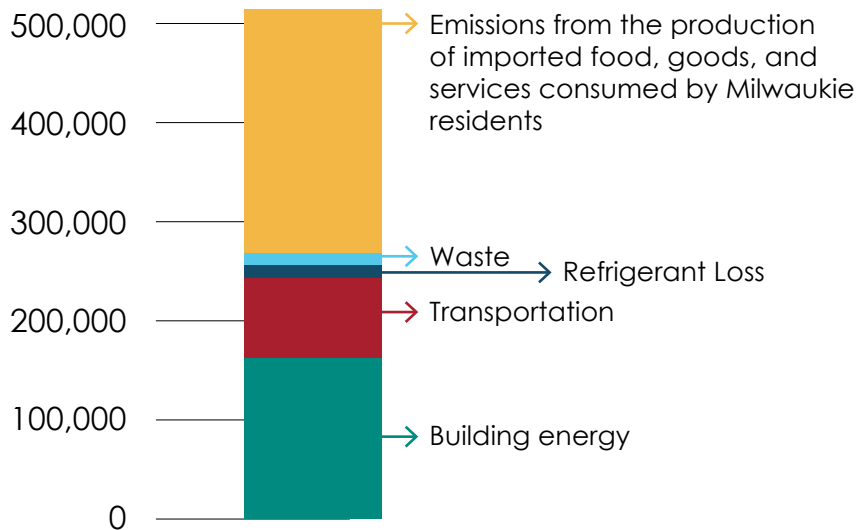
Water & wastewater emissions result from treatment of drinking water and waste water.


City operations emissions include CO₂e resulting from energy use in City-owned facilities and vehicles while providing services to the Milwaukie community.

What about the emissions from goods we buy that are made outside of Milwaukee?

In addition to accounting for local emissions, Milwaukee’s community carbon footprint also considers emissions that are generated outside of the community during the production of goods, food, energy and services that are consumed by residents of Milwaukee. These emissions total approximately 257,175 MT CO₂e. Added to the local emissions, **Milwaukee’s carbon footprint is approximately ~519,749 MT CO₂e** (Figure 13). For a sense of scale, this quantity of emissions is equivalent to the carbon sequestered annually by 600,000 acres of average United States forest – a land area about 400 times the size of the City of Milwaukee.


Figure 13. Milwaukee’s community carbon footprint, including household consumption





LOCAL—OR “SECTOR-BASED”—EMISSIONS

Emissions generated inside of a community’s geographic boundaries plus imported electricity



IMPORTED—OR “CONSUMPTION”—EMISSIONS

Emissions produced outside of a community’s geographic boundaries producing and transporting the goods and materials consumed by our community members

How fast do we have to change?

Our climate action goal implies a specific rate of emissions reduction over a given time (Table 2). On average, our community needs to reduce our emissions by on average 3% each year between now and 2050. While Milwaukie’s goal implies reaching a 100% reduction in emissions by 2050, it also requires that the community continue to reduce emissions “beyond zero” after 2050 to further reduce emissions that are already accumulated in the atmosphere.

Implementation timeline: planned City-led actions

To see how close we will get to that 3% per year average target, technical staff and the CAPC recommended targets for when the City should implement each City-led action or strategy. This “roll out schedule” determines the rate of emissions reduction just from the City-led strategies in this plan (Figure 14, more detailed information is available in [Appendix D](#)). As can be seen by the slope of the solid line in Figure 14, Milwaukie’s Climate Action Plan sets us on a course to reduce our local emissions ahead of the pace needed to reach carbon neutrality by 2050.

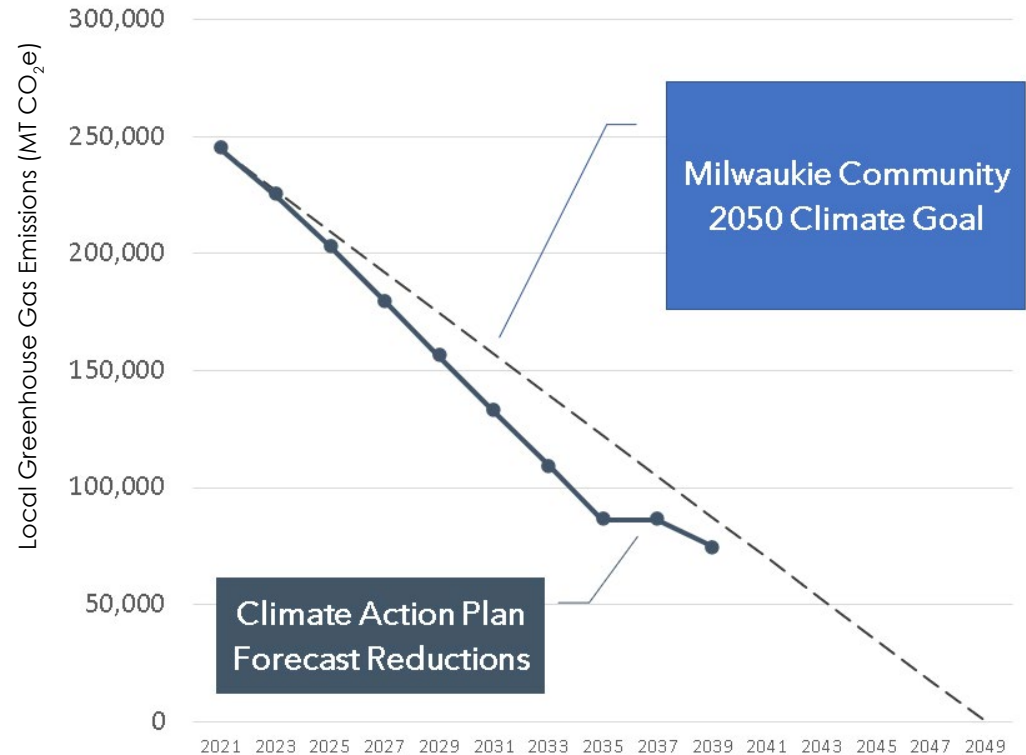
While this is good news, there are several caveats:

- This modeling only looks at local emissions—in other words, emissions produced here and produced in generating the power we use here. It does not include “imported” emissions—the emissions associated with the goods we buy that are produced elsewhere.
- This graph oversimplifies when we will see the true benefit of each City-led action. While we’ve set goals to implement each City-led action in this plan by 2040, the full emissions reduction effect may not be experienced until years after a strategy or policy is put in place.
- Finally, the actions in this plan do not get us all the way to zero. **We still have a considerable gap to make up.**

Table 2. Greenhouse gas reduction benchmarks to reach carbon neutrality by 2050

Target	Greenhouse gas reductions			Average annual reduction
	2020	2030	2050	
Carbon neutral by 2050	15%	35%	100%	3%

Figure 14. Projected emissions reductions from City-led actions and strategies



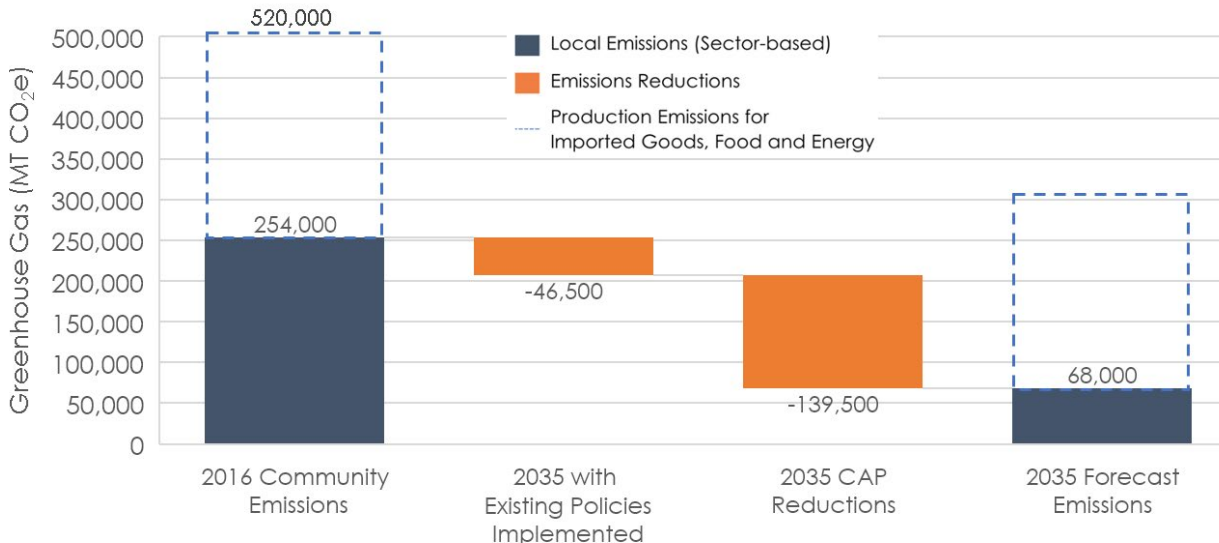
How far do City actions get us?

The project team scaled the mitigation potential of the City-led actions identified in this plan to see how big this gap is.⁷ Figure 15 shows estimated reductions in annual CO₂e emissions by 2035.⁸ The first column shows Milwaukie’s estimated carbon footprint of approximately 520,000 MT CO₂e.⁹ The first orange step down shows the emissions reductions expected from existing regional, state, and federal policies. This is what is frequently called the business as usual (BAU) scenario, in which all existing policies are scaled as if they are to be implemented.

Policies considered include:

- Oregon’s Renewable Portfolio Standard (RPS) to reduce electricity emissions
- Federal Vehicle Corporate Average Fleet Economy (CAFE) standards to reduce our car, truck and bus emissions
- Oregon SB263 Opportunity to Recycle Goal and Recovery Rate Updates (for food waste recovery)
- Montreal Protocol on Refrigerants to reduce the climate warming intensity of the gases that leak
- Energy Trust of Oregon’s Cost-Effective Energy Efficiency

Figure 15. Forecasted emissions reductions from existing policies and Climate Action Plan actions



Read more about the policy context online →

⁷ Actions and strategies recommended for households, businesses and organizations have not been scaled at this time.

⁸ The project team used the year 2035 as it is commonly used by other agencies, policy groups and climate scientists to forecast emissions models. This date allowed for an “apples to apples” comparison of reductions that will occur due to already adopted local, regional and federal policies and reductions from actions in this plan.

⁹ This includes the amount of emissions (CO₂ equivalent) produced in Milwaukie annually from our buildings, vehicles and industry and an estimate for the CO₂ emitted elsewhere to produce the goods Milwaukians consume.

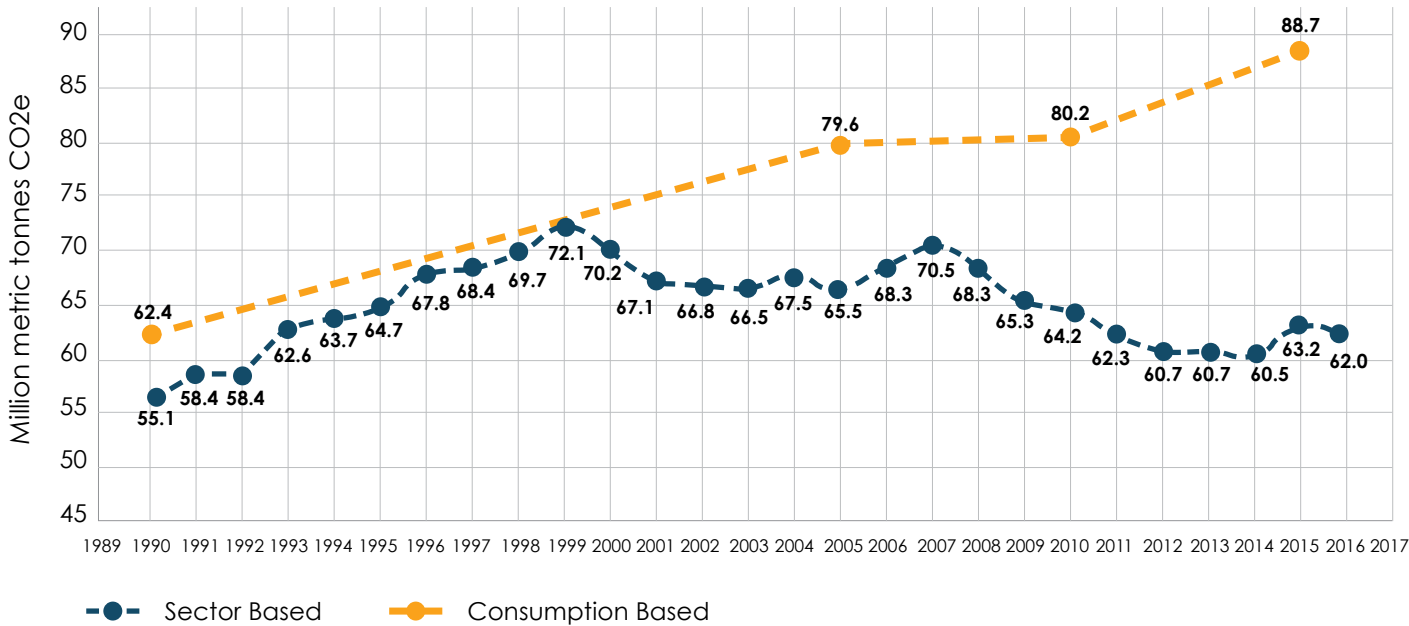
The other orange step in Figure 15 shows us how far the prioritized and scaled City-led actions from this Climate Action Plan get us by 2035. It does not include actions that may be developed in future climate action plans that will help Milwaukie reach carbon neutrality by 2050.

In total, existing policies and the strategies set out in this Climate Action Plan are forecast to reduce emissions by 186,000 metric tonnes of CO₂e – or 73% – compared to 2016 community emissions by 2035.

This leaves a significant gap for us to close by 2050. In short, the City-led actions in this plan along with existing programs at the state, federal and international levels are not enough to achieve our climate goals without other, urgent action. Furthermore, while Oregonians are rapidly de-carbonizing our local emissions, **at the same time, we are buying more goods made elsewhere from higher emitting energy sources and are de-facto increasing our emissions** (see Figure 16).¹⁰ While these emissions don't come from our state, our consumption patterns are responsible for this growth.

Read more about how forecasted emissions reductions were calculated online →

Figure 16. Comparison between sector-based and consumption-based greenhouse gas emissions in Oregon, 1990-2015 - Oregon Department of Environmental Quality, 2018



¹⁰ Oregon DEQ, 2018. "Oregon's Greenhouse Gas Emissions through 2015: An assessment of Oregon's sector-based and consumption-based greenhouse gas emissions."

Closing the gap

What does this mean for our strategy? To reach our goal of being carbon neutral by 2050—in other words, to “close the gap,”—we must accelerate our mitigation efforts, and fast. The United Nations IPCC assumes that carbon neutrality by 2050 will require the dramatic development and deployment of carbon sequestration technologies by 2035, even though most of those technologies are just being thought of now. The effort that is required for this to occur would be of a similar scale to war time efforts that have not been seen since the 1940s.



