Salem Climate Action Plan

2021

Preliminary Public Review Draft, October 2021

CITY OF Salem AT YOUR SERVICE

verdis GROUP

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Acknowledgments

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Executive Summary

EXECUTIVE SUMMARY

The City of Salem is taking action to respond to climate change.

The City of Salem is taking action to respond to climate change. Knowing that climate impacts have already begun to exacerbate hazards for our residents, the City has adopted ambitious greenhouse gas reduction goals and is strengthening our ability to address climate-related challenges. Building on regional action and with global deadlines to reduce greenhouse gas (GHG) emissions rapidly approaching, Salem's Climate Action Plan comes at an opportune time to make real progress.

This climate action plan has two overarching strategic goals: to reduce GHG emissions (mitigation) and to increase climate resilience (adaptation). Both goals must be accomplished through equitable processes so that residents who are most vulnerable to climate-related hazards are engaged in planning processes, protected from severe impacts, and are able to access resources and opportunities to better prepare for climate change.

In addition to the main goals of reducing emissions and increasing resilience, the plan also aims to identify strategies to accomplish these goals, to prioritize these strategies, and to identify key partners in implementing the plan.

SALEM'S CHANGING CLIMATE

Salem residents will notice several changes in the climate in coming decades. The shifts in

climate are projected to occur in three main areas: warming temperatures, changing precipitation patterns, and increased risk of wildfire. Some of the most significant projected climate impacts are the following:

- The number of days with a heat index over 90°F will increase from a historic average of 7 per year to 33 per year by mid-century.
- Hotter and drier conditions are likely to cause more frequent droughts.
- More intense rainfall and rain-on-snow events could also lead to flood events in areas outside of historical high-risk zones.

- Wildfire is a significantly increasing risk across the state of Oregon. The number of extreme fire danger days[1] in Salem will double by mid-century, increasing from a historic average of 10 per year to 20 per year. Extremely large, intense fires will become more likely under hotter and drier climate scenarios.
- Poor to hazardous air quality resulting from wildfires could greatly impact unsheltered populations and people with underlying health issues such as asthma, diabetes and obesity.

SALEM'S EMISSIONS REDUCTION GOAL

In October 2020, the Salem City Council voted to adopt GHG emissions reduction goals. The goals are as follows:

BY 2035

SALEM'S **GREENHOUSE GAS EMISSIONS ARE REDUCED TO 50%** OF THE CITYWIDE GREENHOUSE GAS EMISSIONS FROM THE BASELINE YEAR OF 2016, AND

BY 2050

SALEM **IS CARBON NEUTRAL.**

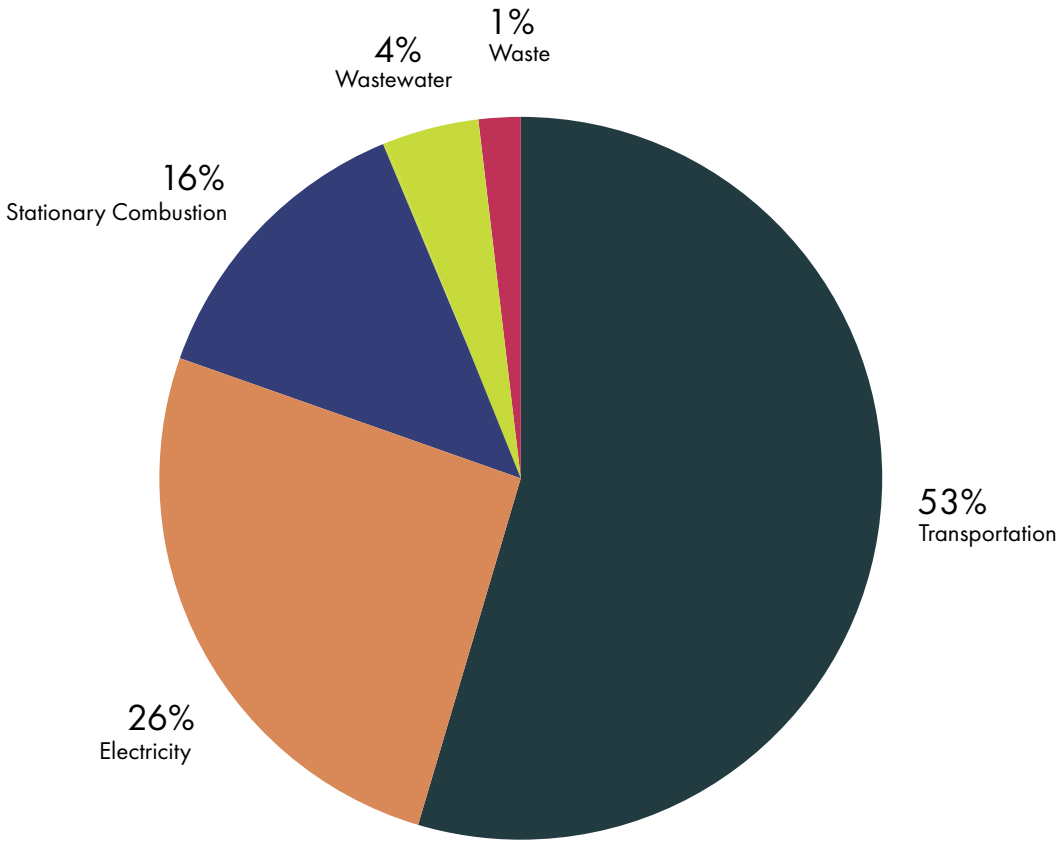
These goals have guided the development of the strategies in this plan. Meeting these goals will require the community to rally around a shared vision of the future and to adopt new policies, behaviors and practices.

WHERE DO SALEM'S EMISSIONS COME FROM?

53% OF SALEM'S GHG EMISSIONS COME FROM TRANSPORTATION

Salem's greenhouse gas inventory[2] shows the source and helps to show where emissions reductions can occur. Using 2016 as the baseline year, the City completed its first GHG inventory in 2019. The inventory shows that total GHG emissions in 2016 were 1,553,573 metric tons of carbon dioxide equivalent ($MtCO_2e$). This equates to roughly 9.59 $MtCO_2e$ per capita. Emissions from transportation were by far the largest source of emissions, constituting more than half (53%) of the total. Emissions from electricity was the second largest category at 26%. Stationary combustion from the use of natural gas, propane, and other fossil fuels was the third largest contributor at 16%.

CITY OF SALEM GROSS GHG EMISSIONS BY SOURCE (2016)*



TOTAL EMISSIONS: 1,553,573 $MtCO_2e$

**Agriculture and urban forestry not included due to a net reduction in GHG emissions.*

Figure 1.

REDUCING EMISSIONS

To achieve reductions in emissions, it will be necessary to make significant changes in the ways that the Salem community uses transportation and energy.

GREENHOUSE GAS EMISSIONS FORECASTS

Two forecasts were created to show what levels of GHG reductions Salem might be able to achieve under different scenarios. A baseline, or business-as-usual, scenario was created that modeled how GHG emissions may change over time if no climate actions were taken. Building upon that baseline forecast, two different emissions reduction scenarios were modeled that showed the projected effects of actions that Salem could take.

SCENARIO 1

The first scenario modeled the outcome of Salem achieving ten emissions reductions targets:

- Double the rate of electric vehicle (EV) adoption
- Quadruple the rate of transit ridership
- Double the rate at which residents use biking and walking
- Transition to a zero-emissions bus fleet
- Reduce the amount of passenger vehicle traffic coming into and out of Salem by 40%
- Reduce the amount of traffic within Salem by 10%
- Halt all growth in natural gas emissions
- Improve building efficiency by an average of 10% by 2050
- Maximize onsite solar
- Maximize carbon sequestration of plants and trees

The outcome of Scenario 1 showed a 43% net reduction from 2016 levels by 2035, and a 58% net reduction from 2016 levels by 2050. In this scenario, Salem would not meet its goals.

SCENARIO 2

The second scenario modeled what it would take to meet Salem's 2035 and 2050 goals. This model assumed that all emissions reduction targets in the Scenario 1 were met, and then added nine additional targets:

- Halt the entry of non-resident internal combustion engine traffic
- Halt the entry of internal combustion engine heavy trucking
- Halt internal combustion air traffic
- Ensure a 100% renewables-only electricity grid
- Remove all fossil fuel-derived natural gas systems in the built environment
- Remove all other building fossil fuels (e.g. propane, diesel) in the built environment
- Achieve zero waste through circular economy, compost, recycling
- Capture all wastewater emissions
- Halt all septic emissions by requiring locations on septic to join centralized wastewater treatment

The outcome of Scenario 2 showed what it would take for Salem to meet its goal of reducing emissions 50% by 2035 and achieving net zero by 2050.

It is important to note that this model shows just one possible way of achieving the goals. The actual path that Salem will take will undoubtedly look different as time goes on. Some of the emissions reductions could be accomplished in other ways and in different combinations. Technological and behavioral solutions that cannot yet be quantified may play an important role by 2050.

BENEFIT-COST ANALYSIS

A detailed benefit-cost analysis (see Appendix 6) was performed on ten climate action strategies selected by three Salem City Council members who served on the Climate Action Plan Task Force. The strategies were selected based on their projected impact to the City of Salem's budget and the desire for analysis that may inform future policy decisions.

In-depth interviews with subject matter experts from the City of Salem, the Mid-Willamette Valley Council of Governments, Cherriots, Friends of Trees, the City of Portland, and the Energy Trust of Oregon were conducted to inform the analysis.

The top-level findings are listed below.

MOST COST-EFFECTIVE CLIMATE ACTION STRATEGIES

1. Charge for parking on-street in downtown.
2. Support energy efficiency and weatherization for lower income households (including renters) and small business owners.
3. Support additional tree canopy in low canopy neighborhoods.

LOOKING FORWARD

With strategic planning, determined resolve, collaborative partnerships, and collective will, the Salem community can achieve significant progress in reducing emissions and becoming a climate-smart city.

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Introduction

INTRODUCTION

This Climate Action Plan seeks to chart a course of action for Salem to become a climate-smart city of 2050

Situated in an agricultural valley with forested riparian areas along the Willamette River, Salem enjoys an idyllic natural setting which is a source of joy and pride for residents. Residents of Salem are also accustomed to periodic natural disasters. Earthquakes and floods have been defining characteristics of the area since the beginning of recorded history, but in recent years, the impacts of climate change have become increasingly evident. The area has experienced record temperatures, record drought, flooding, and, most recently, a historic wildfire season in 2020 and destructive ice storm in early 2021.

The serious impacts of these events have prompted governments across the Pacific Northwest to take ambitious steps to assess future climate impacts, reduce greenhouse gas emissions—what's known in the climate world as "mitigation"—and increase resilience to climate change, or the effort known as "adaptation." This Climate Action Plan seeks to chart a course of action for Salem to become a climate-smart city of 2050: a city that has embraced a carbon-free way of life, that has enhanced equity for all residents, and that protects its residents from the most severe impacts of climate change so that the city can continue to thrive.