SEQUESTRATION

Capture, removal and long-term storage of greenhouse gases from the atmosphere



Photo credit: City of Milwaukee

What's it going to take? Current and future carbon removal solutions

Carbon sequestration strategies include natural methods, such as planting trees and increasing agroforestry, and technological advancements, which allow for storage of carbon in rocks and minerals.

Learn more from the Center for Carbon Removal



Next-generation mitigation technologies must take sequestration a step further.

Learn more about 18 priority technologies from the Imperial College of Science, Technology and Medicine in England



Photo credit: City of Milwaukee

The following chapters define the City-led strategies that get us approximately 73% of the way towards reaching carbon neutrality. They also lay out strategies and actions households, businesses and other community members can take to help us close the gap. Bold, urgent action is needed on all levels to achieve the magnitude and rate of change we need to avoid dire effects of climate change. These actions range from simple changes we can all make today to larger strategies that will take coordination and collaboration.

In addition to executing the actions in this plan, the City of Milwaukie will work to build staff and community capacity to further close this gap. These measures include:

- Ensuring that climate action remains a high priority and staffing levels are sufficient to put the plan into action, identify new opportunities for increased action, and provide support to community members and partners.
- Enabling collaboration between City departments on engagement, information exchange and education.
- Reviewing and updating the Climate Action Plan every five years and updating the community carbon footprint every two years. This plan is a *living document*—as new technologies are developed and information becomes available, the City may make updates to it more frequently than every five years.
- Developing progress reports annually.



4. Topic-specific strategies and actions

The following chapters set out specific actions and strategies for the Milwaukie community to take to move toward our climate action goals.¹¹







Types of actions

The City implementation actions are categorized into mitigation strategies and adaptation strategies.

- **Mitigation actions** will reduce the emissions that come from producing energy to make our goods, food and to move us, keep us warm and keep us cool.
- **Adaptation actions** will prepare for the changing physical conditions that are arriving now, such as warmer temperatures and wildfire increases.
- **Sequestration actions** will capture carbon and pull greenhouse gases out of the atmosphere.

Table 3 summarizes the number of actions per topic category:

Table 3. Number of City-led actions per topic

Topic	City-led mitigation actions	City-led adaptation actions	City-led sequestration actions
 Building energy and efficiency	8	1	
 Vehicles and fuels	7	2	
 Land use and transportation planning	10	4	
 Materials use, purchasing and recovery	7		
 Natural resources		8	1
 Public health and emergency preparedness		5	
Total	33	19	1

How to read the topic chapters:

1. The first section provides an overview of that category of emissions and what “piece of the pie” they represent.
2. The second section summarizes City-led actions and strategies and how far these will get us toward our climate action goals.
3. The third section lists key steps Milwaukie households can take to further help us close the gap.
4. The fourth section lists key steps for Milwaukie businesses, groups and organizations.

¹¹ Actions and strategies are categorized into six thematic topics. These topics were identified to align with other climate planning efforts and provide a framework for discussion and evaluation.

Understanding City-led actions

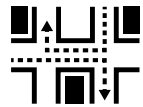
The project team analyzed the City-led actions and strategies based on when they should be implemented, mitigation potential (where possible), anticipated net cost savings/expenditure, and their potential for achieving other “co-benefits.” Tables in each chapter summarize the results of this analysis using the following key:



Building Energy and Efficiency



Vehicles and Fuels



Land Use and Transportation Planning



Materials Use, Purchasing and Recovery



Natural Resources



Public Health and Emergency Preparedness

Implementation

- O** City operations
- L** City law/code
- E** City educates
- SF** City partners to lobby state and federal government
- C** City partners for collective action
- P** Partners lead

Implementation timescale

- Short-term = 0 – 2 years
- Mid-term = 3 – 6 years
- Long-term = 6+ years

Carbon impact

- Reduces annual GHG emissions by less than 500 metric tonnes or lays the foundation for other efforts, though by itself may not reduce emissions measurably
- Reduces total annual GHG emissions by 500 to 1,000 metric tonnes
- Reduces total annual GHG emissions by 1,000 to 2,500 metric tonnes
- Reduces total annual GHG emissions by 2,500 to 5,000 metric tonnes
- Reduces total annual GHG emissions by more than 5,000 metric tonnes

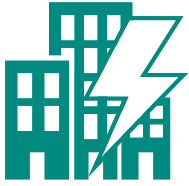
Cost/savings per MT CO₂e reduced

- \$** \$0 - \$40 \$ Net savings per MT CO₂e reduced
- \$\$** \$41 - \$360
- \$\$\$** \$361 - \$680 \$ Net cost per MT CO₂e reduced
- \$\$\$\$** \$681 - \$1,000

Co-benefits

- Addresses Milwaukee's superactions
- Opportunity for social equity
- Mitigates and adapts in one action
- Revenue generation or cost avoidance
- Leverages existing efforts
- Community support

BUILDING ENERGY AND EFFICIENCY

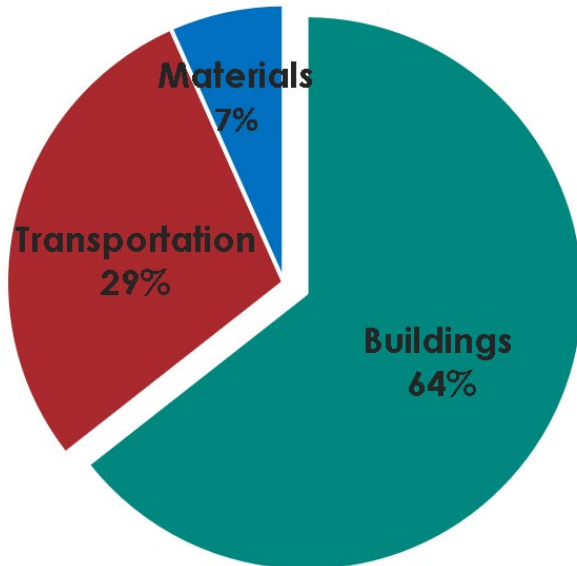


This chapter discusses reducing emissions from the energy used to power our homes and offices, run our appliances and build new structures.

Why it matters

Building energy comprises 64% of our community's local carbon footprint (Figure 17). We use energy in our homes to make ourselves comfortable, provide light at night, preserve our food, wash our clothes and bodies and run our electronics. At work, we use energy for many of the same things, but also for making money via the production of goods, services or knowledge. Milwaukie's portion of building energy derived emissions is greater than most other Oregon communities, due to the large industrial base that remains in our community.

Figure 17. Building energy portion of all local emissions in Milwaukie



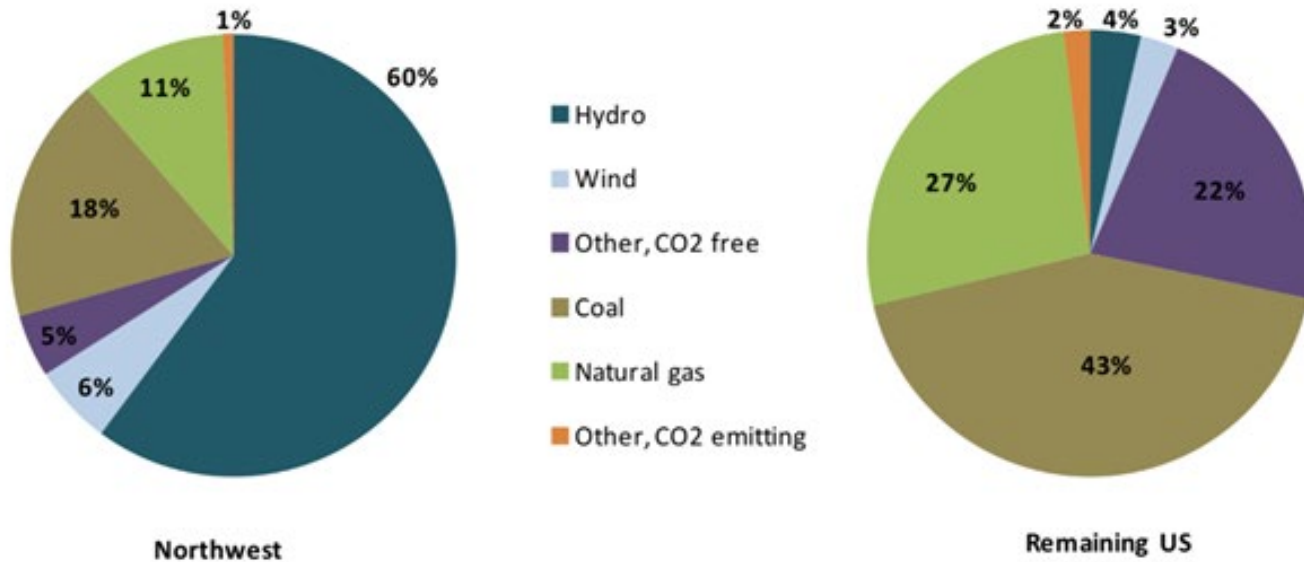
The energy we use in buildings is predominantly composed of methane burned onsite to produce heat and electricity, which is made from many sources of power generations including hydropower, coal, methane, and solar. Figure 18 shows the distribution of power generation types in the Pacific Northwest and in the United States. While the carbon content of the Pacific Northwest's power generation is lower than the rest of the United States, the region's electric utilities still have a long way to go to reduce emissions from our power.¹²

Building energy and efficiency related plans and policies

- [Milwaukie Community Vision](#)
- [Milwaukie Comprehensive Plan](#)
- [Clackamas County Sustainability Policy](#)
- [Clackamas County Natural Hazards Mitigation Plan](#)
- [North Clackamas School District #12 Policies](#)
- [PGE Integrated Resource Plan](#)
- [Energy Trust of Oregon Strategic Plan](#)
- [Metro Climate Smart Strategy](#)
- [Oregon Renewable Portfolio Standard](#)
- [Oregon Biennial Energy Plan](#)
- [Oregon 10-year Energy Plan](#)

¹² Pacific Northwest Utilities Conference Committee, 2014. "Carbon Emissions – a Northwest Perspective."

Figure 18. Power generation mix in the Pacific Northwest compared to the rest of the United States – PNUCC 2014



Reducing our need for power starts first and foremost with [energy efficiency](#). Once we've improved the efficiency of our buildings through weatherization and other specific efforts, we then must look to purchasing more renewable or low carbon power. In Milwaukie, this means subscribing to [NW Natural's Smart Energy Program](#), which buys carbon offsets for the use of your gas, and [PGE's Green Source](#) or [Clean Wind programs](#). Milwaukie is already working with both partners to develop plans for meeting our emission reduction goals.



Solar panels at MAX Station



Rendering of new Ledding Library

What are we already doing to reduce our building emissions?

- Purchasing 76.7% of the City's electricity through Portland General Electric's (PGE) [Clean Wind Tariff](#).
- Retrofitting the [City's Ledding Library](#) to use 1/6 of its former energy.
- Enrolling in the Energy Trust's [Strategic Energy Management \(SEM\) Program](#), which teaches businesses and governments energy management best practices.
- Partnering with [Ameresco](#) to fund a contract to replace heating, ventilation and air conditioning (HVAC) controls and lighting in City facilities with more efficient systems.
- Implementing the "[Solarize Milwaukie](#)" program, including a goal to achieve 2.2 megawatts of rooftop solar energy by 2021.



MILWAUKIE CLIMATE ACTION CHAMPION

Katie Newell

Connection to Milwaukie: Ledding Library Director

How are they taking climate action?

Overseeing the construction of a new, more efficient community library

“As a City, we are seeking to be leaders in energy efficiency. By constructing a new library that embodies these energy savings, it demonstrates how dedicated the City is to leading the way in climate action. [The new library] will see our Energy Use Index (EUI) decrease from its current score of 146 to 23. With the addition of solar panels there will be certain days where our electric use will be close to zero.

We will encourage Milwaukians to follow our example of installing solar panels, radiant floors, and energy efficient systems that will not only reduce electricity use, but will also save money on utilities and thus save money for the citizens of Milwaukie. A win/win result!”

City-led strategies and actions

Prioritized City-led mitigation strategies

Table 4 presents the City-led strategies and actions prioritized through the climate action planning process related to building energy and efficiency. The table summarizes the City’s role in each action, the approximate timescale for implementation, relative levels of greenhouse gas reductions, and the net cost or savings per MT CO₂e reduced (this cost/savings is assumed by the lead implementer of the action). The table also shows the results of the project team’s co-benefits analysis.

Table 4. Building energy and efficiency – City-led mitigation strategies

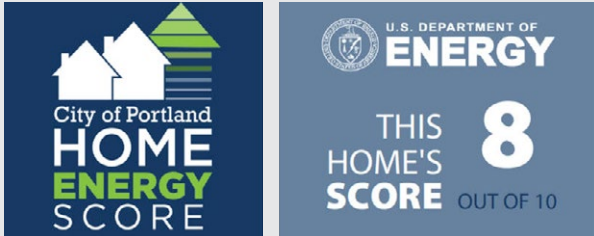
MITIGATION STRATEGIES Building Energy and Efficiency		How will this be implemented?	Implementation timescale	Potential GHG reductions	Cost/savings per MTCO ₂ e reduced	Co-benefits
IN PROGRESS	Work with PGE to become "net zero" from electricity by 2035	C	Long term	██████████ x10	Cost data unavailable	3 — 2 — 1 — [Checkmark] [AT&T] [Double arrow] [Dollar] [People] [Thumbs up]
	Engage NW Natural to develop strategy for becoming "net zero" from natural gas by 2040	C	Long term	██████████ x10	\$	3 — 2 — 1 — [Checkmark] [AT&T] [Double arrow] [Dollar] [People] [Thumbs up]
IN PROGRESS	Adopt a commercial and residential building energy score program based on the City of Portland's	L C	Mid term	██████████	\$\$	3 — 2 — 1 — [Checkmark] [AT&T] [Double arrow] [Dollar] [People] [Thumbs up]
	Develop micro-grids and energy storage systems in conjunction with purchasing renewable power	SF P	Long term	██████████	\$\$	3 — 2 — 1 — [Checkmark] [AT&T] [Double arrow] [Dollar] [People] [Thumbs up]
	Work with PGE to implement demand response programs	C	Long term	██████████	Cost data unavailable	3 — 2 — 1 — [Checkmark] [AT&T] [Double arrow] [Dollar] [People] [Thumbs up]
	Advocate for more energy efficiency state building codes	SF	Mid term	██████████	\$	3 — 2 — 1 — [Checkmark] [AT&T] [Double arrow] [Dollar] [People] [Thumbs up]
	Incentivize property owners to encourage multifamily housing energy efficiency upgrades	L C	Long term	██████████	\$\$	3 — 2 — 1 — [Checkmark] [AT&T] [Double arrow] [Dollar] [People] [Thumbs up]
	Develop a community solar project	C	Long term	██████████	\$\$	3 — 2 — 1 — [Checkmark] [AT&T] [Double arrow] [Dollar] [People] [Thumbs up]

City operations	City law/code	City educates	City partners for collective action	Partners lead, City participates	City partners to lobby state/feds	Short term	net savings	3 high
Addresses Milwaukee's superactions	Opportunity for social equity	Mitigates and adapts in one action	Revenue generation of cost avoidance	Leverages existing efforts	Community support	Mid term	net expenditure	2 medium
						Long term		1 low

Plan to Action! Ways Milwaukie can get to work

Commercial and Residential Energy Score System

Milwaukie will adopt a commercial and residential energy score program as part of this plan. Other cities, including Portland, use energy score systems to catalyze change and encourage energy efficiency improvements.