A GROWING POPULATION

Changes to Salem's climate will take place in the context of a rapidly growing city. Salem's population is projected to grow 28% by 2035[3]. This growth will likely lead to increased climate hazards, as the need for additional housing may lead to increased pressure to build in fire and flood risk zones, and more people may need health or emergency services during extreme heat or hazardous air quality events. In addition, a higher population means that in the future, more individuals will be driving, using electricity and consuming goods, which may lead to increased GHG emissions at the same time the city is trying to make deep reductions.

APPROACH TO EQUITY

The effects of climate change will not be borne equally by Salem residents—those who contribute least to climate change will suffer the most serious consequences. Some Salemites already experience intersecting vulnerabilities due to racial discrimination, poverty, disability, housing insecurity, linguistic isolation, and barriers to nature, healthy food, and economic opportunities. Climate change will exacerbate those vulnerabilities and create new ones. People who live in floodplains, who live with medical conditions, who are unsheltered, and/or who have limited financial and social resources to recover from extreme weather events will have the most difficulty adapting to climate impacts.

Equity means all residents have the opportunity to participate and thrive in an inclusive society. This requires rectifying unequal access to resources and opportunities caused by historic and current systems of oppression and exclusion related to race, income, ability, gender, sexual identity, and other factors. An equitable community overcomes disparities by providing increased levels of support to community members based on their needs. In Salem, it is a priority to advance equity in decision-making processes and the outcomes of those processes, including policies, investments, practices, and procedures. Several strategies in this plan have the potential to increase equity in Salem by addressing systems and practices that have historically disadvantaged groups of Salem residents and by maximizing benefits for frontline communities. Many of the equity strategies are overarching actions that apply to not only the climate action plan, but other facets of City governance and community equity.

Going forward, as the recommendations of this plan are implemented, it will be important for Salem to act from the following equity principles to ensure a fair transition to a climate-smart future. Each of these principles corresponds to one of the seven Action Areas of this Plan:

1. Prioritize actions and allocation of public funding that improve safe mobility and increase transportation choice in low-income neighborhoods. Intentionally engage residents in low-income neighborhoods during planning and decision-making phases to better understand the needs and priorities of specific areas in Salem.

2. Implement strategies such that those responsible for the greatest amount of GHG emissions take the greatest action towards reducing emissions. Ensure the transition to renewable energy generation does not disproportionately affect low-income individuals and households. In decision-making and implementation, elevate the perspective of those most affected by climate change. Use equity frameworks and criteria to evaluate and execute all strategies.

3. Make green spaces and benefits of natural resources accessible to all Salem residents. Prioritize underserved areas and neglected neighborhoods when implementing strategies. Intentionally include residents of these areas and neighborhoods throughout planning and decision-making processes.

4. Cultivate affordable cost of living standards within Salem's economy. Ensure all residents have access to safe and affordable housing options.

5. Intentionally and thoughtfully engage historically excluded communities throughout future planning and implementation efforts related to climate action strategies.

6. Prioritize residents who do not currently have access to healthy foods and grocery stores during implementation of food-related strategies.

7. Ensure that waste disposal practices do not disproportionately affect low-income neighborhoods or historically marginalized communities.

Going forward, as the recommendations of this plan are implemented, it will be important for Salem to act from equity principles to ensure a fair transition to a climate-smart future.

SALEM 2050 VISION

What would a carbon-neutral and resilient Salem of 2050 be like?

In the fall of 2020, Salem residents contributed hundreds of ideas in response to the question, "What would a carbon-neutral and resilient Salem of 2050 be like?" Their responses paint a picture of a carbon-free, resilient, and thriving community. This vision drove the development of strategies in this plan.

Residents' vision for a climate-smart city of the future is that by 2050, Salem will have achieved:

NET ZERO EMISSIONS FROM ENERGY

Salem's utilities have transitioned to carbon-free sources of energy and all residents have benefited from stable electricity prices. All buildings are maximally energy efficient, solar energy is widely used, and the city has achieved its goal of carbon neutrality.

A HEALTHY LOCAL FOOD SYSTEM

A thriving local food system provides abundant, accessible and affordable healthy food for all. Community gardens and farmers markets can be found throughout the city, providing both food and social connectivity.

A CONNECTED, MULTI-MODAL TRANSPORTATION NETWORK

Residents have the ability to travel safely and affordably in all transportation modes, including the zero-emissions public transit system. New housing and commercial developments have added density, sidewalk and transit connectivity, and walkable neighborhoods. Biking and walking trails have been expanded.

ACCESSIBLE AND AFFORDABLE RESOURCES FOR ALL RESIDENTS

All Salem residents have access to affordable housing, healthcare, healthy food, jobs and transportation. When natural disasters strike, people know where to go to get help, which allows them to bounce back successfully.

ZERO WASTE

("Zero waste" is defined as diverting 90% of waste from landfills through waste reduction, composting, recycling and reusing.)

A closed-loop system in which products are recycled or remanufactured has resulted in a dramatic reduction of waste. A city-wide composting program collects all food scraps and yard waste and turns it into compost which is sold to gardeners.

NATURAL RESOURCE PROTECTION

Salem's parks and trees are thriving, thanks to investments in the tree canopy and the incorporation of native plants in parks across the city. Careful management practices have reduced storm runoff, and water quality has been protected with increased buffers.

CLIMATE-SMART ECONOMIC DEVELOPMENT

Local small businesses are thriving, thanks to a variety of partnership and support programs and the choices by residents to support their local economy. Environmentally sustainable business practices are the norm, and green jobs have substantially increased.

A COHESIVE AND CARING COMMUNITY

Salem is an engaged, caring community with a shared vision that works together to achieve climate goals. Formerly underrepresented voices have helped to shape city policies and practices in ways that have improved quality of life for all residents.

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Process

PROCESS

In 2020, the City of Salem hired Verdis Group to lead the community through the climate action planning process. Because of the coronavirus pandemic, the majority of the project was completed virtually. Most meetings and workshops were held via Zoom. Community engagement was conducted in person and virtually in the summer and fall of 2021.

The planning process included the following key steps:

1. CLIMATE ACTION TASK FORCE:

A Task Force of 35 members and 5 City staff representing a diverse cross-section of the Salem community was formed. This group participated in five virtual planning workshops.

2. ADVISORY GROUP:

A group of 13 City staff was created and provided technical input and advising throughout the process. Some members of the City Staff Advisory Group also served on the Climate Action Task Force.

3. CONSUMPTION-BASED EMISSIONS INVENTORY:

An analysis of the GHG emissions associated with the products and services that Salem residents purchase and consume was completed.

4. PUBLIC ENGAGEMENT:

Stakeholder mapping and analysis helped inform representation on the Task Force as well as the creation of a Public Engagement Plan, which outlined approaches and strategies for engaging the public in the climate planning process. A website was created to serve as a hub for information and community engagement related to the Climate Action Plan. At the outset of the project, a survey was conducted, gathering input from

499 community members regarding their views on climate change, characteristics of Salem, and the planning process. Community partners and Task Force members were asked to share requests for public input to their networks at various stages. Specific public engagement activities are included in the steps below.

5. VISIONING:

Nearly 75 community members and Task Force members contributed 221 ideas to identify a vision for a resilient Salem of 2050. These activities resulted in a set of visionary ideas categorized into eight main action areas.

6. VULNERABILITY ASSESSMENT:

Twelve interviews were conducted with 23 stakeholders and subject matter experts to ascertain the ways in which climate impacts have already affected Salem, how some residents are and may be disproportionately affected by climate impacts, and the kinds of climate hazards that residents may

experience in the future. Discussions were held on topics like water quality, stormwater management, fire risk, homelessness, emergency management, and equity. From the information gathered during interviews and through supplemental resources shared by interviewees, a methodological assessment of the climate risks Salem faces was conducted to identify the greatest threats to the community and how these climate-related threats interact with existing vulnerabilities. (See Climate Vulnerability Assessment chapter for details.)

7. STRATEGY DEVELOPMENT:

Members of the Task Force and community members were invited to submit their ideas on an online activity about the ways in which Salem could reduce GHG emissions and increase climate resilience. Nearly 250 individuals contributed ideas or comments. Next, additional strategies and best practices were generated by the consultants, ultimately leading to a list of over 200 ideas. A survey was conducted in which the Task Force and community members were asked to express their degree of support for each idea. The strategy ideas then went through a rigorous refinement process in which dozens of subject matter experts were consulted and strategies were refined in order to ensure relevance and specificity.

8. BENEFIT-COST ANALYSIS:

A benefit-cost analysis was performed by Ecotone Analytics on 10 strategies selected by three Salem City Council Task Force members. The analysis is different from a usual benefit-cost analysis in that it takes a broader view of impacts to account for social, environmental and economic valuations that can come from each strategy. A series of interviews with 29 subject matter experts in local and regional agencies was conducted to inform the analysis, in addition to extensive research (see Appendix 6).

9. GHG FORECASTING AND PLANNING:

An in-depth analysis of Salem's GHG reduction potential over the next 30 years was performed. Three separate business-as-usual forecasts were prepared, along with three separate forecasts showing the potential reductions Salem could make with ambitious climate action. Ten target scenarios, or assumptions about future GHG reductions, were modeled to show results by 2035 and 2050 (see Chapter 7).

10. COMMUNITY ENGAGEMENT:

Gathering perspectives and expertise from the Salem community was an essential part of creating a climate action plan tailored to the unique needs of the community. Throughout the Salem Climate Action Plan preparation process, the public provided input through online activities, community meetings, surveys, and by commenting on the draft plan (see Appendix 7). Public input from each phase of the process framed the next phase — feedback from the public was discussed by the project team and incorporated into the visioning, vulnerability assessment, strategy development phase, and finalization of the plan.

11. CITY COUNCIL WORK SESSION:

The Salem City Council received a briefing on the Climate Action Plan and discussed next steps at a Work Session on September 20th, 2021.

12. IMPLEMENTATION PLANNING:

Task Force members and City Staff were engaged in creating a prioritized Implementation Plan.