Example energy score card from the City of Portland's home energy score program (City of Portland)

PGE Path to Zero

Milwaukie is working with PGE on a comprehensive “Path to Zero” strategy for our community. Energizing Milwaukie’s future has four key components:

Infrastructure	Energy Mix	Transportation Electrification	Clean Energy Future Challenge
<ul style="list-style-type: none"> • Smart, more efficient streetlights: Replacement of non-LED streetlights downtown with LED smart lights 	<ul style="list-style-type: none"> • Green future city: Opportunity to purchase bundled Renewable Energy Certificates • Smart neighborhoods project: Demonstration showing the potential for energy storage, expanded demand response and rooftop solar 	<ul style="list-style-type: none"> • Electric vehicle (EV) charging stations: Implementation of more EV stations downtown and at multi-family complexes • Electric shuttles and buses: Opportunities to bring electrified transit to Milwaukie • Public works vehicle conversion: Replacement of City vehicles with EVs 	<ul style="list-style-type: none"> • A year-long, co-branded campaign to support Milwaukie’s goal to become a Net Zero Electricity city by 2035.

Prioritized City-led adaptation strategies

The City of Milwaukee must also act to plan for future physical conditions to ensure safety and ongoing service to the community. The strategy in Table 5 will help Milwaukee prepare our buildings for resilience in weather events.

Table 5. Building energy and efficiency – City-led adaptation strategy

ADAPTATION STRATEGIES Building Energy and Efficiency			
Action	How will this be implemented?	Implementation timescale	Co-benefits
Implement solar, battery storage, and micro-grids for resilience in weather events	C		

City operations	City law/code	City educates	City partners for collective action	Partners lead, City participates	City partners to lobby state/feds	Short term	3 high
Addresses Milwaukee's superactions	Opportunity for social equity	Mitigates and adapts in one action	Revenue generation of cost avoidance	Leverages existing efforts	Community support	Mid term	2 medium
						Long term	1 low

Emissions reductions over time from prioritized City-led actions

Figure 19 shows the expected rate of local greenhouse gas emissions overtime due to these City-led actions. Table 6 shows the actual projected emissions reductions from these actions every two years until 2035. More information on emissions reductions is available in [Appendix D](#). Overall, these actions put us on course to reduce emissions ahead of the pace needed to reach our 2050 goal of carbon neutrality. However, there is still a gap to get completely to zero.

Figure 19. Rate of emissions reductions from City-led building energy and efficiency actions and strategies

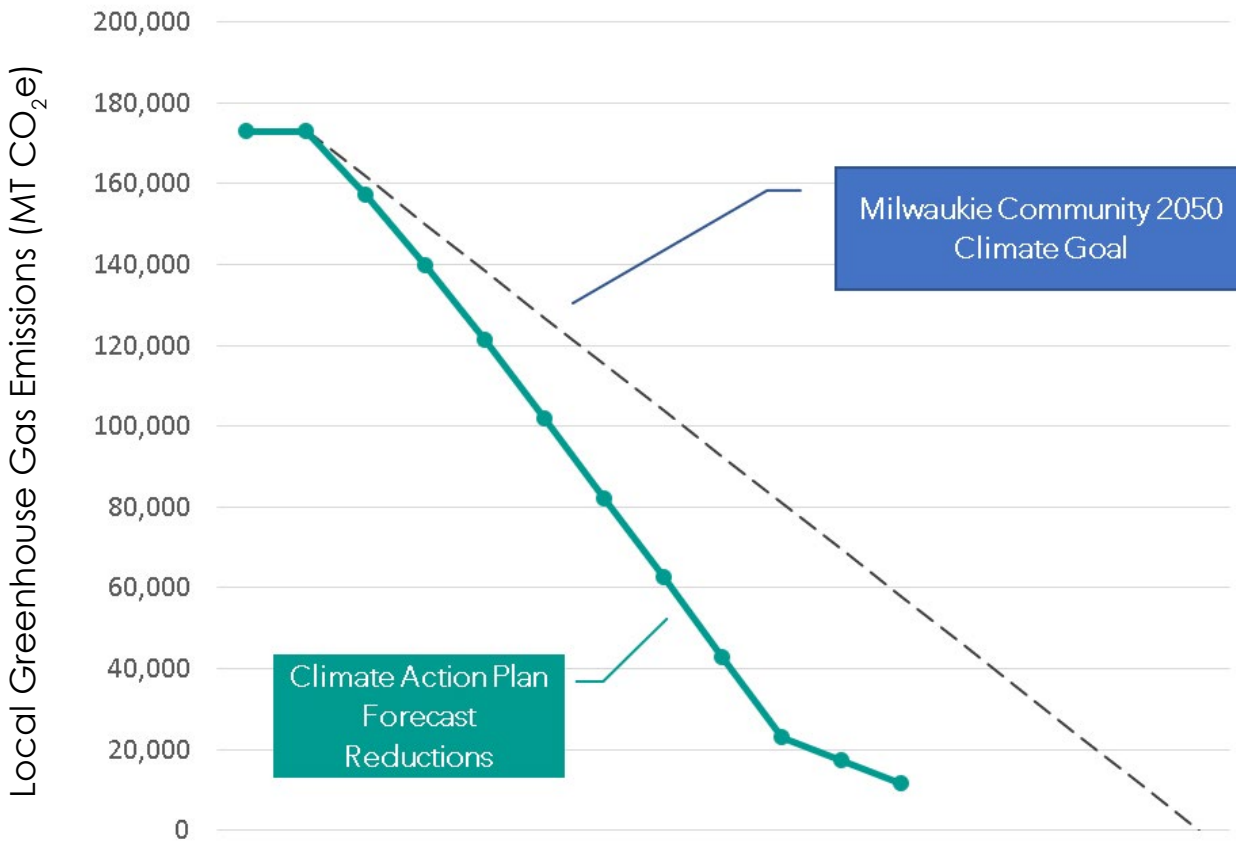


Table 6. Projected emissions reductions from City-led building energy and efficiency actions and strategies

	2021	2023	2025	2027	2029	2031	2033	2035
Reductions from prioritized City-led strategies in the Climate Action Plan (MT CO ₂ e)	11,321	23,943	37,581	52,459	67,337	82,215	97,093	111,971

Mind the gap: How much more do we have to do?

Looking ahead to the full implementation of the plan (including natural gas-related strategies that will be implemented after 2035), City-led strategies and the actions already planned through existing policies at the local, state and federal level result in a 93% reduction in total local greenhouse gas emissions related to building energy and efficiency (Figure 20). *Note: this does not include household or corporate consumption. This leaves a gap of 7% to get to carbon neutral from building energy.* To close this gap, Milwaukee households, businesses and other organizations must also take swift action.

Figure 20. Reduction in 2016 greenhouse gas emissions from building energy and efficiency City-led strategies and existing policies and gap to close to be carbon



Closing the gap: Household and organizational actions

The following pages provide ideas for ways households, organizations and businesses can take action and help us close the gap and reach our goals.

HOUSEHOLD STRATEGIES

Ways Milwaukie households can help us reach our climate action goals



Buy green electricity

Switch to renewable and cleaner energy sources to power your home

[Enroll in PGE's Green Source program](#)



Start using Smart Energy

If you have natural gas, learn how to reduce your use and offset the rest

[Enroll in NW Natural's Smart Energy program](#)



Give your house a quick efficiency makeover

Switch to LED light bulbs and put on low flow faucet and shower heads to reduce hot water consumption

[Learn the easy changes you can make from the Energy Trust of Oregon](#)

Go tiny! Live in a smaller house or apartment

[Learn about the environmental benefits of downsizing](#)

Look for the ENERGY STAR label when upgrading home appliances

[See how much energy you could save with the ENERGY STAR calculator](#)

Wash your clothes in cold water

[Learn more from coldwatersaves.org](#)

Insulate and weatherize your home

[Learn how from the Energy Trust of Oregon](#)

When reroofing, choose a lighter color or reflective roof

[Learn the benefits from the Global Cool Cities Alliance](#)

Switch from natural gas or propane heat to electric heat pumps

[Read more from the Union of Concerned Scientists](#)

Participate in demand response programs

[Enroll in PGE's programs today](#)

Consider developing an accessory dwelling unit on your property

[Get the latest info from the City of Milwaukie](#)

ORGANIZATION STRATEGIES

Ways Milwaukie businesses and organizations can help us reach our climate action goals



Buy green electricity

Switch to renewable and cleaner energy sources to power your business

[Enroll in PGE's Green Future program](#)



Start using Smart Energy

If you have natural gas, learn how to reduce your use and offset the rest

[Enroll in NW Natural's Smart Energy program](#)



Employ lean management strategies

Adjust the way your team works to reduce energy usage

[Find a training at University of Portland](#)

Get a building energy audit and evaluate conservation opportunities

[Connect with the Energy Trust of Oregon](#)

Switch from natural gas or propane heat to electric heat pumps

[Read more from the Union of Concerned Scientists](#)

Insulate and weatherize for hot or cool seasons

[Learn how from the Energy Trust of Oregon](#)

Upgrade lighting and install occupancy sensors or timers

[Discover incentives from the Energy Trust of Oregon](#)

When reroofing, choose cool or reflective roof

[Learn the benefits from the Global Cool Cities Alliance](#)

Look for the ENERGY STAR label when upgrading workplace appliances

[See how much energy you could save with the ENERGY STAR calculator](#)

Install smart power strips at workstations with three or more peripherals

[Get the facts from the National Renewable Energy Laboratory](#)

Install solar panels

[Learn about incentives available through the Energy Trust of Oregon](#)

VEHICLES AND FUELS

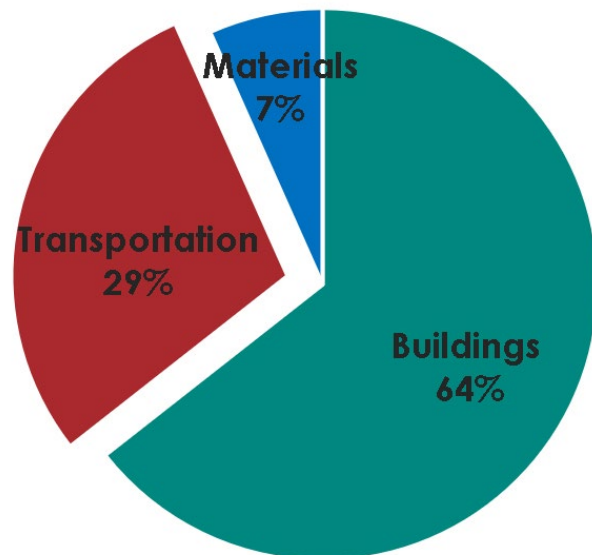


This chapter discusses strategies for reducing emissions from the vehicles we use to travel around our community for work, play or errands. Transportation systems such as bike lanes and mass transit are covered in Land Use and Transportation Planning, the next chapter.

Why it matters

We get around and move goods in our community in many different ways: by car, truck, bus, motorcycle and more. Emissions from all these modes add up to 29% of Milwaukie's carbon footprint (Figure 21).

Figure 21. Transportation proportion of all local emissions in Milwaukie



Powered vehicles can be run on electricity or fuels. Fuels generally are most greenhouse gas intensive but are currently the most common. That said, there are low carbon fuels that can make large reductions in those emissions including biodiesel and renewable diesel – especially from used cooking oil, renewable natural gas from wastewater and dairy farm digesters, and other fuels such as cellulosic ethanol made from agricultural or forest waste as they become available in the area.

Always consider biking or transit, but when you must drive, an electric vehicle is absolutely the best option, especially if powered with low carbon or renewable power and for predictable trips in town or inside the range of the vehicles, such as your work commute. For heavy duty vehicles, there are many choices for lower carbon alternatives, but the market is more dynamic, meaning the power trains range from compressed natural gas, to propane, to renewable and bio-diesel (made from low carbon feedstocks) to battery electric and fuel cell electric trucks.

Vehicles and fuels-related policies and plans

- [Milwaukie Comprehensive Plan](#)
- [Milwaukie Transportation System Plan](#)
- [Clackamas County Sustainability Policy](#)
- [PGE Integrated Resource Plan](#)
- [Oregon 10-year Energy Plan](#)
- [Oregon Statewide Planning Goals](#)
- [Oregon Clean Fuels Program](#)
- [Federal Corporate Average Fuel Economy \(CAFE\) standards](#)



MILWAUKIE CLIMATE ACTION CHAMPION

Vic Foley

Connection to Milwaukie: City of Milwaukie Lead Mechanic

How are they taking climate action?

Helping the City move away from inefficient and polluting vehicles to sustainable technology and transport options.

“It is extremely important to start transitioning to cleaner alternatives now, such as electric vehicles and vehicle sharing, instead of paying the monetary and health costs down the road, which will be magnitudes higher and possibly irreversible.”

Plan to Action! Ways Milwaukie can get to work

Electric Vehicle “Electric Avenue”

PGE and the City of Milwaukie are partnering on the development of a new electric avenue EV charging hub in downtown Milwaukie. The newest Electric Avenue will be on Highway 99E, between SE Jackson and Monroe Streets, a location strategically selected for its high use and visibility to expand access to and awareness of the benefits of driving electric. With six ports, charging options will be available for any type of EV.



What are we already doing to reduce our vehicle emissions?

- Purchased three electric vehicles to replace City administrative cars.
- Installed a public electric vehicle charging station and a City fleet charging station.
- Partnering with PGE to construct an “[Electric Avenue](#)” charging station at the intersection of Southeast Jackson Street and Southeast McLoughlin Boulevard.

City-led strategies and actions

Prioritized City-led mitigation strategies

Table 7 presents the strategies and actions prioritized through the climate action planning process related to vehicles and fuels. The table summarizes the City’s role in each action, the approximate timescale for implementation, relative levels of greenhouse gas reductions, and the net cost or savings per MT CO₂e reduced (this cost/savings is assumed by the lead implementer of the action). The table also shows the results of the project team’s co-benefits analysis.