13. FINAL REVIEW AND APPROVAL:

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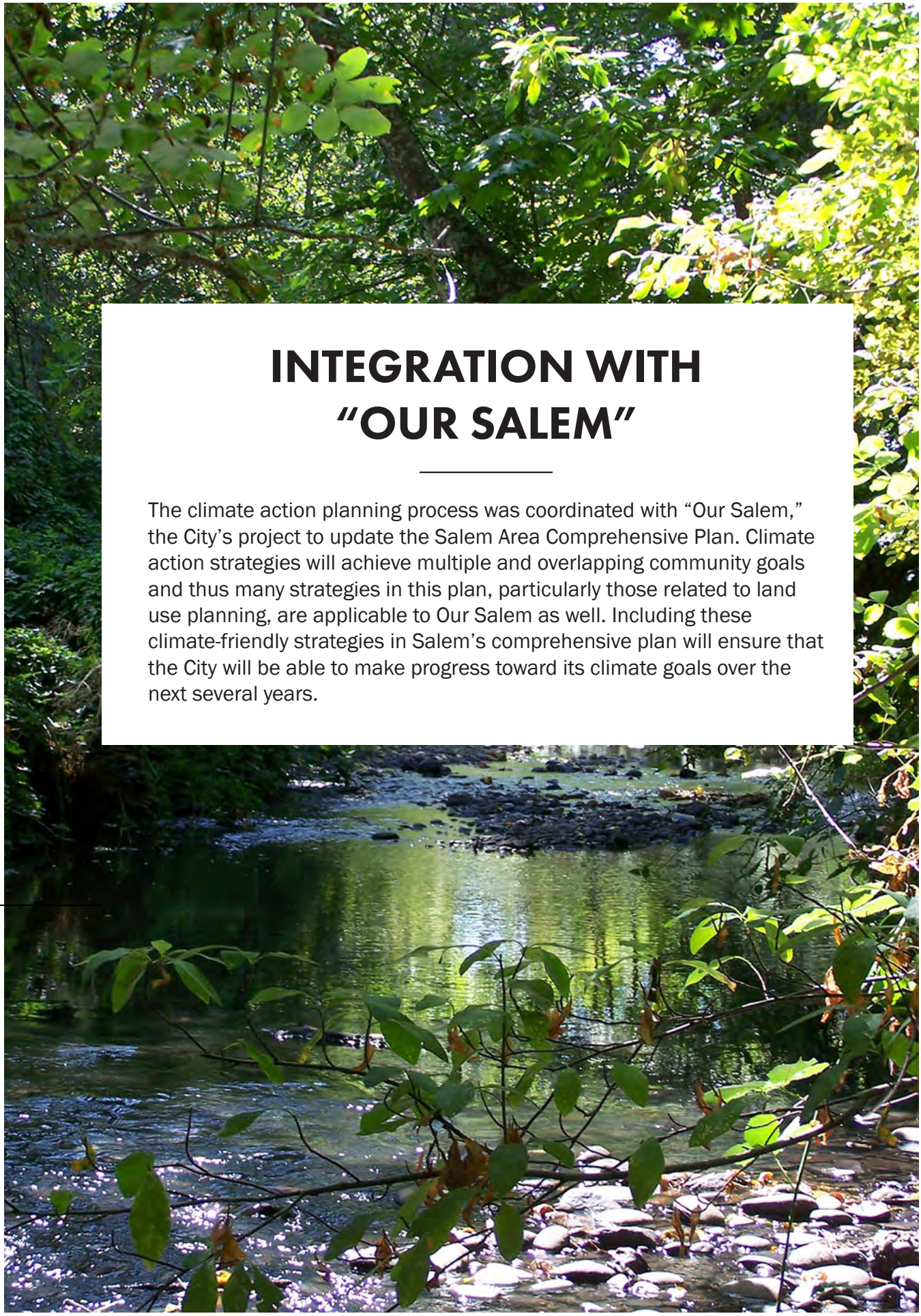


INTEGRATION WITH "OUR SALEM"

The climate action planning process was coordinated with "Our Salem," the City's project to update the Salem Area Comprehensive Plan. Climate action strategies will achieve multiple and overlapping community goals and thus many strategies in this plan, particularly those related to land use planning, are applicable to Our Salem as well. Including these climate-friendly strategies in Salem's comprehensive plan will ensure that the City will be able to make progress toward its climate goals over the next several years.

5

Building on State and Local Strengths

BUILDING ON STATE AND LOCAL STRENGTHS

Salem conducted its first greenhouse gas inventory in 2019 and joined ICLEI - Local Governments for Sustainability, a global network of more than 1,750 local and regional governments committed to sustainable urban development, in 2020. These recent commitments build on the city's dedication to creating a more sustainable Salem and on the state's longstanding foundation of improving regional environmental quality. For decades, the State of Oregon has been leading the way for a climate-smart future. Understanding past and present efforts to address climate change at the state level helps provide context for Salem's actions at the local level. This section provides an overview of recent actions from the State of Oregon and a summary of Salem's efforts to mitigate and adapt to the realities of climate change.

STATE OF OREGON LEADERSHIP

Recent legislation at the state level helps incentivize and reinforce equitable climate action here in Salem. In March 2020, Governor Kate Brown signed Executive Order 20-04.[4] This executive order set greenhouse gas (GHG) emissions reduction goals for the State of Oregon:

- At least 45% reduction in GHG emissions from 1990 levels by 2035; and
- At least 80% reduction in GHG emissions from 1990 levels by 2050.

Prior to these state-level goals, Governor Brown also issued Executive Order 17-21 in 2017, which focuses on accelerating the adoption of electric vehicles (EVs).[5] Both executive orders highlight the importance of the transportation sector in achieving GHG emissions reduction goals. In 2020, a new law (SB 1044) went into effect that establishes goals that promote zero-emission vehicle use and requires entities of executive departments to promote zero-emission vehicle use. At a national level, as well as at a state level in Oregon, the transportation sector currently represents the largest source of GHG emissions.[6]

In 2021, several important new pieces of climate-related legislation were signed into state law.

- HB2021, the 100% Clean Energy Standard, requires retail electricity providers to reduce greenhouse gas emissions associated with electricity sold to Oregon consumers to 80% below baseline emissions levels by 2030, 90% below baseline emissions levels by 2035, and 100% below baseline emissions levels by 2040.
- HB 2062 establishes new energy efficiency standards for appliances and certain water fixtures.
- HB2165, the Transportation Electrification Package, provides incentives and rebates to Oregon residents, including low- and moderate-income individuals, toward the purchase of electric vehicles (EVs). It also expands EV charging infrastructure with a particular emphasis on underserved communities.

- HB2180 requires certain newly constructed buildings to be EV-ready, meaning they are built with the electrical service capacity for charging electric vehicles.
- HB 2475 requires the Public Utility Commission to set different rates for lower-income energy users, and allows for greater public engagement in PUC proceedings by low-income and environmental justice advocates.
- HB 2842 establishes the Healthy Homes program to grant funds for home weatherization and building retrofits for low-income households.
- HB 3141 continues funding energy efficiency projects across the state.

In September 2021, the Oregon Department of Environmental Quality announced a new rulemaking process to establish a Climate Protection Program.

The purposes of the Climate Protection Program (CPP) are to: set limits on greenhouse gas emissions from significant sources in Oregon, including large stationary sources, transportation fuels, and other liquid and gaseous fuels; achieve co-benefits from other air contaminant reductions; and prioritize equity by promoting benefits and alleviating burdens for environmental justice and impacted communities. Importantly, this new rule would mandate emissions reductions from natural gas utilities. The proposed rule is expected to go before the Environmental Quality Commission in late 2021.

Focused rulemaking has been established by the State to help ensure transportation and land use planning efforts are equitable and help the State of Oregon, as well as local governments, achieve climate-related goals. Oregon's Land Conservation and Development Commission initiated Climate-Friendly and Equitable Communities (CFEC) Rulemaking in September 2020 and is responsible for several different actions and outcomes related to meeting Oregon's GHG emissions reduction goals and other climate-related targets. From the CFEC Rulemaking initiative, local governments can expect requirements from the State regarding climate-friendly and equitable land use and transportation planning. According to the CFEC Rulemaking Charge, specific requirements are expected to include:[7]

1. Creation of climate-friendly areas allowing high levels of mixed-use development, focused transportation investments.
2. Planning for high-quality pedestrian, bicycle, and transit infrastructure.
3. Limiting off-street minimum parking mandates.
4. Limiting motor vehicle congestion standards.
5. Prioritizing and selecting transportation projects to meet climate and equity goals.
6. Supporting EV charging.

CITY OF SALEM INITIATIVES

Over the past decade, the City of Salem has completed dozens of climate actions. The City's Climate Actions Audit,[8] completed in 2020, includes an inventory of past climate actions based on interviews with City staff and a thorough review of projects, practices, programs, 11 core City of Salem plans, and 12 climate action plans adopted by peer municipalities. Many of Salem's actions align with the forthcoming transportation and land use planning requirements from the State listed above. Additionally, Salem has completed or has in place over 25% of the recommended actions and policies identified for inclusion in CAPs. Examples of Salem's previous actions across five categories are listed on the next page.

BUILDINGS AND ENERGY

- All new city facilities are built to Leadership in Energy and Environmental Design (LEED) Silver Standard.
- City of Salem participates in PGE's Green Future Impact program. Through the program, Salem expects 80% of the energy that powers city operations will come from renewable sources by the end of 2021.
- Streetlights and signals have been converted from older, less energy efficient light fixtures to longer lasting and more efficient LEDs.
- Improvements to the Willow Lake Wastewater Treatment Plant continue the City's production of renewable energy from biogas to power the plant. At full capacity, the plant will be able to produce up to 1,200 kW of electricity, which is about 50% of the electricity needed to operate the plant for a year, or enough to power over 900 homes in Salem.

LAND USE

- Three new Mixed-use Zones have been added that prioritize pedestrian-oriented development.
- To accommodate dense and affordable living, barriers to Accessory Dwelling Unit (ADU) developments have been reduced.

TRANSPORTATION

- Between 2008 – 2016, the City completed nearly 50 different projects to upgrade existing or add new sidewalks, crosswalks, bike lanes, pedestrian crossing islands, shortened crossings at certain intersections, and radar speed signs.
- Access to bicycles and support of biking as a transportation mode have increased through a downtown-focused bikeshare program and installation of rentable bike lockers for storage.
- To enhance collaboration and efficiency, the City has increased its communication with Cherriots, the agency that provides public transit in Salem.
- EV charging stations have been installed at City and community facilities. Currently there are 41 publicly accessible EV charging stations in Salem.[9]

MATERIALS MANAGEMENT

- The City participates in the State of Oregon Sustainable Procurement procedures to help reduce waste at the source and reuse materials before resorting to recycling or landfilling items.

NATURAL SYSTEMS AND COMMUNITY WELLBEING

- Salem facilitates an environmental education program for the community's youth. The program serves an average of 12,530 students every year.
- Access to and connectivity between parks has increased.
- Salem has a tree canopy goal and invests in tree planting projects on City owned properties.

Though great efforts have been made in Salem since 2010, the City recognizes that there is always more work to be done. The City's Climate Actions Audit laid the groundwork for this current Climate Action Plan, including an evaluation of areas for improvement. One such area is the development of a climate vulnerability assessment.

6

Climate Vulnerability Assessment

CLIMATE VULNERABILITY ASSESSMENT

Salem is fortunate to have a mild climate—only 21 degrees separate the average annual maximum temperature of 63.1°F from the average annual minimum temperature of 42.1°F.[10] While this mild baseline means that the changes to Salem's temperatures due to climate change may be less extreme than other locations in the country, the City will nevertheless experience notable shifts in the future.

Climate change is already affecting Oregon. The *Fifth Oregon Climate Assessment* describes increasing temperatures, changes to precipitation patterns, increased risk of floods, and increasing risk of wildfire across the state.[11] Since 1895, Oregon has already experienced an average temperature increase of 2.2°F per century. The state is on pace to see temperatures rise by an average of 5°F by mid-century and by an average of 8.2°F by the 2080s. Summer temperatures are projected to increase the most. Rising temperatures, combined with changes in precipitation patterns, may lead to hotter and drier conditions that increase the risk of wildfires across the state and in the Salem area.