Table 7. Vehicles and fuels – City-led mitigation strategies

MITIGATION STRATEGIES Vehicles and Fuels					
Action	How will this be implemented?	Implementation timescale	Potential GHG reductions	Cost/savings per MTCO ₂ e reduced	Co-benefits
Incentivize workplace electric vehicle charging in parking lots	L E	Short term	4 bars	\$	3: ✓, 2: Δ, 1: >>, \$, 👤, 👍
Support outreach efforts to encourage shift to electric vehicles	E	Short term	4 bars	\$\$	3: ✓, 2: Δ, 1: >>, \$, 👤, 👍
Create a program to install electric vehicle charging infrastructure at multi-family housing complexes	L E	Short term	2 bars	\$	3: ✓, 2: Δ, 1: >>, \$, 👤, 👍
Convert diesel-powered heavy fleet vehicles to low carbon fuels	O	Short term	1 bar	\$\$	3: ✓, 2: Δ, 1: >>, \$, 👤, 👍
Optimize the City's light duty fleet and replace least efficient vehicles with more efficient vehicles	O	Short term	1 bar	\$\$	3: ✓, 2: Δ, 1: >>, \$, 👤, 👍
Work with Clackamas County, TriMet and Metro to develop micro-transit from park-and-ride or light rail station to local destinations	P	Short term	Not scalable	Not scalable	3: Δ, 2: \$, 👤, 👍, 1: ✓, >>
Work with school district, and waste haulers on fleet transition	P	Short term	Data unavailable	Data unavailable	3: \$, 👤, 👍, 2: ✓, Δ, >>, 1: >>

O City operations	L City law/code	E City educates	C City partners for collective action	P Partners lead, City participates	SF City partners to lobby state/feds	Short term	\$ net savings	3 high
✓ Addresses Milwaukie's superactions	Δ Opportunity for social equity	>> Mitigates and adapts in one action	\$ Revenue generation of cost avoidance	👤 Leverages existing efforts	👍 Community support	Mid term	\$ net expenditure	2 medium
						Long term		1 low

Prioritized City-led adaptation strategies

The City of Milwaukee must also act to plan for future physical conditions to ensure safety and ongoing service to the community. The strategies in Table 8 will help Milwaukee prepare its fleet and fuel storage for climate change.

Table 8. Vehicles and fuels – City-led adaptation strategies

ADAPTATION STRATEGIES | Vehicles and Fuels

Action	How will this be implemented?	Implementation timescale	Co-benefits
Review location of fleet yard and fuel storage to examine flood vulnerability. Look at fuel movement during flood conditions and diversify fuel sources to prepare for climate event-related import challenges.			
Implement intergovernmental agreements or MOUs with other agencies for fleet support in emergencies (e.g. large-scale debris removal)			

City operations	City law/code	City educates	City partners for collective action	Partners lead, City participates	City partners to lobby state/feds	Short term	3	high
Addresses Milwaukee's superactions	Opportunity for social equity	Mitigates and adapts in one action	Revenue generation of cost avoidance	Leverages existing efforts	Community support	Mid term	2	medium
						Long term	1	low



Emissions reductions over time from prioritized actions

Figure 22 shows the expected rate of local greenhouse gas emissions from transportation over time due to City-led actions. The action plan forecast in this graph includes the effect of City-led actions related to vehicles and fuels and the City-led actions in the next section on land use and transportation planning. Table 9 shows the actual projected emissions reductions just from vehicles and fuels actions every two years until 2035. More information on emissions reductions is available in [Appendix D](#). Overall, City-led actions related to transportation will not be enough to get us to our goal of carbon neutrality by 2050.

Figure 22. Rate of emissions reductions from City-led transportation actions and strategies

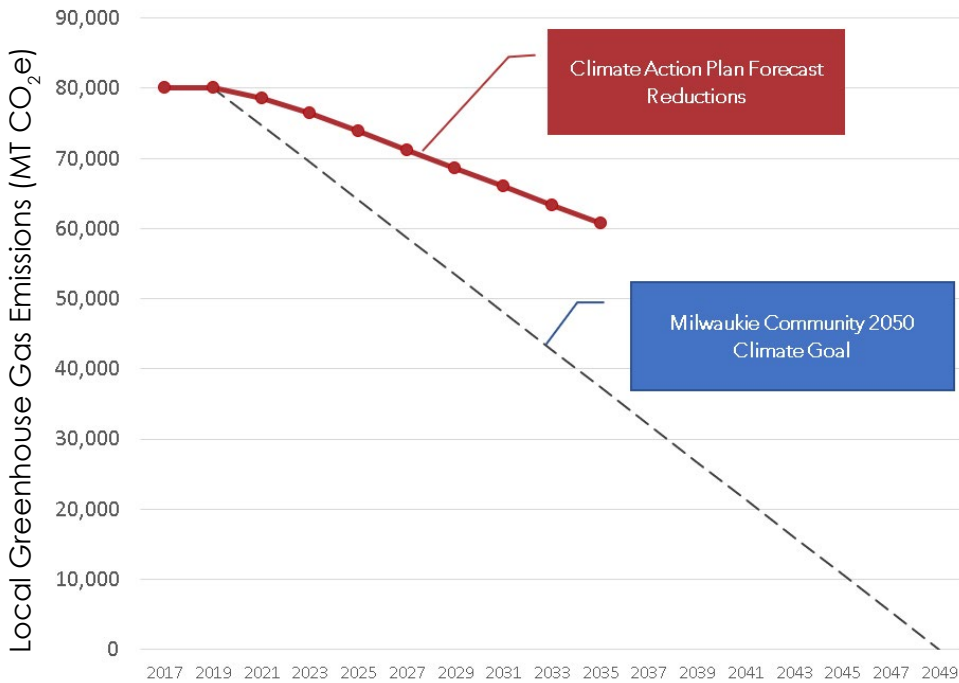


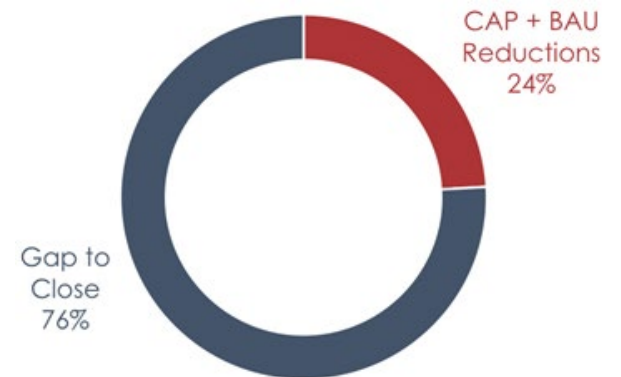
Table 9. Projected emissions reductions from City-led vehicles and fuels actions and strategies

	2021	2023	2025	2027	2029	2031	2033	2035
Reductions from prioritized City-led strategies in the Climate Action Plan (MT CO ₂ e)	0	616	1,731	2,847	3,963	5,079	6,194	7,310

Mind the gap: How much more do we have to do?

The City-led strategies in this plan and the actions already planned through existing policies at the local, state and federal level result in a 24% reduction in total local greenhouse gas emissions related to vehicles and fuels (Figure 23). *Note: this does not include emissions from household or corporate consumption. This leaves a gap of 76% to get to carbon neutral from fleets and fuels emissions.* To close this gap, Milwaukee households, businesses and other organizations must also take swift action.

Figure 23. Reduction in 2016 greenhouse gas emissions from vehicles and fuels City-led strategies and existing policies



Closing the gap: Household and organizational actions

The following pages provide ideas for ways households, businesses and organizations can take action and help us close the gap and reach our goals.

HOUSEHOLD STRATEGIES

Ways Milwaukie households can help us reach our climate action goals



Reduce your air travel

Consider alternative travel options that are less impactful

[Learn more about the impact of air travel from the New York Times](#)

If possible, telecommute or carpool to avoid transportation emissions

[Discover carpooling connections from Drive Less Connect](#)

Bike, walk or take public transit to work

[Get all the info you need from Metro](#)

Consider ridesharing, bike-sharing and scooter-sharing opportunities rather than owning a car if they are carbon neutral, electric or hybrid

[Learn the latest from Metro](#)



Buy carbon credits to offset your impact

Can't avoid the trip? Buy a credit to help mitigate the impact

[Check out the options on Terrapass](#)



Choose a green vehicle

Consider an electric vehicle, hybrid or car with high mileage-per-gallon

[Learn how you could save money through the Oregon Clean Vehicle Rebate Program](#)

ORGANIZATION STRATEGIES

Ways Milwaukee businesses and organizations can help us reach our climate action goals



Invest in green vehicles

If buying or leasing a new vehicle for your fleet, consider an electric, hybrid or high mileage vehicle

[Learn how you could save money through the Oregon Clean Vehicle Rebate Program](#)



Help your employees reduce their travel emissions

Use telecommuting and video conferencing when possible

[Learn about telework options from the U.S. General Services Administration](#)



Incentivize transit

Provide incentives or purchase passes for employees who choose to commute by public transit, alternative transportation or carpooling

[Get all the info you need from Metro](#)

Install showers in your workplace and provide bike parking to encourage active transportation among your employees or members

[Learn more ideas to encourage bike commuting](#)

Locate your business or organization and hold events near transit connections

[Consult TriMet for the latest transit information](#)

Consider ridesharing, bike-sharing and scooter-sharing opportunities if they are carbon neutral, electric or hybrid

[Learn the latest from Metro](#)

Host a “commute clinic” to encourage active transportation

[Engage the Street Trust about a possible commute clinic](#)

Offset air travel

[Check out the options on Terrapass](#)

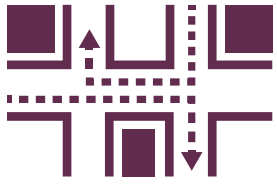
Install electric vehicle charging stations for customers and employees

[Connect with PGE](#)

Promote a “no idling” policy with your motor fleet and vendors who deliver goods and services

[Consult the National Idling Reduction Network for ideas](#)

LAND USE AND TRANSPORTATION PLANNING

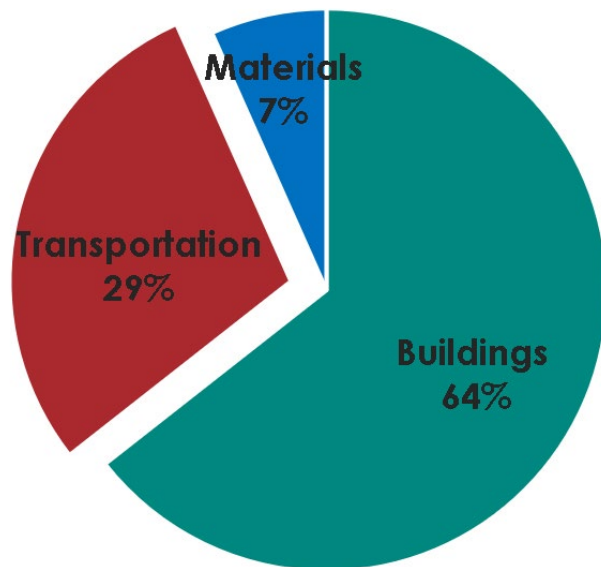


This chapter discusses land use, zoning and transportation planning efforts that could make our urban form more sustainable and make it easier for people to choose the mode of transportation that works for them the best.

Why it matters

As discussed in the previous chapter, transportation emissions amount to 29% of our total community carbon footprint (Figure 24). Generally, a well-planned community allows people to live and get to their essential needs and services within a 20-minute walk. Also, zoning sets the stage for denser housing, which often reduces the size of dwellings, leading to less consumption of energy and goods. Essentially, a densely planned city with a strong transportation network allows for a more efficient society and more efficient use of household funds.

Figure 24. Transportation proportion of all local emissions in Milwaukie



Land use and transportation-related plans and policies

- [Milwaukie Community Vision](#)
- [Milwaukie Comprehensive Plan](#)
- [Central Milwaukie Land Use and Transportation Plan](#)
- [Milwaukie Downtown and Riverfront Land Use Framework Plan](#)
- [Milwaukie Transportation System Plan](#)
- [Milwaukie Water, Wastewater and Stormwater master plans](#)
- [Milwaukie-specific park plans](#)
- [Clackamas County Sustainability Policy](#)
- [Clackamas County Natural Hazards Mitigation Plan](#)
- [PGE Integrated Resource Plan](#)
- [Metro Climate Smart Strategy](#)
- [Oregon Biennial Energy Plan](#)
- [Oregon 10-year Energy Plan](#)
- [Oregon Statewide Planning Goals](#)
- [Oregon Greenhouse Gas Goals](#)



MILWAUKIE CLIMATE ACTION CHAMPION

David Levitan

Connection to Milwaukie: Milwaukie Senior Planner

How are they tackling climate action?

Leading the comprehensive planning process

“Milwaukie is projected to add several thousand new jobs and residents in the next two decades. Climate change will have a direct impact on how we grow, so it is essential to incorporate adaptation and mitigation strategies into the planning process.”

“It may seem like Milwaukie is too small to make a difference. However, when taken collectively with actions taken by communities throughout the world, minor changes in our behavior can make a major difference.”

What are we already doing to reduce emissions from a land use and transportation planning perspective?

- Providing a “green building energy bonus” allowing additional stories for more energy-efficient construction
- Developing 27.9 miles of sidewalks, four miles of bike lanes and 900 sidewalk ramps between 2019 and 2021 as part of the “Safe Access for Everyone” program

City-led strategies and actions

Prioritized City-led mitigation strategies

Table 10 presents the strategies and actions prioritized through the climate action planning process related to land use and transportation planning. The table summarizes the City’s role in each action, the approximate timescale for implementation, relative levels of greenhouse gas reductions, and the net cost or savings per MT CO₂e reduced (this cost/savings is assumed by the lead implementer of the action). The table also shows the results of the project team’s co-benefits analysis.