HOW CLIMATE RISK IS CREATED

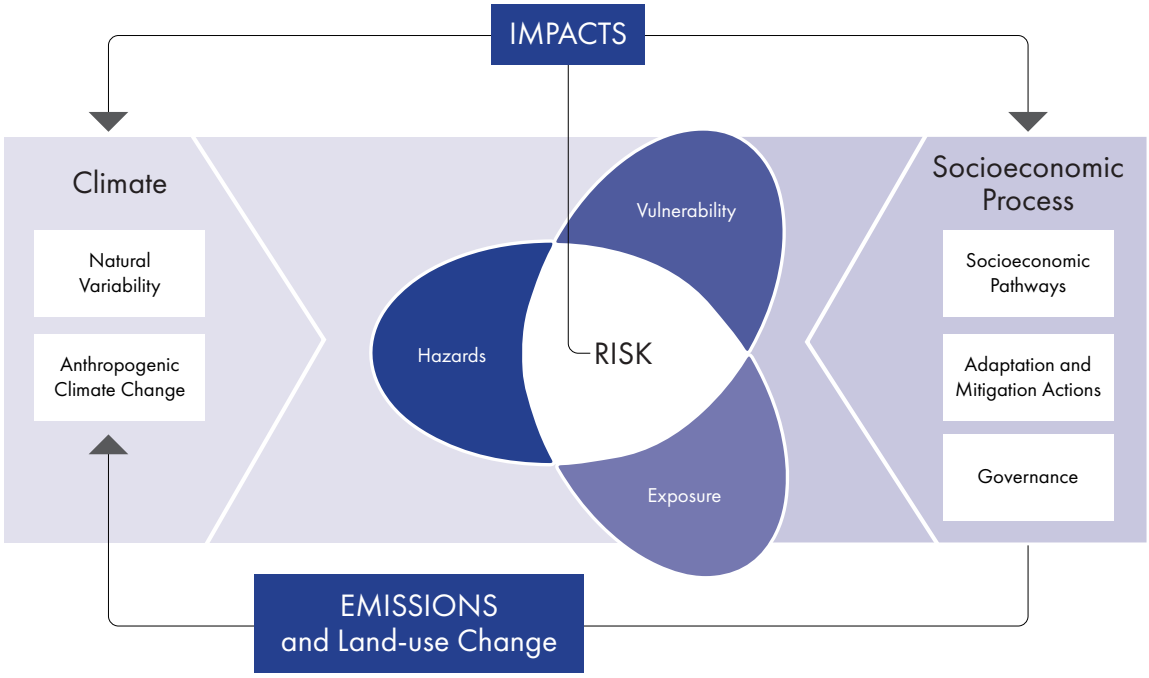


Figure 2. Source. IPCC, 2014: Summary for policymakers. *In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, et. al. Mastrandrea, et. al., (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1-32.

A critical step of the climate planning process is to take a close look at the specific ways that Salem will be affected by projected climate change impacts. This process helps to identify potential hazards, which then allows the community to take steps to reduce those hazards. As the Climate Assessment report notes, "disasters may result either from single, major events or from recurrent events that individually are not extreme, but degrade a community's social and economic infrastructure."[12]

The climate action planning process for Salem included the important step of assessing Salem's specific vulnerabilities to climate change. The process yielded valuable results which can inform the city's approach to improving climate resilience.

METHODOLOGY

The methodology for completing the climate vulnerability assessment included the following steps:

1. OCCRI CONSULTATION

A consultation was conducted with Dr. Erica Fleishman, Director of the Oregon Climate Change Research Institute at Oregon State University. Dr. Fleishman recommended the online resource known as the Climate Toolbox as a source of climate projection data for Salem. She also recommended a vulnerability assessment framework developed by the Climate Impacts Research Consortium (CIRC).[13]

PROJECTED TEMPERATURE INCREASES FOR OREGON

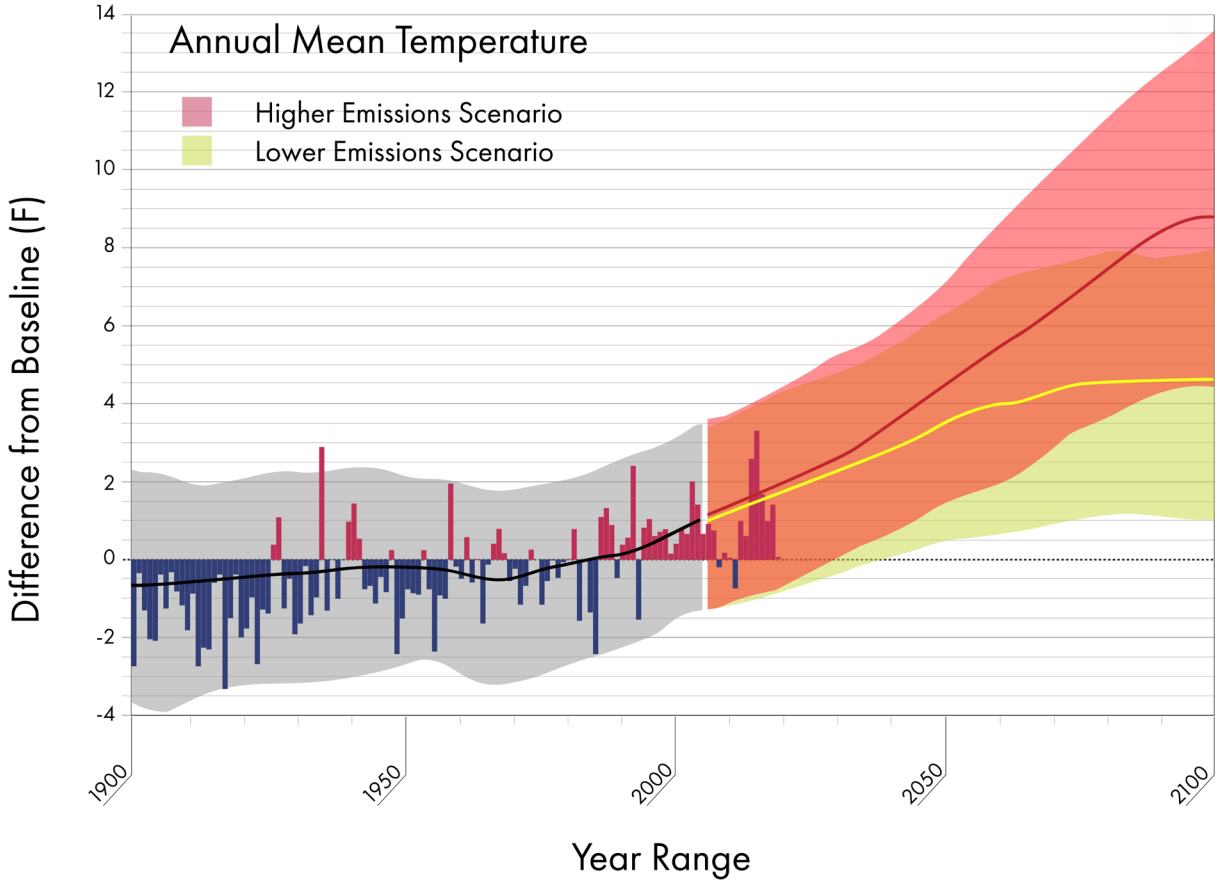


Figure 3.

2. CLIMATE PROJECTIONS

Climate projection data for the location of Salem, Oregon was obtained using the "Future Climate Dashboard" tool from the Climate Toolbox.[14] Data was collected in the categories of heat indices, summer temperatures, winter temperatures, water, growing season, chilling hours, and fire danger. Additional sources were consulted to gain a full profile of Salem's future climate.

3. CLIMATE IMPACTS

A Vulnerability Assessment Table was created based on the framework developed by CIRC. Climate impacts were grouped into four categories: warming temperatures, changes in precipitation patterns, increased fire risk, and reduced chilling hours.

4. COMMUNITY IMPACTS

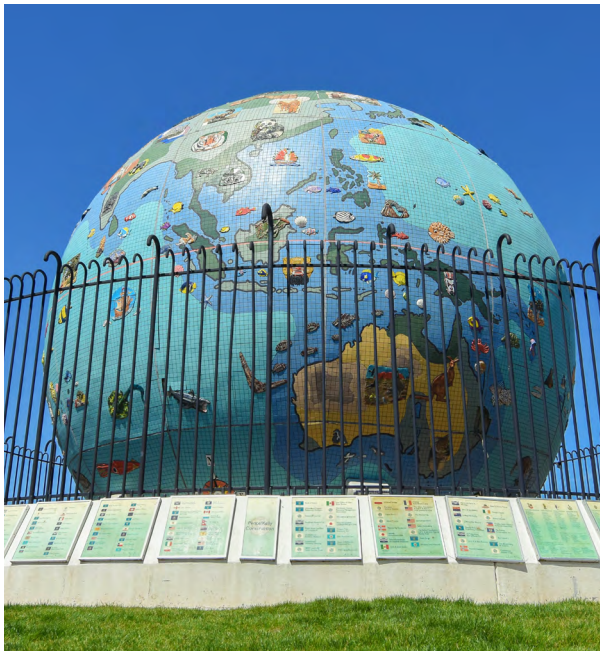
The ways in which each climate projection data point could impact the Salem community was summarized in narrative form.

5. LIKELIHOOD

The likelihood of each climate impact occurring was rated according to the level of evidence.

6. STRESSORS AND CONSEQUENCES

Next, projected intersections between non-climate and climate stressors were assessed. Non-climate stressors contain multiple impacts to the community that are not related to climate, and the examples assessed for Salem were population changes, increased demand for affordable housing, vulnerable populations, emerging health trends, local economy, and earthquake. Each of these non-climate stressors was examined in terms of how it might intersect with the identified climate stressors related to warming temperatures, changes to precipitation patterns, increased fire risk, and reduced chilling hours. From this assessment a consequence level between "negligible" and "catastrophic" was determined.



7. RISK

Using the determined values for likelihood and consequence level, a risk value from "low" to "extreme" was determined.

8. ADAPTIVE CAPACITY

Next, Salem's adaptive capacity was rated. This assessment involved understanding where capacities exist in a community, where weaknesses exist, and how well the community is poised to respond to change from multiple stressors and impacts. To obtain information about Salem's adaptive capacity, a meeting was held with City staff members on the project Advisory Committee. They were asked to respond to a survey in which they rated Salem's adaptive capacity to respond to warming temperatures, changes in precipitation patterns and increased fire risk in the areas of social potential, organization capacity, and management potential. Their scores were analyzed and then used to assign an adaptive capacity rating of "low," "medium," or "high."

9. VULNERABILITY

Finally, using the determined values for risk and adaptive capacity, a vulnerability level between "low," "moderate," and "high" was assigned for each climate impact area.

PROJECTED CLIMATE IMPACTS

Salem's projected climate impacts will fall into three main categories: warming temperatures, changes in precipitation patterns, and increased risk of wildfire. A fourth impact, reduced number of chilling hours, is primarily pertinent to the agricultural sector.

WARMING TEMPERATURES

Salem's average annual temperatures are expected to increase in the coming decades, with the most notable changes occurring in summer and winter. All projections assume a high-emissions scenario based on Representative Concentration Pathway 8.5 and use the 1990s average compared to projections by mid-century.[15] The reason mid-century (year 2050) is used for projections rather than end-of-century (year 2100) is to align with the mid-century emissions reduction goal of this Climate Action Plan.

The average summer temperature increase will be mild: it is projected to increase from a historic average of 66°F to 71°F by mid-century, while the average high summer temperature will increase from a historic average of 79°F to 86°F by mid-century.

What is of more concern is the projected increase in the number of extreme heat days, meaning days where the temperature exceeds 90°F. These temperatures can have serious health consequences such as heat exhaustion, heat cramps, mild heat

PROJECTED EXTREME HEAT DAYS PER YEAR

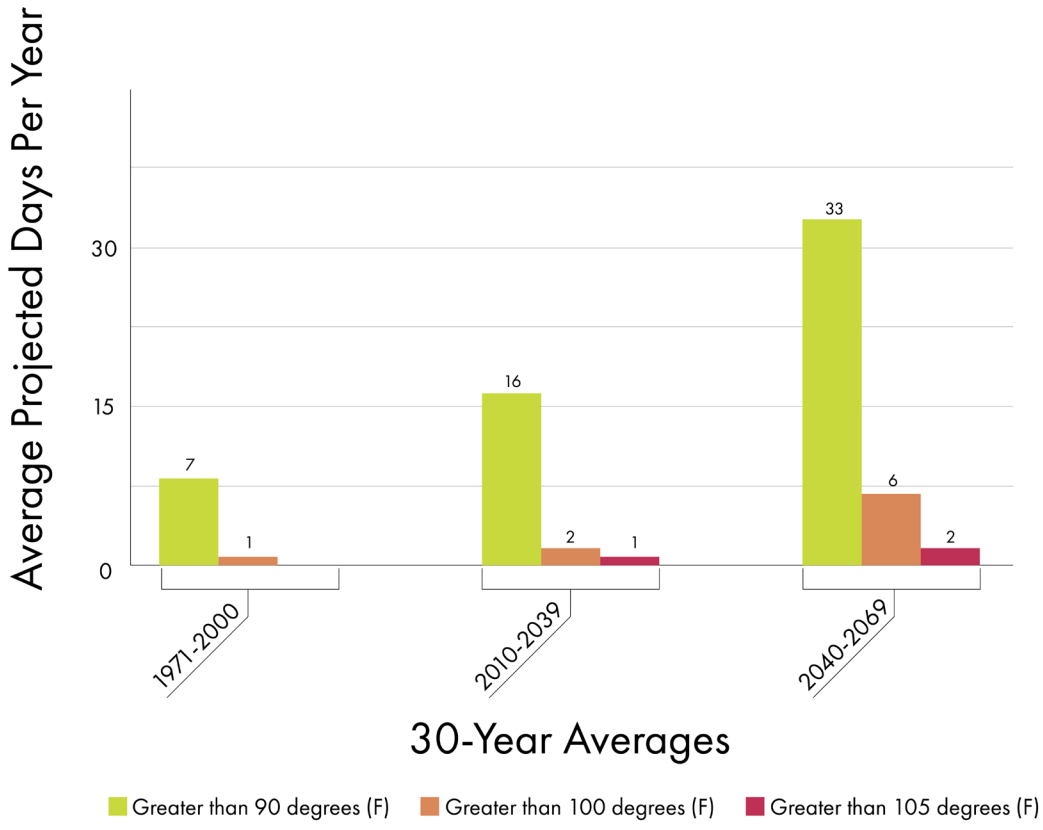


Figure 4: Extreme heat days (days over 90°F) are projected to increase from a historic average of 7 per year to 33 per year by mid-century. Average days over 100°F will increase from 1 to 6.

edema (swelling in the legs and hands), heat syncope (fainting), and heat stroke.[16] Salem's increasing hot days will bring an increased risk of heat-related illnesses for small children, the elderly, people with chronic diseases, residents living at or near the poverty line, people who are unsheltered, and people who work outdoors. People who live in urban areas with little to no tree canopy are at risk of experiencing urban heat islands, areas where heat intensifies due to the absorption and re-emitting of the sun's heat by buildings and roads. The Oregon Health Authority's Climate and Health Profile Report identifies the urban heat island effect as the reason why residents of low-income urban neighborhoods are at greater risk of health-related illness and death from extreme heat.[17] More extreme heat conditions may also bring an increase in respiratory problems, because higher temperatures contribute to the build-up in the air of harmful air pollutants.[18]

Winter temperatures, already mild in Salem, will become slightly warmer. The average high winter temperature is projected to increase from a historic average of 48.2°F to 52.5°F by mid-century. The coldest winter temperatures won't be quite so cold in the future—the average winter low is projected to increase from a historic average of 34.6°F to 39°F by mid-century. Heating needs may decline and put slightly less demands on the energy system, but this could be offset by air conditioning energy demands on hot days.

PROJECTED WINTER TEMPERATURES

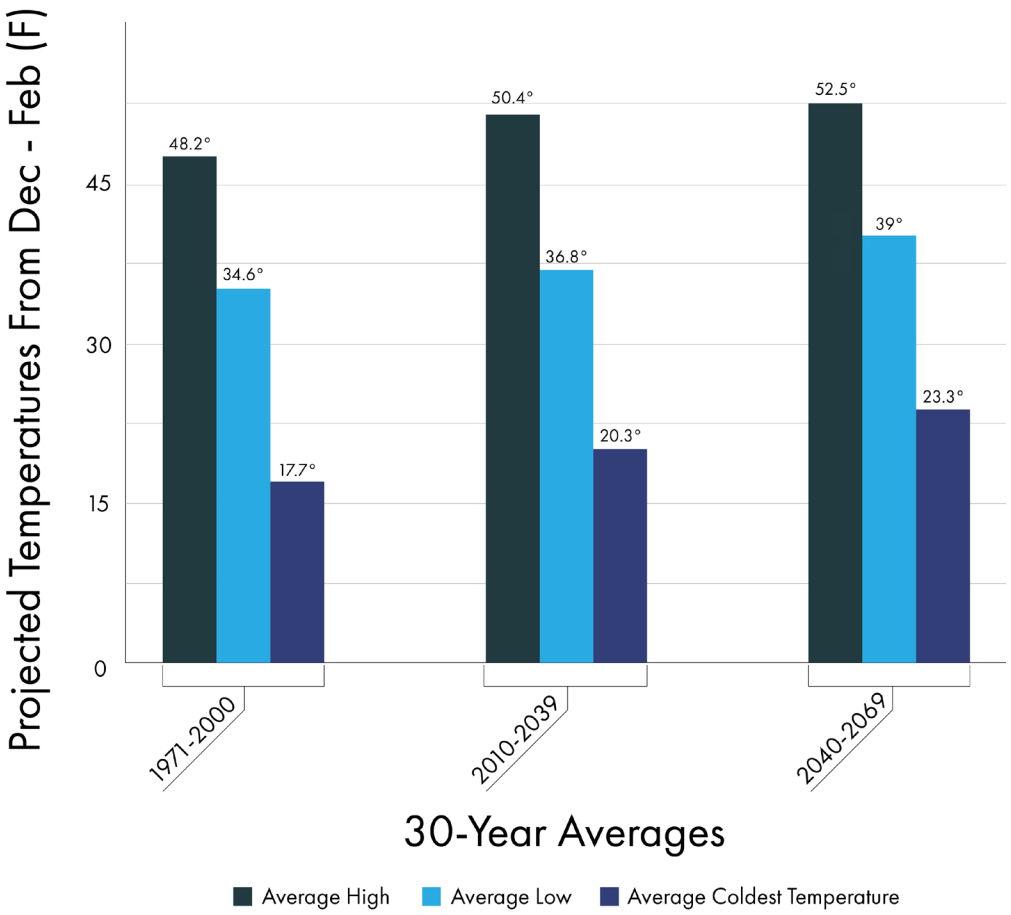


Figure 5: The average high winter temperature is projected to increase from a historic average of 48.2°F to 52.5°F by mid-century.

Warming temperatures will lengthen Salem's growing season, which may bring advantages to agricultural producers in the region. By mid-century, the growing season is expected to lengthen by 68 days, stretching from February to December. By the end of the century, the growing season will last nearly the entire year. While this shift may allow more varieties of crops to be grown in the area, any gains may be offset by other climate impacts like drought, wildfire, increased pests and diseases, and the shift away from traditional cold-season dependent crops.

PROJECTED GROWING SEASON

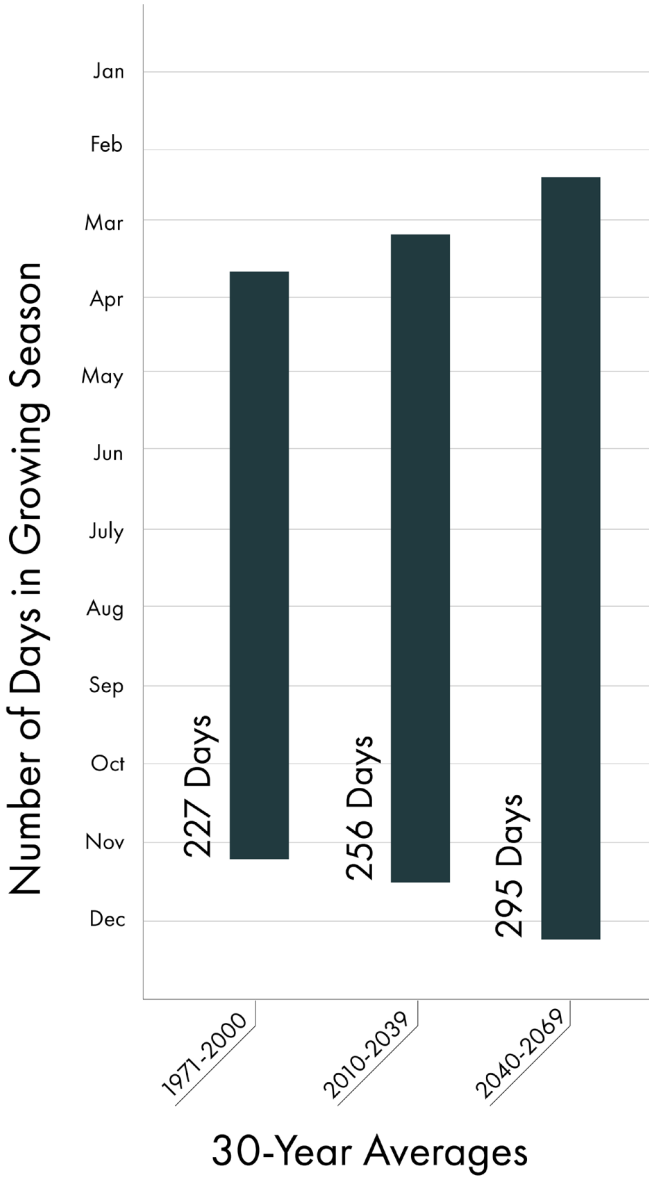


Figure 6: The growing season is expected to lengthen from a historic average of 227 days to 295 days by mid-century. By the end of the century, the growing season will last for nearly the entire year.