Axletree Development in downtown Milwaukie

Table 10. Land use and transportation planning – City-led mitigation strategies

MITIGATION STRATEGIES Land Use and Transportation Planning					
Action	How will this be implemented?	Implementation timescale	Potential GHG reductions	Cost/savings per MTCO ₂ e reduced	Co-benefits
<p>IN PROGRESS</p> <p>Implement the Safe Access for Everyone (SAFE) street and sidewalk improvement program to expand bike and pedestrian access</p>	O C	Short term	Emissions already incorporated into BAU forecast		<p>3 —</p> <p>2 —</p> <p>1 —</p> <p>Addresses Milwaukee's superactions, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, Community support</p>
<p>Partner with Metro and TriMet to increase transit service, particularly to underserved employment areas</p>	C	Short term	Medium reduction	\$\$	<p>3 —</p> <p>2 —</p> <p>1 —</p> <p>Addresses Milwaukee's superactions, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, Community support</p>
<p>Implement a Transportation Management Agency (TMA) with area partners</p>	C	Short term	Medium reduction	\$\$	<p>3 —</p> <p>2 —</p> <p>1 —</p> <p>Addresses Milwaukee's superactions, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, Community support</p>
<p>Implement "electric vehicle ready" zoning regulations for commercial buildings and multifamily housing</p>	L E	Short term	Medium reduction	Data unavailable	<p>3 —</p> <p>2 —</p> <p>1 —</p> <p>Addresses Milwaukee's superactions, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, Community support</p>
<p>Incentivize employers to encourage active transportation and transit</p>	E C	Short term	Medium reduction	\$\$	<p>3 —</p> <p>2 —</p> <p>1 —</p> <p>Addresses Milwaukee's superactions, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, Community support</p>
<p>IN PROGRESS</p> <p>Promote the purchase of sidewalk credits in areas outside of pedestrian corridors and redirect funds to areas needing this infrastructure</p>	L	Short term	Medium reduction	\$\$	<p>3 —</p> <p>2 —</p> <p>1 —</p> <p>Addresses Milwaukee's superactions, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, Community support</p>

City operations	City law/code	City educates	City partners for collective action	Partners lead, City participates	City partners to lobby state/feds	Short term	net savings	3 high
Addresses Milwaukee's superactions	Opportunity for social equity	Mitigates and adapts in one action	Revenue generation of cost avoidance	Leverages existing efforts	Community support	Mid term	net expenditure	2 medium
						Long term		1 low

MITIGATION STRATEGIES | Land Use and Transportation Planning (continued)

	Action	How will this be implemented?	Implementation timescale	Potential GHG reductions	Cost/savings per MTCO ₂ e reduced	Co-benefits
IN PROGRESS	Promote "neighborhood hubs" through Comprehensive Plan policies	L	Short term	2 units	\$\$	3 - High 2 - Medium 1 - Low Co-benefits: City operations, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, Community support
IN PROGRESS	Implement parking pricing in downtown	L	Short term	2 units	Data unavailable	3 - High 2 - Medium 1 - Low Co-benefits: City operations, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, Community support
	Implement variable system development charges to encourage accessory dwelling unit development	L	Short term	2 units	\$\$\$\$	3 - High 2 - Medium 1 - Low Co-benefits: City operations, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, Community support
	Lower parking ratios near high capacity corridors	L	Short term	Data unavailable	Data unavailable	3 - High 2 - Medium 1 - Low Co-benefits: City operations, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, Community support

City operations	City law/code	City educates	City partners for collective action	Partners lead, City participates	City partners to lobby state/feds	Short term	net savings	3 high
Addresses Milwaukee's superactions	Opportunity for social equity	Mitigates and adapts in one action	Revenue generation of cost avoidance	Leverages existing efforts	Community support	Mid term	net expenditure	2 medium
						Long term		1 low

Note on the SAFE program: Mitigation scaling for the SAFE program is accounted for in a number of transportation related actions in the analysis including: Work with partner agencies to address bike and pedestrian gaps; Incentivize employers to encourage active transport; and Promote "neighborhood hubs". Emissions reductions from this strategy are also accounted for in Metro's Climate Smart Strategy, which is included in the BAU reduction estimate.

Plan to Action! Ways Milwaukie can get to work



Hub Example: Community Bicycle Repair Shed
Source: www.communitycyclingcenter.org

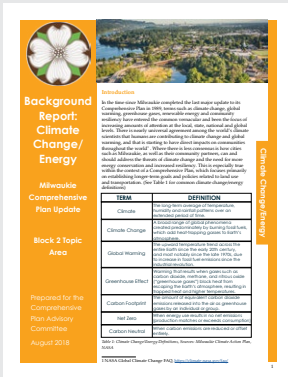


Hub Example: Small Cafe with Outdoor Seating
Source: www.timeout.com

Neighborhood hubs

As part of its current update to Milwaukie’s Comprehensive Plan, the City is currently exploring options for how to make the neighborhood hub vision a reality. Neighborhood hubs are intended to provide neighborhood gathering places and locations where residents have access to a variety of services or goods within walking or biking distance of their homes. Hubs are envisioned to vary in size and intensity. They could be as small as a mobile neighborhood tool library (tool sharing) or as large as a cluster of mixed use buildings with housing above shops and services.

[Learn more on the City's website.](#) →



Comprehensive Plan Update

Policies related to climate change will be integrated into Milwaukie’s updated 20-year Comprehensive Plan. For more information about the planning process, visit milwaukieplan.com.

Prioritized City-led adaptation strategies

The City of Milwaukie must also act to plan for future physical conditions to ensure safety and ongoing service to the community. The strategies in Table 11 will help Milwaukie prepare for climate change from a land use perspective.

Table 11. Land use and transportation planning – City-led adaptation strategies

ADAPTATION STRATEGIES | Land Use and Transportation Planning

Action	How will this be implemented?	Implementation timescale	Co-benefits
Update flood plain maps with local group coordination and funding	O	Long term	
Provide incentives to increase flood storage capacity	L	Long term	
Reclaim riparian areas for flood storage for safety and property protection	O	Long term	
Plan for future developable land considering flood risk and natural resources	L	Long term	

O City operations	L City law/code	E City educates	C City partners for collective action	P Partners lead, City participates	SF City partners to lobby state/feds	Short term	3 high
Addresses Milwaukee's superactions	Opportunity for social equity	Mitigates and adapts in one action	Revenue generation of cost avoidance	Leverages existing efforts	Community support	Mid term	2 medium
						Long term	1 low

Emissions reductions over time from prioritized actions

As shown in the previous section on vehicles and fuels, Figure 25 shows the expected rate of local greenhouse gas emissions from transportation overtime due to City-led actions on vehicles and fuels and land use and transportation planning. Table 12 shows the actual projected emissions reductions just from just land use and transportation actions every two years until 2035. More information on emissions reductions is available in [Appendix D](#). Overall, City-led actions related to transportation will not be enough to get us to our goal of carbon neutrality by 2050.

Figure 25. Rate of emissions reductions from City-led transportation actions and strategies

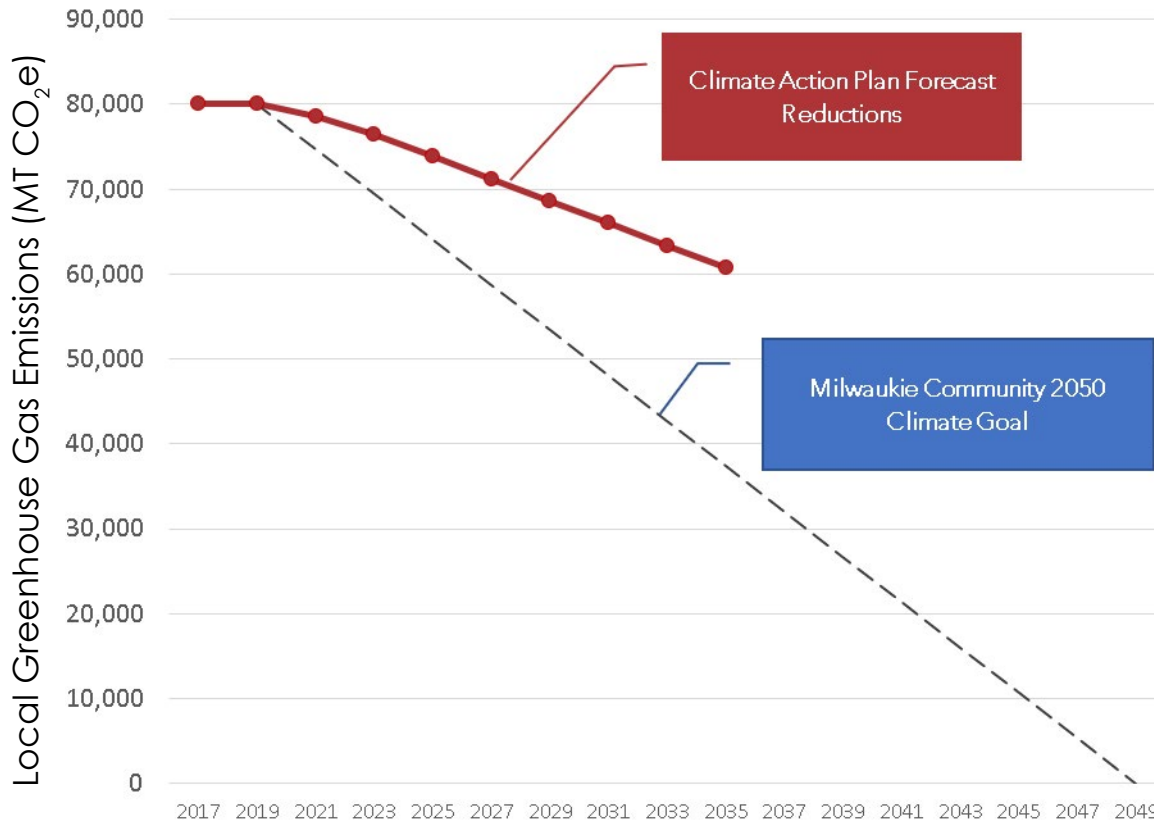


Table 12. Projected emissions reductions from City-led land use and transportation actions

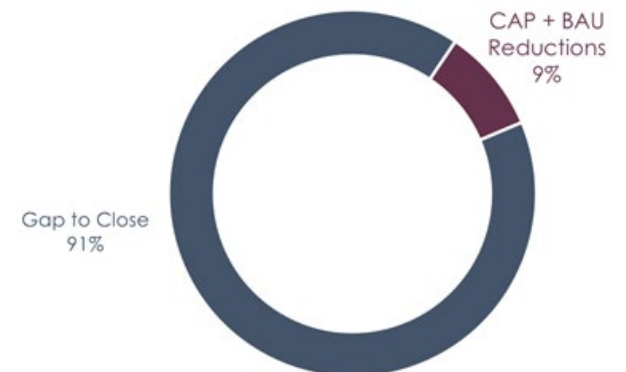
	2021	2023	2025	2027	2029	2031	2033	2035
Reductions from prioritized City-led strategies in the Climate Action Plan (MT CO₂e)	0	443	1,536	2,629	3,721	4,814	5,907	7,000

Mind the gap: How much more do we have to do?

The City-led strategies in this plan and the actions already planned through existing policies at the local, state and federal level result in a 9% reduction in total local greenhouse gas emissions related to transportation (Figure 26). This is additional to the 24% emissions reductions from vehicles and fuels strategies. The total reduction of all transportation related actions adds up to 33% of Milwaukee’s local transportation emissions (represented in this chapter and the vehicles and fuels chapter). *Note: this does not include emissions from household or corporate consumption.*

Looking just at the land use and transportation component, this leaves a gap of 91% to get to carbon neutral. While the emissions reductions from these policies may not seem significant, they represent a key investment in future generations. The benefit of these policies and strategies will continue unfolding long into the future as they impact our development patterns.

Figure 26. Reduction in 2016 greenhouse gas emissions from land use and transportation planning City-led strategies and existing policies



MATERIALS USE, PURCHASING AND RECOVERY

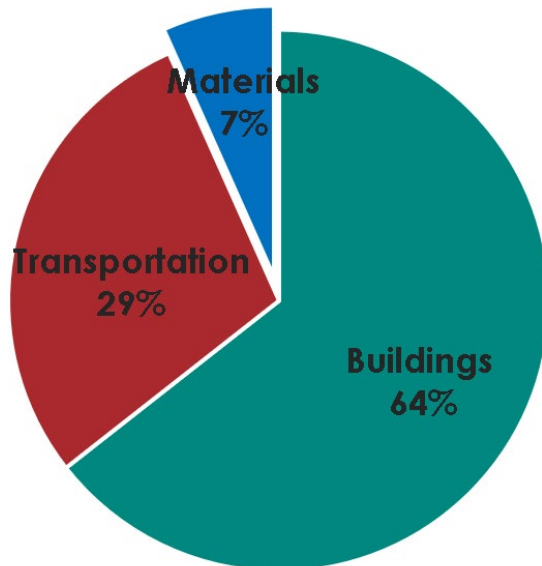


This chapter explores strategies and actions for reducing emissions related to the things we buy and use such as goods, food and the major materials of regular life.

Why it matters

In Milwaukie, materials and goods make up 7% of our community's local carbon footprint (Figure 27). However, when we buy goods, materials and food, we are also causing greenhouse gas emissions to be created from the production of those materials elsewhere. When we import these goods from places other than our own community we are also “importing” the emissions. These emissions represent nearly double the amount of emissions we produce here in Milwaukie in total (sector-based or “local” emissions). If those emissions could be accounted without overlap, the materials slice of the pie in Figure 27 would be approximately 49%.

Figure 27. Materials proportion of all local emissions in Milwaukie



While we can estimate household imported emissions from consumption, we cannot yet accurately estimate the emissions coming from organizational consumption – such as businesses and non-profits – due to the proprietary nature of that data, as well as no existing reason for that to be gathered previously by governments. The Oregon Department of Environmental Quality (DEQ) estimates that 80% of total greenhouse gas emissions in Oregon come from household demand, while governments and businesses are 10% each.¹³

For most materials, the greatest amount of emissions are released during pre-purchase and production (Figure 28). Overall, emissions at the “disposal” phase are minimal, meaning recycling alone may not have a significant impact. Therefore, it is essential for us all to buy less, buy used, buy goods made with recycled material, buy durable, buy energy-efficient, and buy lower carbon. Once we have materials, we need to consider fixing before buying new or disposal, giving or selling unwanted goods to others, and recycling as much as possible. In short – **reduce, reuse, recycle.**

¹³ Oregon DEQ, 2015. “[Consumption-based Greenhouse Gas Emissions Inventory for Oregon.](#)”

Materials-related plans and policies

- [Milwaukie Community Vision](#)
- [Milwaukie Comprehensive Plan](#)
- [Central Milwaukie Land Use and Transportation Plan](#)
- [Clackamas County Sustainability Policy](#)
- [Oregon DEQ Materials Management Vision](#)
- [Oregon Biennial Energy Plan](#)
- [Oregon 10-year Energy Plan](#)
- [Oregon Greenhouse Gas Goals](#)
- [Oregon Senate Bill 263 Recovery Goals](#)

Figure 28. Oregon consumption-based greenhouse gas emissions by category and life cycle stage – Oregon DEQ, 2015