POTENTIAL CONSEQUENCES

While Salem's projected temperature increases will be mild, some consequences may be of concern:

- Increased risk of heat-related illnesses to small children, the elderly, people with chronic illnesses, residents living at or near the poverty line, and people who work outside (e.g., farmworkers and construction workers), and people who are unsheltered.
- Increased risk of respiratory problems.
- Salem's population is expected to grow 28% by 2035.[19] Combined with warming temperatures, increases in population mean more people will likely use air conditioning on the warmest days, which may lead to an increased demand for electricity.
- Warming temperatures will also likely lead to sustained or increased frequency of cyanotoxins, or harmful algal blooms, in the freshwater systems surrounding Salem. Exposure to cyanotoxins can cause hay fever-like symptoms, skin rashes, respiratory and gastrointestinal distress, and drinking untreated water containing cyanotoxins can cause liver and kidney damage.[20] Salem has been monitoring and treating drinking water for cyanotoxins for years, and recently invested in a new ozone filtration system at the Geren Island water treatment plant to ensure drinking water for residents will continue to be safe. But recreational activities in local lakes and rivers could be inhibited.

- Warming temperatures may allow for new pests to infiltrate the area New pests may have the ability to negatively impact Salem's ecosystems, for example by harming the city's tree canopy and spreading disease.
- Decreased water levels in the reservoirs on the North Santiam River which provide all of Salem's water.

In summary, while higher summer temperatures may lead to health impacts for vulnerable populations, the temperature increase is not projected to be extreme and may be offset by people's ability to naturally acclimate to changing temperatures over time. The issue of increasing cyanotoxins in drinking water due to algal blooms would be a significant risk to Salem's residents if not for the important water treatment efforts already underway. In the vulnerability assessment (see Appendix 4), the overall risk level from warming temperatures was categorized as moderate. Salem's assessed adaptive capacity, or ability to address these changes, was rated as moderate, which led to an overall vulnerability rating as moderate as well.

PROJECTED SUMMER TEMPERATURES

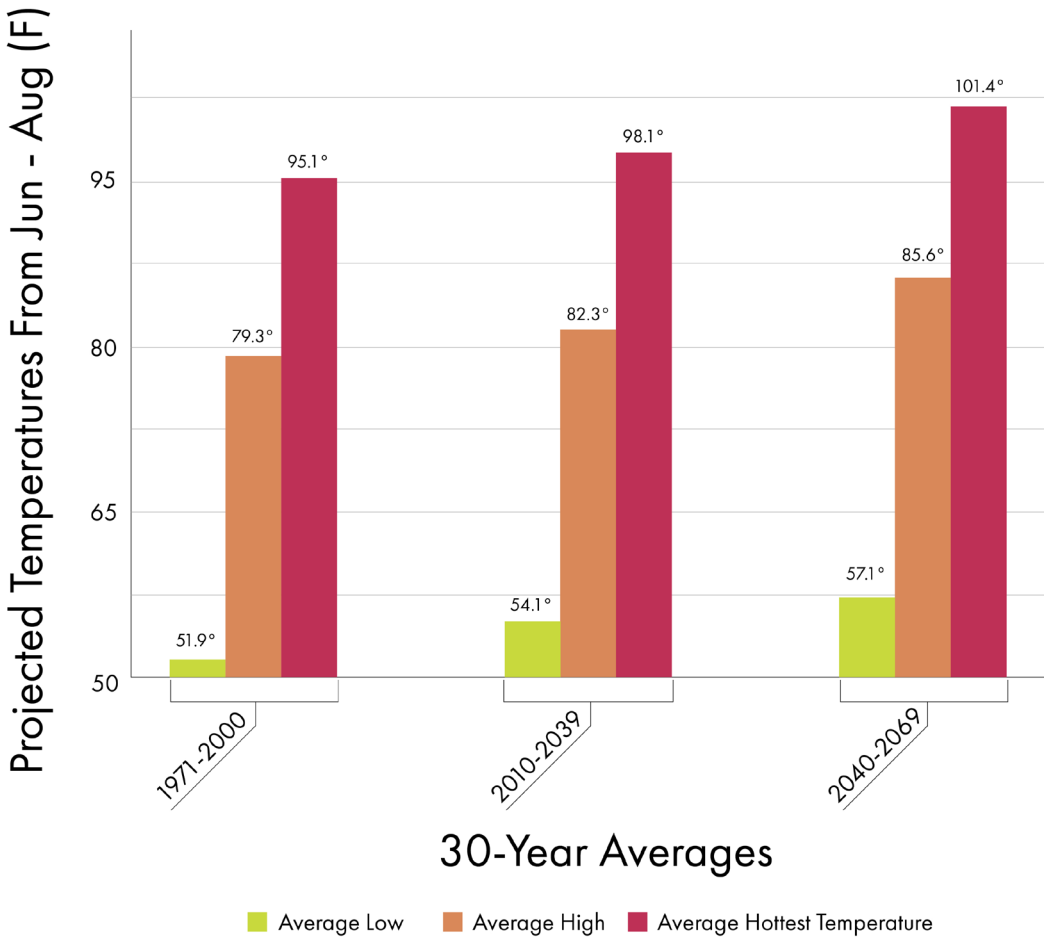


Figure 7: The average high summer temperature is projected to increase from a historic average of 79.3°F to 85.6°F by mid-century.

CHANGES IN PRECIPITATION PATTERNS

Overall precipitation in Salem is not projected to change significantly—an increase of only one inch per year is projected. However, because of warming temperatures, the type and timing of precipitation is likely to shift. One change will be a shift from mountain snow to rain in winter due to warming temperatures. Another change is a likely increase in unpredictable cloudburst events, in which an extreme amount of precipitation falls in a short amount of time. These events could lead to flash flooding in areas not designated as high risk.[21] According to Dr. Erica Fleishman, Director of the Oregon Climate Change Research Institute, events where rain falls on existing snow accumulation (rain-on-snow events) have been increasing in Oregon, and can cause unexpected flooding due to runoff. Peak streamflows in the Willamette River are expected to increase from a historic average of 48,863 cfs (cubic feet per second) to 54,982 cfs by mid-century, meaning increased risk of flooding is possible.

While there will be more water flowing in some areas, other waterways will have less water. Salem's water balance (the amount of annual rainfall minus the annual potential evapotranspiration) is projected to decrease from a historical surplus of three inches per year to a deficit of nearly one inch per year by mid-century, due to increasing evapotranspiration rates. A water deficit occurs when the amount of precipitation that falls in a

U.S. DROUGHT MONITOR-OREGON

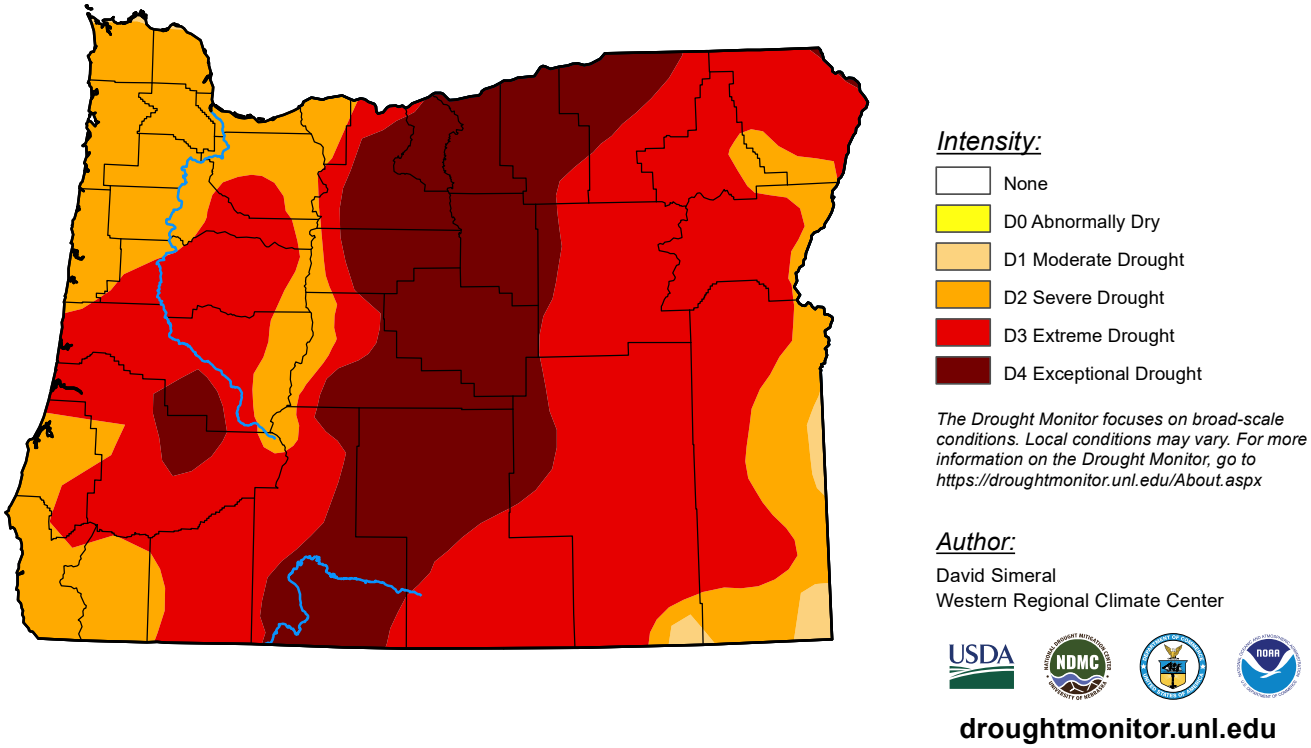


Figure 8: Oregon drought map as of September 7, 2021.

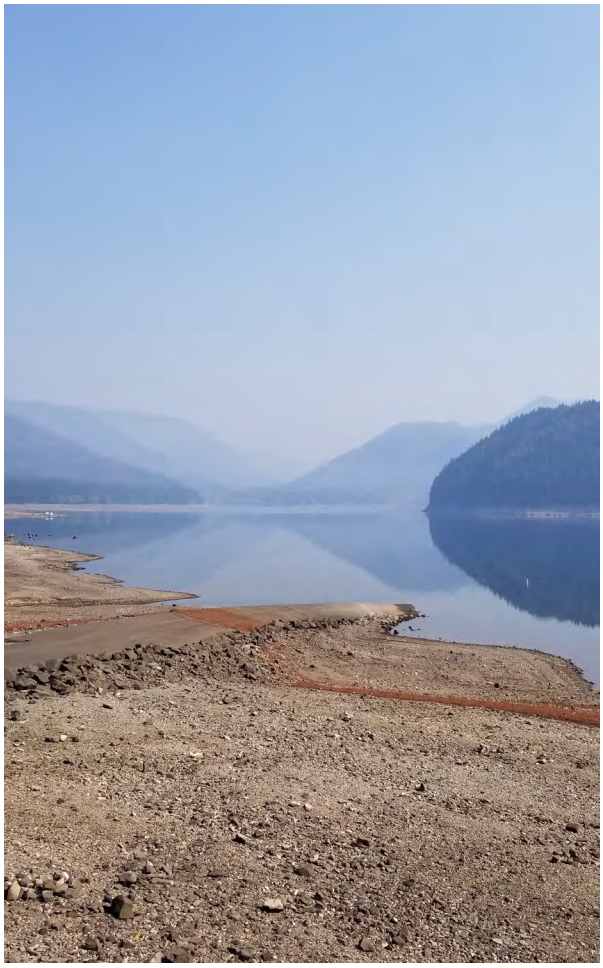
specific period is exceeded by the amount of evapotranspiration that occurs during the same time period.[22]

Drought is an important risk for the Salem area. The Fourth National Climate Assessment states that in Pacific Northwest, "periods of prolonged drought are projected to be interspersed with years featuring heavy rainfall driven by powerful atmospheric rivers and strong El Nino winters."[23] In recent years, Oregon has experienced many of the associated impacts of drought, including stress to crops and livestock, reduced agricultural yields, reduced snowpack and runoff, reduced winter and summer recreation activities, fish die-offs, drinking water quality concerns, hydropower shortages, and larger wildfires. These impacts are expected to continue as climate change worsens.

POTENTIAL CONSEQUENCES

The consequences from changing precipitation patterns could include the following:

- Flood conditions could be exacerbated in areas outside the historical high-risk floodplain and where new development is occurring. Risks to unsheltered people living near waterways could increase.
- Risk of water damage to homes and businesses from flooding.
- Water intrusion in homes can create mold issues, respiratory issues, and psychological stress.
- Potential harm to railroads, bridges, and overpasses from flooding.
- Increased risk of drought, especially when combined with warmer temperatures.
- Water use restrictions and food insecurity in periods of drought.



Water level at the Detroit Reservoir on the North Santiam River, 2021.

In summary, though overall precipitation amounts are expected to remain consistent, hotter temperatures will lead to a water deficit which may impact water supply and demand. Precipitation patterns may change, leading to increased frequency of heavy downpour events and flooding. Because Salem has had extensive experience dealing with flood events throughout its entire history as a city, the community's adaptive capacity is relatively high when it comes to mitigating flood risk and recovering from flood events. Therefore, the overall vulnerability rating from changing precipitation patterns was rated as low in the vulnerability assessment.

INCREASED RISK OF WILDFIRE

Wildfire is a significant increasing risk across the state, and the 2020 fire season presented historic events. According to the Fifth Oregon Climate Assessment report, "The total area burned in Oregon during summer and autumn 2020 was among the largest in recorded history. During the 2020 fire season, five wildfires over 100,000 acres, ignited by lightning and human activity, burned in wildlands and the wildland-urban interface. These and other fires across the western United States led to the displacement of thousands of people and loss of structures and infrastructure, and contributed to hazardous air quality in many parts of Oregon and the Northwest."[24]

PROJECTED WILDFIRE RISK

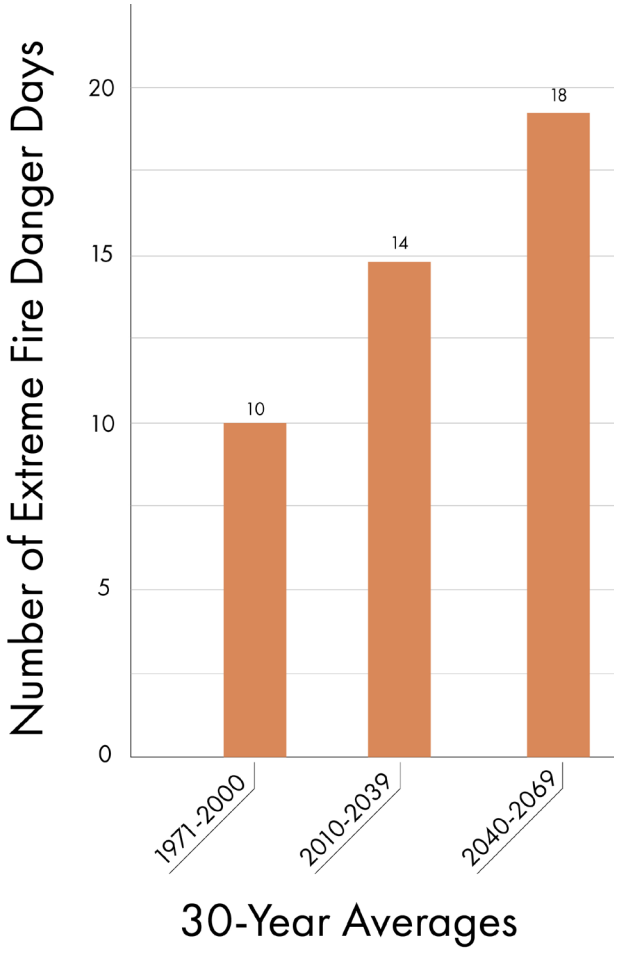


Figure 9: The number of extreme fire danger days will double by mid-century

By the year 2100, annual area of land burned in the state, burn severity and frequency of wildfires are all projected to increase. One study estimated that the annual area burned in the Willamette Valley is projected to increase 900% by the end of the century, relative to the 1986-2010 average.[25] A recent analysis of the impact of climate change on wildfire hazard in the nearby Clackamas Basin found that "all climate and baseline scenarios illustrate that extremely large, intense fires are plausible, and that they will become more plausible under hotter and drier climate scenarios."[26]

The number of extreme fire danger days*[27] in Salem will double by mid-century, increasing from a historic average of 10 per year to 20 per year. A majority of the increase will occur during the summer months.

With increased risk of fire comes the increased risks of fire damage to public and private properties, smoke inhalation, evacuation of residents, economic losses, landslides, erosion, water quality degradation, and transportation disruption. Unhealthy and hazardous air quality related to wildfire smoke can also take a physical and mental health toll on residents. Wildfire smoke contains a variety of gases and particles, including ozone, carbon monoxide, polycyclic aromatic compounds, nitrogen dioxide, and particulate matter—pollutants linked to respiratory and cardiovascular illnesses.[28] What's more, wildfires release great amounts of carbon dioxide, which works against local efforts to reduce GHG emissions.

Additional risks occur after a fire, including increased risk of landslides, potential

negative environmental impacts from firefighting materials on soil and water resources, and degraded quality of surface water and drinking water due to post-fire debris, hazardous materials and soil movement.

POTENTIAL CONSEQUENCES

- The consequences from increasing wildfire risk could include the following:
- Poor to hazardous air quality resulting from wildfires would greatly impact vulnerable populations—for example, people who are unsheltered, people who work outdoors, and people who live with chronic medical conditions such as asthma.
- Salem's drinking water source, the North Santiam River, could be degraded. Debris and chemicals in surface water following a fire could put additional pressure on water treatment facilities. The Geren Island water treatment plant could itself be at risk of wildfire.
- Oregon's population growth could lead to increased pressure to build housing in fire-prone zones, further exacerbating fire risk.
- Higher than expected population growth. If people choose to relocate from other areas with higher climate change risk, the population influx could strain existing resources, services, and contribute to housing-related issues.
- Fire-damaged forests and trails and poor air quality may reduce tourism and outdoor events in the area, resulting in economic impacts.

Wildfire smoke at Fairview Park, 2020

In summary, hotter and drier conditions will lead to increased fire risk in forested areas outside of Salem. Main impacts to Salem include health risks due to poor air quality, increased emergency operations and evacuations, and reductions in revenue and employment in the tourism industry. Salem could also experience higher than expected population growth as people from more climate change affected locations relocate due to their own fire risk. In the vulnerability assessment, the consequences from fire risk were rated as moderate and the risk high. However, Salem's adaptive capacity was rated moderate, which led to an overall vulnerability rating of moderate.

* Extreme fire danger days are defined as the mean number of days in summer which are classified as very high fire danger days, calculated as the days with 100-hour fuel moisture that is below the 3rd percentile from historical years.

REDUCED NUMBER OF CHILLING HOURS

"Chilling hours" generally refers to the number of hours between 32° and 45° that fruit and nut trees need to produce fruit successfully.[29] Climate projections show that the number of chilling hours in Salem will decline from a historic annual average of 2,408 hours to 1,553 hours by mid-century. This reduction could have implications for fruit and nut tree growers in the Willamette Valley, but should not affect Salem residents directly. The risk level was rated as negligible in the vulnerability assessment.

COMPOUNDED RISK OF CLIMATE IMPACTS AND EARTHQUAKE

According to the Marion County Emergency Operations Plan, a major earthquake is the highest-ranked risk to the area. There is approximately a 40% chance of an earthquake occurring along the Cascadia Subduction Zone in the next 50 years.[30] Depending on the earthquake's magnitude, critical infrastructure systems could be disrupted, including severe damage to energy, water, transportation, and communication systems.

If a major earthquake were to occur during an extreme weather event such as a wildfire or flood, the compounded effects could be catastrophic. Furthermore, earthquakes have the potential to cause wildfires (e.g., breaks in natural gas lines and downed power lines). With fire seasons projected to lengthen and extreme fire danger days to multiply, the risk of an earthquake occurring during fire season grows. Such overlapping events could lead to catastrophic consequences for the Salem area.

CONCLUSION

Whether it be extreme heat, prolonged drought, wildfires, dangerous air pollution from wildfire smoke, or ice storms, Salem residents are already feeling the effects of the changing climate.

These impacts will continue and may become exacerbated as the climate continues to change. Increased heat leads to reduced snowpack, reduced streamflow runoff, increased evapotranspiration, wildfire, drought, increased water use and risks to water quality. Increasing wildfire events and their associated impacts are the most serious projected climate risks for the Salem area.

Caution will need to be taken during extreme heat days in summer to protect vulnerable residents from heat stroke. The risk of flooding from unpredictable cloudburst events, or from rain-on-snow events, may cause problems for neighborhoods already at risk of flooding.

Food security for Salem residents may be impacted as local agricultural producers experience climate impacts or as regional transportation and supply chain networks may be disrupted by extreme weather events.

Having a clear understanding of these future climate risks will allow the Salem community to adequately prepare for a climate-altered future.

The state of Oregon is on pace to see temperatures rise by an average of 5°F by mid-century and by an average of 8.2°F by the 2080s.

7

Greenhouse Gas Emissions Forecasts

Note: The forecasts in this chapter are being reviewed in accordance with pending rulemaking from the Oregon Department of Environmental Quality. Final versions will be made available in November.

GREENHOUSE GAS EMISSIONS FORECASTS

The City of Salem has set ambitious targets, aiming for a 50% reduction in GHG emissions by 2035 and net-zero emissions by 2050. Forecasting was completed to show possible pathways for Salem to achieve these goals.