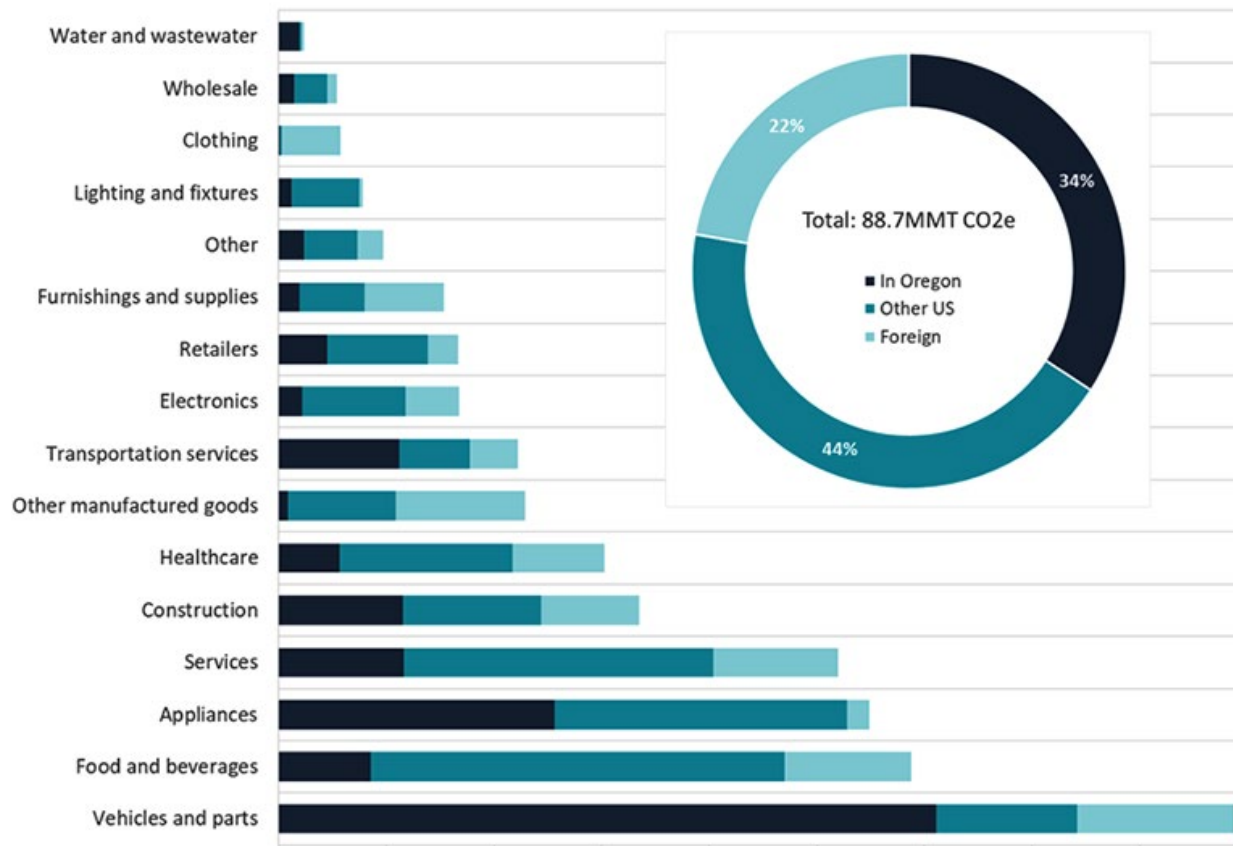


Photo credit: Clackamas County



Photo credit: Clackamas County

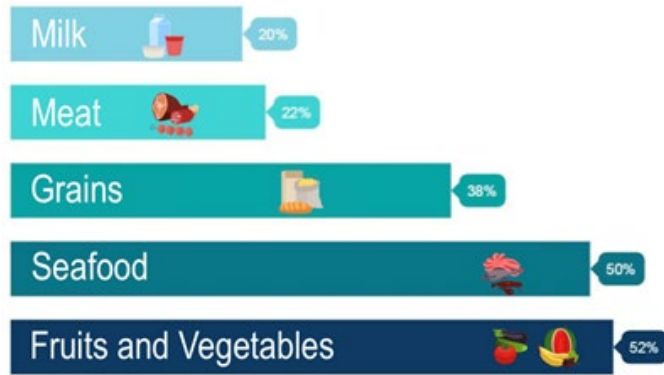
Volunteers fix goods at a re-use fair at the Wichita Center

One of the greatest places for action is reducing food waste and considering the carbon footprints of the types of food we consume. The average American household wastes more than a fifth of all the milk, meat, grains, seafood, and fruits and vegetables they buy (Figure 29).

When considering which types of foods we should consume, meat and dairy products tend to have a much higher carbon footprint than other food options (Figure 30). This is often from the production of feed and from manure management.

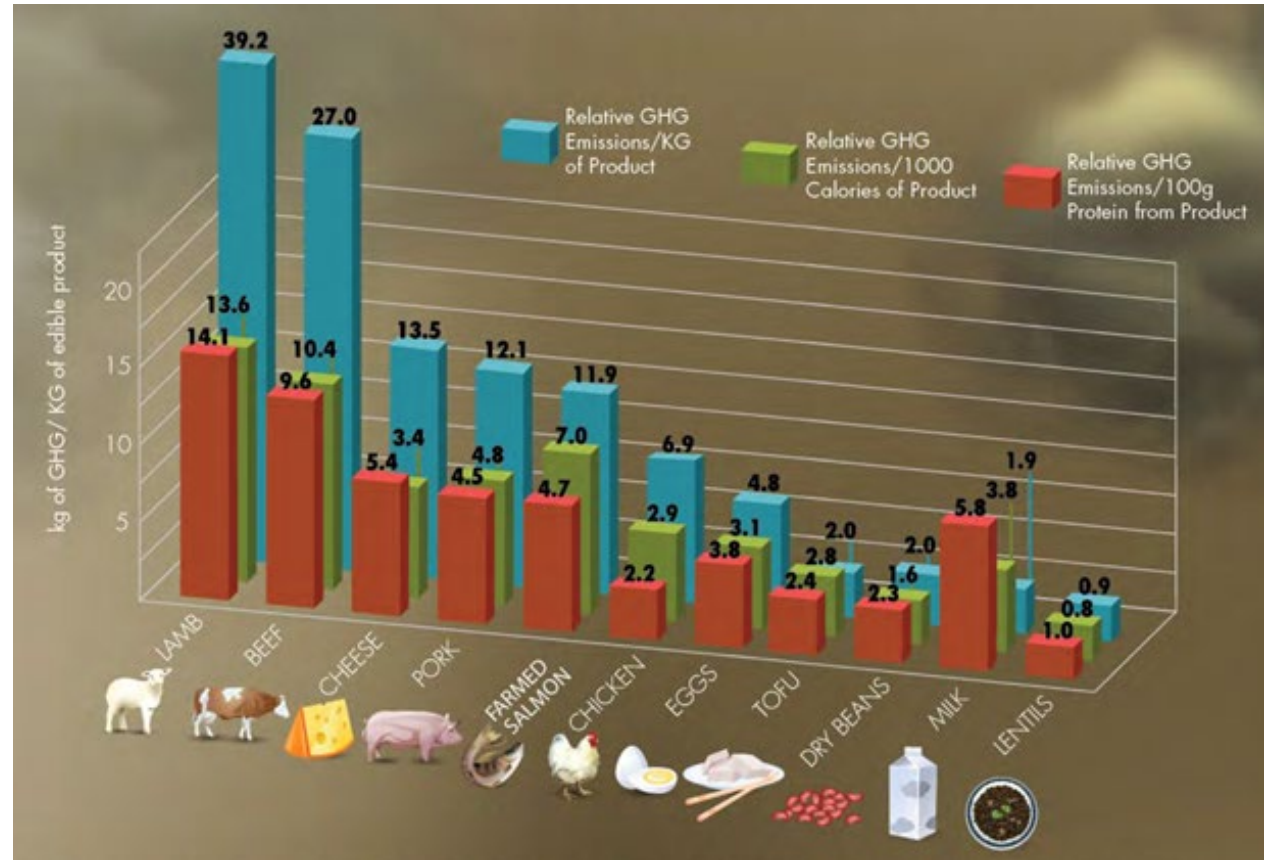
Figure 29. Proportion of food wasted by average American households – NRDC, 2017

What gets wasted?



Reducing food waste, donating edible food, and composting unavoidable food waste, are meaningful ways that Milwaukie residents and businesses can reduce our carbon footprint. Businesses can call Clackamas County’s Sustainability and Solid Waste program at 503-557-6363 to schedule a free walkthrough and orientation to food scraps collection or recycling assistance. Milwaukie residents can learn more about practical ways to reduce food waste at home at www.eatsmartwasteless.com, and can compost their food scraps with their yard debris.

Figure 30. Emissions from different food sources – Menu of Change, 2017





MILWAUKIE CLIMATE ACTION CHAMPION

Charles Maes

Connection to Milwaukie: Owner of Casa de Tamales, a local Milwaukie restaurant

How are they taking climate action?

Working with Clackamas County to compost food scraps and reduce food waste

“Clackamas County is a partner with the City of Milwaukie in providing assistance to businesses to reduce waste, recycle properly, and keep food waste out of the landfill. With technical assistance from Kelly Stewart (left), Casa de Tamales (Charles Maes, owner; on right) is now collecting their food scraps. Casa de Tamales has been finding ways to keep their food scraps out of the landfill for years.”

City-led strategies and actions

Prioritized City-led mitigation strategies

Table 13 presents the strategies and actions prioritized through the climate action planning process related to materials use, purchasing and recovery. The table summarizes the City’s role in each action, the approximate timescale for implementation, relative levels of greenhouse gas reductions, and the net cost or savings per MT CO₂e reduced (this cost/savings is assumed by the lead implementer of the action). The table also shows the results of the project team’s co-benefits analysis.

Table 13 - Materials use, purchasing and recovery - City-led mitigation strategies

MITIGATION STRATEGIES | Materials – Purchasing, Use and Recovery

Action	How will this be implemented?	Implementation timescale	Potential GHG reductions	Cost/savings per MTCO ₂ e reduced	Co-benefits
Require deconstruction of existing properties or delayed demolition periods	L	Short term	High	Net expenditure (\$\$)	Addresses Milwaukie's superactions, Opportunity for social equity, Revenue generation of cost avoidance, Leverages existing efforts, Community support, High
Promote the repair of equipment and materials and buy used and durable before purchasing new	E C	Short term	High	Net savings (\$\$)	Addresses Milwaukie's superactions, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, High
Provide education and outreach to avoid edible food waste	E C P	Short term	High	Net savings (\$\$\$\$)	Addresses Milwaukie's superactions, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, High
Use less impactful pavement alternatives when paving streets and sidewalks	O	Short term	High	Net expenditure (\$)	Addresses Milwaukie's superactions, Opportunity for social equity, Revenue generation of cost avoidance, Leverages existing efforts, High
Promote existing food waste composting services	E P	Short term	High	Net savings (\$\$)	Addresses Milwaukie's superactions, Opportunity for social equity, Mitigates and adapts in one action, Revenue generation of cost avoidance, Leverages existing efforts, High
Use mulch and compost in landscaping	O	Short term	High	Net savings (\$\$)	Addresses Milwaukie's superactions, Opportunity for social equity, Revenue generation of cost avoidance, Leverages existing efforts, High
Showcase materials management practices with a demonstration project	E	Short term	Not scalable	Not scalable	Addresses Milwaukie's superactions, Opportunity for social equity, Revenue generation of cost avoidance, Leverages existing efforts, High

City operations	City law/code	City educates	City partners for collective action	Partners lead, City participates	City partners to lobby state/feds	Short term	net savings	3 high
Addresses Milwaukie's superactions	Opportunity for social equity	Mitigates and adapts in one action	Revenue generation of cost avoidance	Leverages existing efforts	Community support	Mid term	net expenditure	2 medium
						Long term		1 low

Plan to Action! Ways Milwaukie can get to work

Building deconstruction

Deconstruction refers to carefully dismantling structures in order to re-use, repurpose or recycle its materials. It differs from demolition, where a site is cleared as quickly as possible and materials are often discarded. Deconstruction allows the embodied energy of one structure's materials to be repurposed into a new structure or item, reducing the need for new material production. Deconstruction also protects public health and creates economic opportunity by switching the costs from the materials to the workers.

The City of Portland requires projects seeking a demolition permit of a house or duplex to fully deconstruct the structure if it was built in 1916 or earlier or is a designated historic resource. Milwaukie could follow suit with its own ordinance requiring deconstruction or delayed demolition.



Emissions reductions over time from City-led actions

Figure 31 shows the expected rate of local greenhouse gas emissions overtime due to these City-led actions. Table 14 shows the actual projected emissions reductions from these actions every two years until 2035. More information on emissions reductions is available in [Appendix D](#). Overall, these actions help us reduce our emissions at close the rate we will need to in order to reach carbon neutrality by 2050—but they leave a significant gap for us to make up.

Figure 31. Rate of emissions reductions from City-led materials actions and strategies

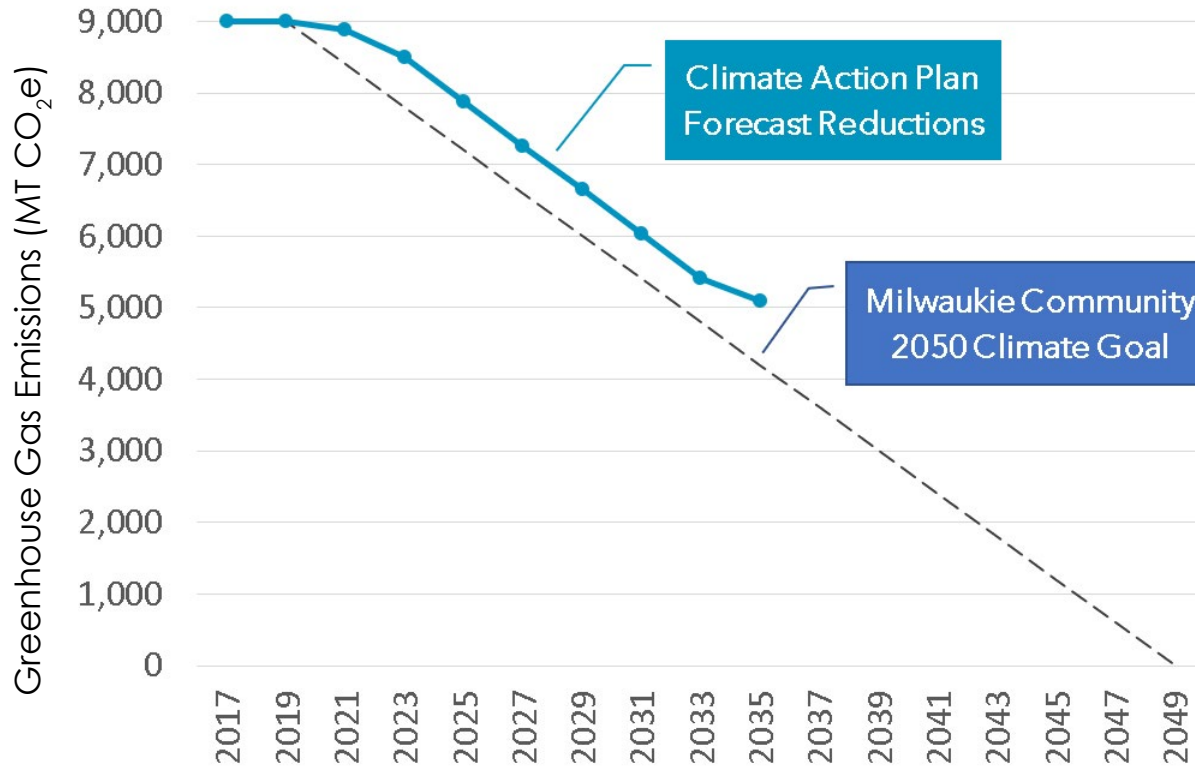


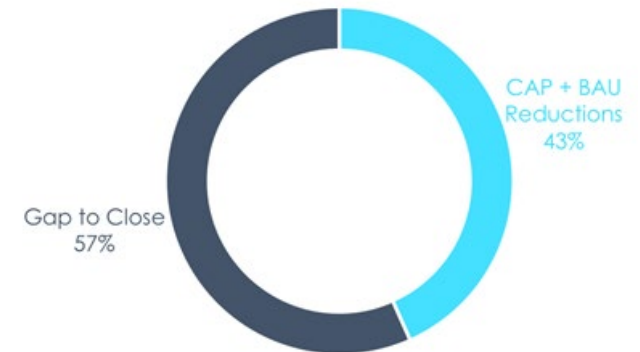
Table 14. Projected emissions reductions from City-led actions and strategies

	2021	2023	2025	2027	2029	2031	2033	2035
Reductions from prioritized City-led strategies in the Climate Action Plan (MT CO₂e)	0	257	748	1,238	1,729	2,219	2,710	3,200

Mind the gap: How much more do we have to do?

The City-led strategies in this plan and the actions already planned through existing policies at the local, state and federal level result in a 43% reduction in total local greenhouse gas emissions related to materials use, purchasing and recovery (Figure 32). *Note: this does not include emissions from household or corporate consumption. This leaves a gap of 57% to get to carbon neutral from materials-related emissions.* To close this gap, Milwaukee households, businesses and other organizations must also take swift action.

Figure 32. Reduction in 2016 greenhouse gas emissions from materials use, purchasing and recovery City-led strategies and existing policies



Closing the gap: Household and organizational actions

The following pages provide ideas for ways households, organizations and businesses can take action and help us close the gap and reach our goals.

HOUSEHOLD STRATEGIES

Ways Milwaukie households can help us reach our climate action goals



Calculate your household carbon footprint

Learn more about where and how you are generating emissions—and get ideas to reduce your impact.

[Use the Oregon DEQ Carbon Calculator](#)



Offset your impacts

Purchase carbon credits for your household impacts to help mitigate emissions elsewhere

[Learn more about offsetting options from Terrapass](#)



Reduce food waste through meal planning

Shop smart and buy only what you need

Find [tips and tricks from Metro](#) and get inspired by [SaveTheFood.com](#)

Eat a plant-rich diet

[Buy local produce at the Milwaukie farmer's market](#)

Repair and reuse durable goods

[Learn about upcoming repair fairs](#)

Purchase used items and products at flea markets, garage sales, local and online marketplaces

[Find resources for buying and sharing re-used materials from the Rebuilding Center](#)

Sell, donate or recycle unwanted goods

Bring your items to a local [Habitat for Humanity](#) or [Goodwill donation station](#)

Share tools and other infrequently used items with neighbors

[Learn how to set up a community tool library](#)

Compost your food scraps and use in your landscape or dispose of them appropriately

Get composting [tips from Metro](#) and learn about the benefits from [Drawdown](#)

Buy local and consider emissions from shipping

[Read more about the environmental costs of shipping](#)

ORGANIZATION STRATEGIES

Ways Milwaukie businesses and organizations can help us reach our climate action goals



Get certified as a Clackamas County “Leader in Sustainability”

Be recognized for your efforts to minimize waste, conserve energy and water, and invest in your employees and community

[Learn more about the program from Clackamas County](#)



Consider total cost of ownership

Select vehicles based on how much they will cost to maintain over their lifetime and their total emissions, not just upfront costs

[Use the Department of Energy Vehicle Cost Calculator](#)



Implement “lean manufacturing” practices

Reduce material consumption and waste and improve your business’ efficiency

[Engage the Oregon Manufacturing Extension Partnership](#)



Fix equipment before replacing it

Unless there is a big energy or material efficiency gain, try to repair rather than replace

[Take the pledge to fix it first!](#)

Purchase durable and used products and inputs

[Learn more about the importance of expanding the lifespan of office products from Oregon DEQ](#)

Donate surplus electronics and furniture to charitable organizations

Consider donating to [Goodwill](#) or [FreeGeek](#)

Compost commercial food waste, particularly if a food business

[Learn about food scrap collection options in Clackamas County](#)

Prevent paper waste: Use centralized printers that are defaulted to double sided, and go paperless for invoicing, billing and payroll

[Learn other ways to reduce paper waste from MIT](#)

NATURAL RESOURCES

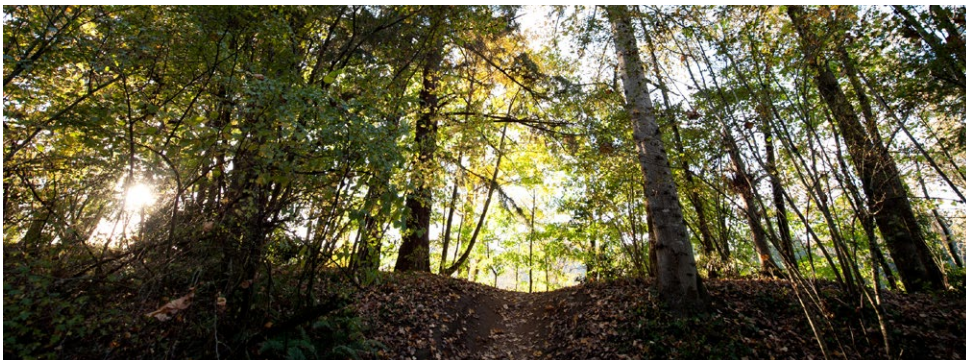


This chapter addresses how we can plan for the impact of climate change on our natural resources, including the urban forest and Milwaukie's waterways.

Why it matters

Our community and all of its inhabitants have developed around the natural patterns of the systems all around us. Our trees have provided comfort, water absorption, soil retention, clean air and mental well-being for generations. With the climate changing, the trees we care for and plant will be challenged by more water in the winter and less water and more heat in the warm months. As our climate moves to a two-season year, we will have to select species that can provide all the benefits or “ecosystem services” that we all enjoy, but can withstand drought, heat and fire.

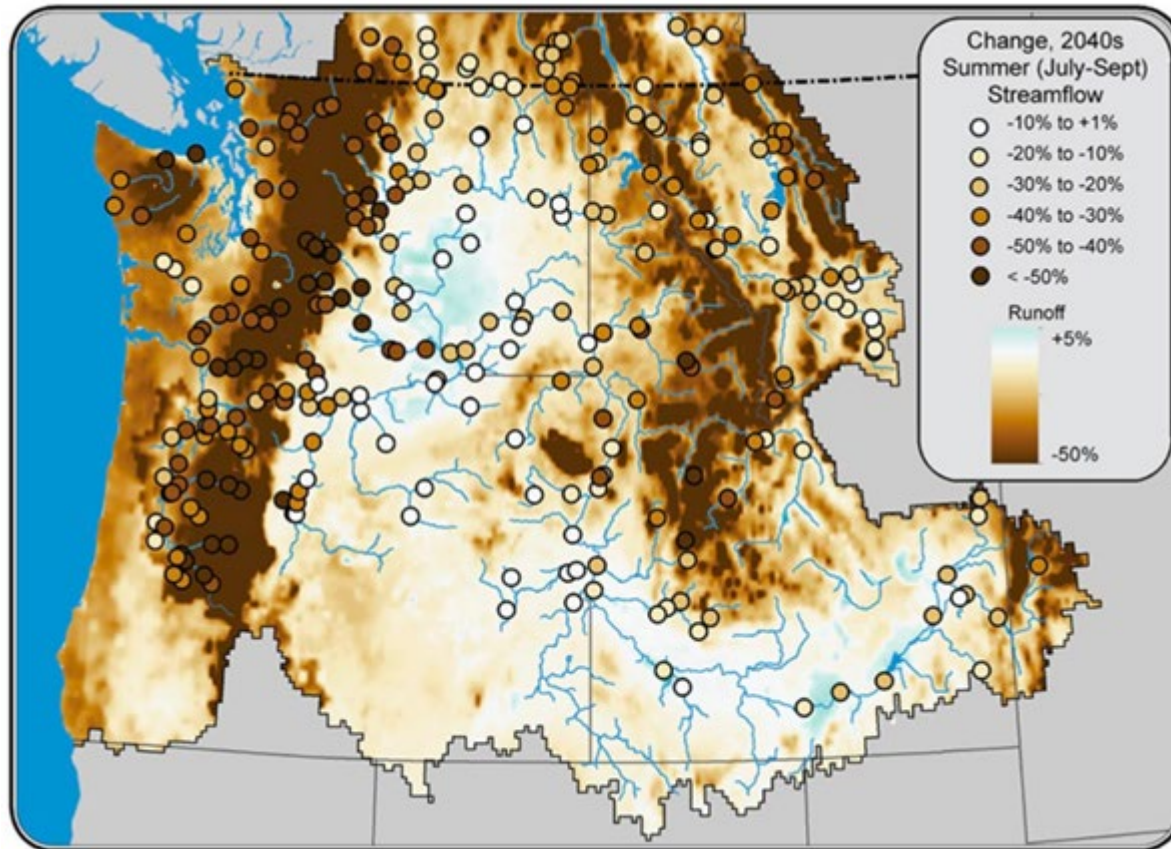
Our waterways are the arteries of the natural world and it is no different in our community. As we move to the two-season regime, we will need to deliberately manage our waterways for the health of our natural ecosystems as well as the health, safety and comfort of our residents. In the wet season, with the loss of snowpack, we will be getting more flow down our streams and rivers. The flooding that will occur from the increase in real time flow of precipitation will be exaggerated by the tidal stretch of the Willamette River and sea level rise. The dry season will challenge our water systems as temperatures rise (Figure 31). By 2040 we will see 30-50% reduction in summer flows that can leave people, animals and fish looking for cool refuge and may cause algal blooms that can harm human and other species' health.



Natural resources-related plans and policies

- [Milwaukie Community Vision](#)
- [Milwaukie Comprehensive Plan](#)
- [Central Milwaukie Land Use and Transportation Plan](#)
- [Milwaukie Downtown and Riverfront Land Use Framework Plan](#)
- [Milwaukie Water, Wastewater and Stormwater master plans](#)
- [Milwaukie-specific park plans](#)
- [Clackamas County Sustainability Policy](#)
- [Clackamas County Natural Hazards Mitigation Plan](#)
- [North Clackamas Parks and Recreation District North Side Master Plan](#)
- [Regional Water Providers Consortium Strategic Plan](#)
- [Oregon Biennial Energy Plan](#)
- [Oregon 10-year Energy Plan](#)
- [Oregon Statewide Planning Goals](#)
- [Oregon Greenhouse Gas Goals](#)

Figure 31. Change in summer streamflow by 2040 – National Climate Assessment, 2014



Prioritized City-led strategies

Table 15 presents the actions prioritized through the climate action planning process related to natural resources. It summarizes how the actions will be implemented and the timescale for completion. Results of co-benefits analysis are also summarized for each action. Most of these actions are intended to plan for future physical conditions to ensure safety and ongoing service to the community. The action related to increasing our tree canopy to 40% by 2040—a goal of Milwaukie’s Tree Board and draft Urban Forest Plan—is considered a “sequestration” strategy that will enable us to remove greenhouse gases and put them into soil, wood or minerals greenhouse gases even after we are carbon neutral in 2050.

MILWAUKIE CLIMATE ACTION CHAMPION



Linda Carr

Connection to Milwaukie: Resident and Tree Board Member

How are they taking climate action?
Serving on the Milwaukie Tree Board and advocating for tree protection

“Look around at our urban forest, the shade it provides, the protection from wind and rain, the birds that sing in the branches, and know that we all benefit. Join in the discussion, through your Neighborhood District Association, the Climate Action Plan or community discussions with the Milwaukie Tree Board.”

Martin O’Malley (61st Governor of Maryland) said ‘Reversing deforestation is complicated; planting a tree is simple.’ A philosophy that I take to heart.”

Table 15. Natural resources – City-led adaptation strategies

ADAPTATION STRATEGIES | Natural Resources

	Action	How will this be implemented?	Implementation timescale	Co-benefits
IN PROGRESS	Work with the Tree Board to develop a tree planting program focused on shielding low income neighborhoods from heat	O L E	Short term	3 high 2 medium 1 low Addresses Milwaukee's superactions Opportunity for social equity Mitigates and adapts in one action Revenue generation of cost avoidance Leverages existing efforts Community support
IN PROGRESS	Review intergovernmental water agreements	O C	Short term	3 high 2 medium 1 low Addresses Milwaukee's superactions Opportunity for social equity Mitigates and adapts in one action Revenue generation of cost avoidance Leverages existing efforts Community support
	Identify sewer and waterways vulnerable to flooding	O C	Short term	3 high 2 medium 1 low Addresses Milwaukee's superactions Opportunity for social equity Mitigates and adapts in one action Revenue generation of cost avoidance Leverages existing efforts Community support
IN PROGRESS	Adjust design criteria to require on-site stormwater storage and water filtration before release that meets future conditions	L	Short term	3 high 2 medium 1 low Addresses Milwaukee's superactions Opportunity for social equity Mitigates and adapts in one action Revenue generation of cost avoidance Leverages existing efforts Community support
	Update stormwater master plan	O L	Short term	3 high 2 medium 1 low Addresses Milwaukee's superactions Opportunity for social equity Mitigates and adapts in one action Revenue generation of cost avoidance Leverages existing efforts Community support
	De-pave areas where possible to encourage stormwater infiltration	O	Short term	3 high 2 medium 1 low Addresses Milwaukee's superactions Opportunity for social equity Mitigates and adapts in one action Revenue generation of cost avoidance Leverages existing efforts Community support
	Introduce more monitoring stations to protect drinking water wells	O C	Short term	3 high 2 medium 1 low Addresses Milwaukee's superactions Opportunity for social equity Mitigates and adapts in one action Revenue generation of cost avoidance Leverages existing efforts Community support
	Develop a potable/drinkable water re-use plan	O C	Short term	3 high 2 medium 1 low Addresses Milwaukee's superactions Opportunity for social equity Mitigates and adapts in one action Revenue generation of cost avoidance Leverages existing efforts Community support

City operations	City law/code	City educates	City partners for collective action	Partners lead, City participates	City partners to lobby state/feds	Short term	3 high
Addresses Milwaukee's superactions	Opportunity for social equity	Mitigates and adapts in one action	Revenue generation of cost avoidance	Leverages existing efforts	Community support	Mid term	2 medium
						Long term	1 low

Table 16. Natural resources – City-led sequestration strategy

SEQUESTRATION STRATEGIES Natural Resources						
Action	How will this be implemented?	Implementation timescale	Potential GHG reductions	Cost/savings per MTCO ₂ e reduced	Co-benefits	
IN PROGRESS Increase tree canopy to 40% by 2040	O E C	▶▶▶	■ ■ ■ ■ ■	\$		
O City operations Addresses Milwaukee's superactions	L City law/code Opportunity for social equity	E City educates Mitigates and adapts in one action	C City partners for collective action Revenue generation of cost avoidance	P Partners lead, City participates Leverages existing efforts	SF City partners to lobby state/feds Community support	Short term 3 high Mid term 2 medium Long term 1 low

Plan to Action! Ways Milwaukee can get to work

Increasing our tree canopy

Trees make Milwaukee a special place to live, work and visit. Our urban forest helps reduce the amount of CO₂ in our atmosphere, conserve energy, provide shade capture stormwater run-off, and curb the impacts of flooding—increasingly important functions as our community plans for climate change.

Canopy cover refers to the percentage of ground area covered by trees, and evaluating it over time is necessary to understanding the state of our urban forest. A 2014 LiDAR¹⁴ assessment estimated Milwaukee’s tree canopy coverage to be 26%. It also reveals many areas that can accommodate increased canopy coverage within the City. The City has set a goal of increasing our canopy coverage to 40% by 2040.

A new Urban Forest Plan and stronger tree ordinance being developed in Fall 2018 will help us reach this ambitious but achievable target by guiding new development responsibly and preventing harmful, unnecessary tree removal.



¹⁴ LiDAR is a surveying method that measures distance to a target by illuminating the target with pulsed laser light and measuring the reflected pulses with a sensor

Closing the gap: Household and organizational actions

The following pages provide ideas for ways households, organizations and businesses can take action and help us close the gap and reach our goals.

HOUSEHOLD STRATEGIES

Ways Milwaukie households can help us reach our climate action goals



Plant trees in your yard to provide shade and cooling in summer heat

Select climate adapted trees that don't interfere with power lines

Consult the [Milwaukie Tree Board](#), [Friends of Trees](#) and [PGE](#) with your tree planting questions

Proactively prune and choose ice-resistant trees to reduce damage from ice storms

[Learn more from OSU Extension](#)

Install bioswales/rain gardens or rainwater diversion systems ("green infrastructure") to reduce impact on the stormwater system

Get water management ideas from the [Clackamas Soil and Water Conservation District](#) and [OSU Extension](#)



Landscape with drought-resistant, native or well-adapted plants

Consider seeking certified backyard habitat status

Learn more from [Metro](#) and [Audubon Portland](#)

Upgrade your appliances and install low flow faucets and shower heads to reduce water consumption.

[Get tips from the Regional Water Providers Consortium](#)



Remove pavement and increase permeable surfaces

De-pave areas wherever possible to encourage stormwater infiltration onsite

Learn more about the [benefits of de-paving from the US EPA](#), and get the info you need on how to do it from [Depave.org](#)

ORGANIZATION STRATEGIES

Ways Milwaukie businesses and organizations can help us reach our climate action goals



Plant trees around your building to provide shade and cooling in summer heat

Select climate adapted trees that don't interfere with power lines

Consult the [Milwaukie Tree Board](#), [Friends of Trees](#) and [PGE](#) with your tree planting questions



Landscape with drought-resistant, native or well-adapted plants

Consider seeking certified backyard habitat status

Learn more from [Metro](#) and [Audubon Portland](#)



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Install bioswales/rain gardens or rainwater diversion systems to reduce impact on the stormwater system

Get water management ideas from the [Clackamas Soil and Water Conservation District](#) and [OSU Extension](#)

Upgrade appliances and install low flow faucets and shower heads to reduce water consumption.

[Get tips from the Regional Water Providers Consortium](#)

PUBLIC HEALTH AND EMERGENCY PREPAREDNESS

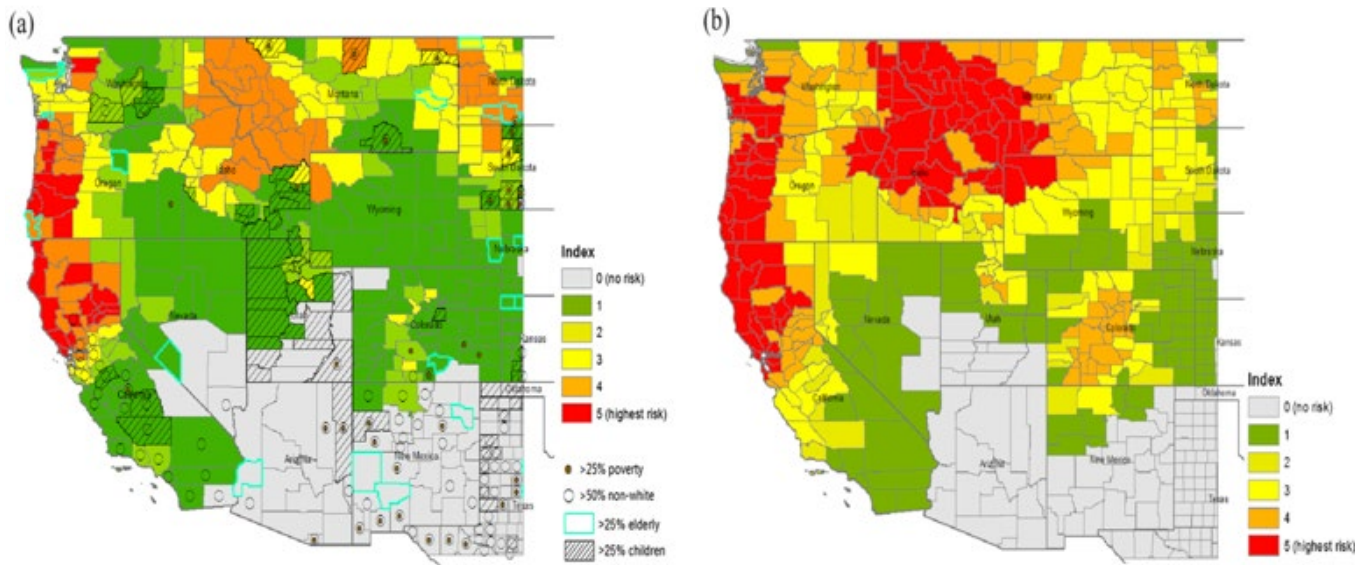


This chapter addresses strategies for keeping our community healthy and safe as we experience the impacts of climate change.

Why it matters

Acute climate events resulting from climate change include heat waves, increase wildfires in our region, decreased air quality, flooding risk and more (see chapter 2 for more information). For example, Figure 34 demonstrates the expected air quality impacts that will follow the increased wildfire in the western United States. By 2050, almost all of Oregon will experience high-risk levels of particulate air pollution from wildfires in the warmer months. These acute events must be addressed through a planned, coordinated response—being proactive and setting processes in place now will help us adapt and respond quickly when the time comes.

Figure 34. Particulate air pollution from wildfires in the western United States under climate change, (a) 2004-2009 to (b) 2046-2051 – Liu, 2016



Public health and emergency preparedness-related plans and policies

- [Milwaukie Community Vision](#)
- [Milwaukie Comprehensive Plan](#)
- [Central Milwaukie Land Use and Transportation Plan](#)
- [Milwaukie Downtown and Riverfront Land Use Framework Plan](#)
- [Milwaukie Transportation System Plan](#)
- [Milwaukie Water, Wastewater and Stormwater master plans](#)
- [Milwaukie-specific park plans](#)
- [Clackamas County Sustainability Policy](#)
- [Clackamas County Natural Hazards Mitigation Plan](#)
- [Energy Trust Strategic Plan](#)
- [Metro Climate Smart Strategy](#)
- [Regional Water Providers Consortium](#)
- [Oregon Statewide Planning Goals](#)
- [Oregon Greenhouse Gas Goals](#)

Climate change will also have chronic impacts on our community's health and wellbeing. In addition to planning for acute events, we need to prepare for increased population, the potential for a rise in crime from increased and prolonged heat, mental health stress from more dramatic weather events, and the introduction of new diseases following insects (ticks and mosquitoes), people and animals that migrate north (Figure 35).



MILWAUKIE CLIMATE ACTION CHAMPION

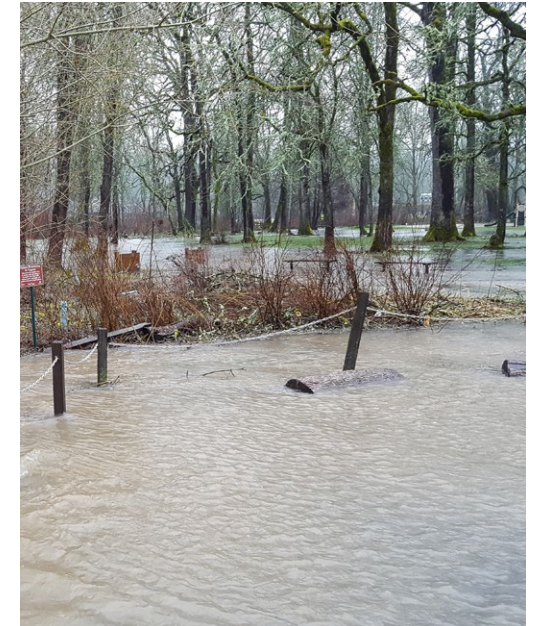
Linda Blue

Connection to Milwaukie: Resident and member of Milwaukie Community Emergency Response Team (CERT), Parks and Recreation Board (PARB) and Climate Action Plan Committee (CAPC)

How are they taking climate action?

Serving on the Milwaukie CERT team and helping community members become more prepared for potential natural disasters

"Climate change is causing an increase in natural disasters such as fires, floods and storms. Milwaukie CERT is uniquely trained to work with emergency response organizations such as fire and rescue, police and FEMA during the increasing incidences of disasters caused by climate change. Learn more and join us! www.clackamasfire.com/cert.html."



Severe flooding in Milwaukie, 2015

Figure 35. Climate change triggers and potential health and public safety impacts – Oregon Health Authority, Oregon Climate and Health Profile, 2014



Prioritized City-led strategies

Table 17 presents the adaptation actions prioritized through the climate action planning process related to public health and emergency preparedness. It summarizes how the action will be implemented and the timescale for completion. Results of co-benefits analysis are also summarized for each action. These actions are intended to plan for future physical conditions to ensure safety and ongoing service to the community.

Plan to Action! Ways Milwaukie can get to work

Update flood plain maps in partnership with FEMA

Milwaukie's flood plain maps are out of date. Parts of Milwaukie are susceptible to flooding due to our proximity to the Willamette River and several other waterways. Sea level rise, which in turn will raise Willamette River levels and its tributaries, and heavier annual rainfall that will not be delayed through snow storage put us at increasingly greater risk. Updating our flood plain maps is a crucial step to prepare our City for potential flooding events. Having more accurate knowledge of acute flood risk areas will also help the City communicate with property owners to better prepare for flood risk.



Closing the gap: Household and organizational actions

The following pages provide ideas for ways organizations, households and businesses can take action and help us close the gap and reach our goals.

HOUSEHOLD STRATEGIES

Ways Milwaukee households can help us reach our climate action goals



Get involved with the Milwaukee Community Emergency Response Team (CERT)

Join your neighbors and receive training to prepare for potential disasters

[Learn more about CERT](#)

Develop a family emergency plan and accumulate essential supplies for home and your vehicle

[Get tips on making a plan from the Department of Homeland Security](#)

Include adequate water in your emergency kit

[Get the facts from the Regional Water Providers Consortium](#)

Learn how to get from your home or work to essential services to avoid potential hazards

[Learn how to make a disaster preparedness plan from the Red Cross](#)

When choosing a new apartment or home, consider fire, flood, heat waves, trees for shade, and landslides risks

[Get ideas for what to plan for from FEMA](#)



Attend Neighborhood District Association meetings

Learn from and educate others

[Find your association and meeting schedule on the City's](#)



Protect and improve your household indoor air quality

Consider updating your air filters and taking other steps

[Get air quality tips from the US EPA](#)

ORGANIZATION STRATEGIES

Ways Milwaukie businesses and organizations can help us reach our climate action goals



Evaluate threats to your business from wildfire smoke, flooding and landslides

[Get ideas for what to plan for from FEMA](#)

Offer programs or education to employees on managing stress and mental health

[Find resources from the Employee Assistance Trade Association](#)



Protect and improve your business' indoor air quality

Consider updating your air filters and taking other steps

[Get air quality tips from the US EPA](#)



Prepare a resiliency plan for your company

Help keep employees safe in the event of a disaster

[Learn more from the Oregon Health Authority](#)

5. Looking forward: Committing to climate action

Milwaukie's Climate Action Plan is a big, bold roadmap for making real progress on climate change. Working together to implement this plan, our community can be a leader, demonstrating to other cities the power of collective, coordinated action to address this challenge of our generation.

Implementation recommendations

While working to execute the strategies in this plan, the City will also take the following steps to better prepare ourselves for taking action, measure our progress, and institutionalize our commitment to climate action:

1. Build City staff and community capacity to ensure effective implementation and equitable outcomes of climate action efforts.
2. Develop City of Milwaukie staff capacity to implement the Climate Action Plan by recruiting and hiring a Climate Action and Sustainability Coordinator.
3. Partner with other local and regional governments to influence local, state and federal climate policy activities.
4. Facilitate interdepartmental collaboration, engagement, information exchange and peer-to-peer learning related to City of Milwaukie climate action efforts.
5. Create work plans for each department to incorporate climate change actions as appropriate.
6. Change standard operating procedures and policies to reflect relevant climate actions.
7. Incorporate climate action and sustainability expectations and questions into the recruitment process.
8. Incorporate climate change mitigation and adaptation actions into every job description and during employee goal setting.
9. Highlight "climate champions" and include climate education information in the *Milwaukie Pilot*.
10. Track progress annually, provide progress reports to City Council and publish results online so the community can chart our success.
11. Integrate the Climate Action Plan into the City's updated Comprehensive Plan.
12. Look for opportunities to incorporate climate action within relevant City code.

Plan updates

The City commits to the following steps to ensure our plan remains relevant and timely:

1. Re-evaluate and update the Climate Action Plan every five years. Additionally, the plan is a living document. The strategies identified to achieve the goals will require periodic reevaluation and updating, taking into consideration advancements in technology, community feedback and financing approaches. New information may be added as it becomes available.
2. Update our community carbon footprint every two years.
3. Develop detailed progress reports annually.
4. Make the latest version of the Climate Action Plan, technical memos and other relevant resources available on the City of Milwaukie's website.

By developing this Climate Action Plan and by actively committing to implement the plan, Milwaukie is not only responding to the existential threat of climate change, but it will also make our community stronger, healthier, and more economically resilient.

The goals and actions outlined in this plan recognize the need for dynamic participation on all levels. Help us in this effort to reduce our collective greenhouse gas emissions, to educate ourselves, to learn from and teach one another how to be smarter, kinder, and better stakeholders of our planet.

Stay involved! Climate action involves us all

We encourage you to come forward with your ideas to strengthen and inform our community's climate action efforts. By acting together, we will make the City of Milwaukie a **flourishing city that is entirely equitable, delightfully livable, and completely sustainable.**



Appendices

- A. Acknowledgements and implementation partners
- B. Glossary
- C. Building on a foundation: Climate action we have taken thus far
- D. Emissions reduction tables
- E. Progress metrics