Greenhouse gas (GHG) emissions are produced primarily by the burning of fossil fuels for purposes such as transportation and electricity,[31] and are the main driver of climate change. Activities such as driving a gas-powered vehicle, heating a home, or flipping on a light switch all contribute to GHG emissions in Salem. A sector-based GHG inventory completed in 2019 details the sources of all GHG emissions in Salem and forms the baseline from which future emissions reductions can be measured.

To complement the sector-based GHG inventory, a consumption-based GHG inventory was completed in 2020. This inventory measured emissions that are associated with the goods and services that are purchased and used by Salem residents. This alternate way of measuring emissions takes into account the production, transport, sale, use and eventual disposal of any purchased item or service, and thus has a global footprint.

The consumption-based GHG inventory showed that the purchase, use, and disposal of vehicles, food and beverages, and furnishings were the three largest categories of consumer-driven GHG emissions in Salem (see Appendix 2).

In accordance with industry norms and protocols, the sector-based GHG inventory was the version used as the baseline for planning emissions reductions.

Salem's success is highly reliant on its three utility companies (Salem Electric, Portland General Electric, and NW Natural) achieving their goals to reduce emissions. Salem needs to continue to collaborate and communicate with these partners, as well as with residents, to ensure Salem can meet its goals.

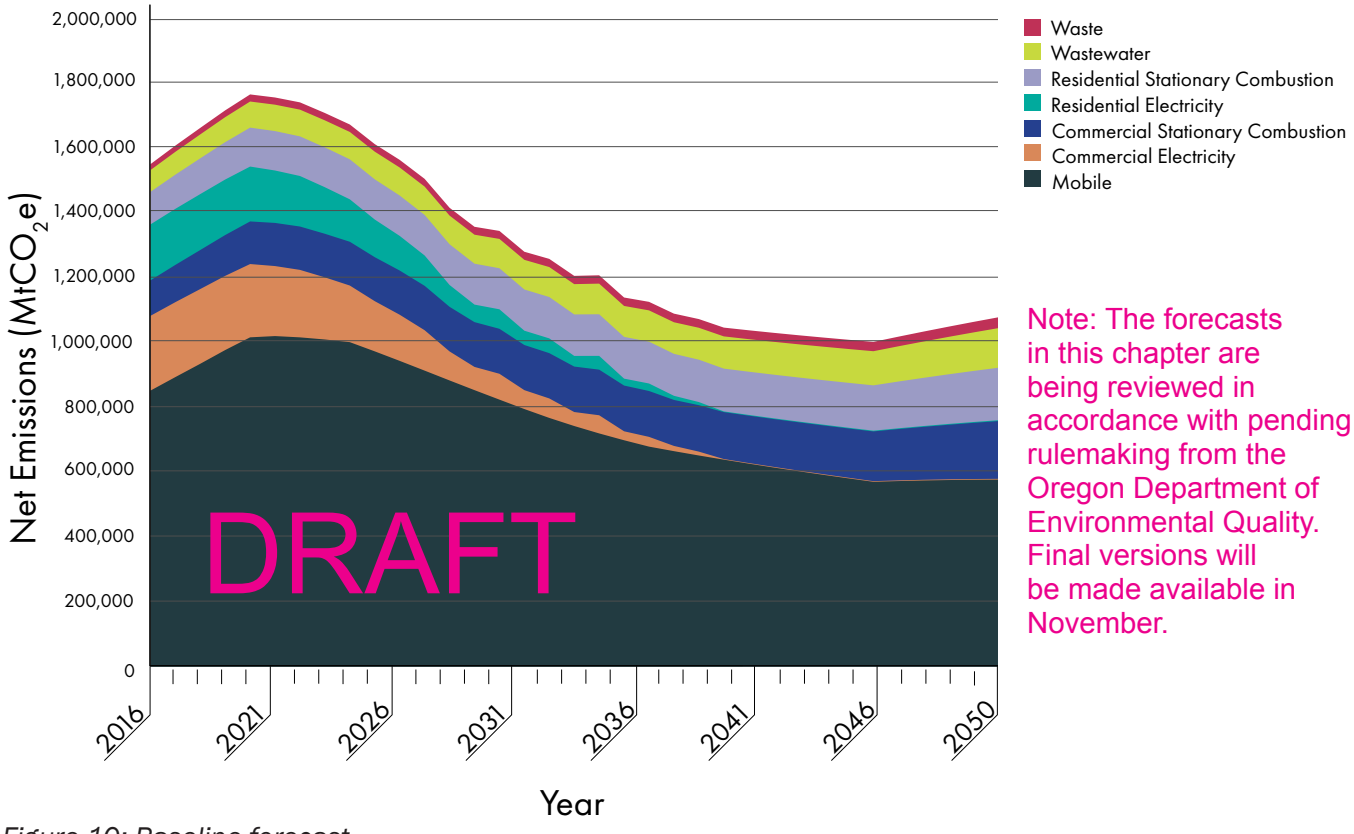
BASELINE FORECAST OVERVIEW

To measure the impact of GHG reduction strategies, Salem first needs a baseline from which to measure reductions. Unlike most baselines, which measure the past, GHG baseline forecasts make

assumptions about what the future might look like. Salem has a GHG Protocol compliant sector-based GHG inventory measuring emissions from 2016, from which the baselines were projected. Commonly, Climate Action Plans include a "Business As Usual" (BAU) forecast, which generally assumes only small changes in emissions intensity coupled with population growth. Typically these forecasts predict a significant increase in GHG emissions over time, which leads to an overstatement of the impact of target reductions. This is true because these forecasts often make an unrealistic assumption by holding per-capita emissions steady, so emissions grow with population. However, outside of these simulations and in the real world, per-capita emissions in many parts of the US are trending downward over time for numerous reasons, such as increases in energy efficiency standards. If BAU forecasts do not take these decreases into account, then municipalities may unduly claim credit for decreased emissions in future GHG inventories—decreases that would have occurred regardless. Typical BAU forecasts also rarely include a quantitative or qualitative measurement of certainty, which can lead to overconfidence in the model projection. To address these problems, Salem developed three baseline forecasts from which to measure emissions. These forecasts provide a range of possible BAU outcomes and provide a qualitative estimate of forecast certainty (see Appendix 5). Based on the outcomes of these three forecasts, the model which represented the middle outcome was used to perform further analysis.

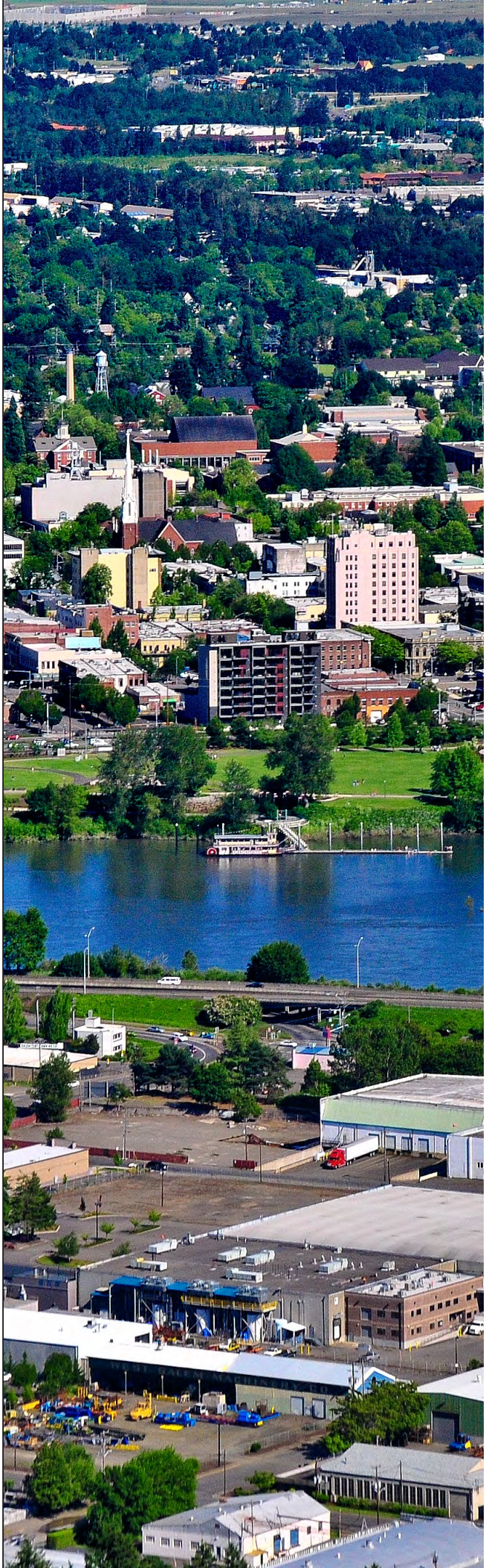
Salem's baseline forecast showed a 38% reduction in emissions between 2016 and 2050. Emissions peaked in 2020-2021 before declining until 2045, after which emissions began to increase, primarily

BASELINE GREENHOUSE GAS (GHG) EMISSIONS FORECAST



Note: The forecasts in this chapter are being reviewed in accordance with pending rulemaking from the Oregon Department of Environmental Quality. Final versions will be made available in November.

Figure 10: Baseline forecast.



because of increased natural gas emissions from population growth, which was no longer being offset by reductions in electricity or transportation emissions. Electricity emissions reached near-zero in 2040. Transportation emissions declined until 2045 and then stabilized. Natural gas emissions increased slowly throughout and were the second largest source of emissions in 2050 after transportation.

Given the forecasting results, it appears likely that absolute GHG emissions will decline in Salem and reach lower levels in 2050 than in 2016 even without direct intervention by the city of Salem. This is because of factors such as expected increases in energy efficiency, renewable energy, and the use of electric vehicles. However, without local action to pursue opportunities to reduce net GHG emissions, Salem will not achieve its 2035 or 2050 GHG emissions goals.

SALEM EMISSIONS REDUCTIONS PROJECTIONS

Salem produced future emissions projections for two scenarios measured from the baseline discussed above. The first projection, labeled “Scenario 1,” shows a challenging but achievable pathway for Salem to significantly reduce emissions. While it may be achievable with serious effort, this scenario shows that Salem will miss its goal of reducing emissions 50% by 2035 and achieving net zero by 2050. The second projection, labeled “Scenario 2,” shows one model of what it would take for Salem to meet both the 2035 and 2050 goals. In order to achieve either scenario, the Salem community will need to implement a number of highly impactful GHG reduction strategies.

SCENARIO 1

In the first scenario, ten emissions reduction assumptions were selected for modeling based on subjective criteria. The majority of assumptions reflect areas in which there are significant opportunities to reduce emissions. For example, because transportation is the largest source of emissions, the majority of reductions tackle different ways to reduce emissions from the transportation sector. Reducing transportation emissions can be pursued by reducing the number of miles driven or the emissions intensity per mile. These reductions can be further broken down, for example, into whether the reduction in emissions intensity per mile is pursued while retaining vehicles (e.g. electric vehicles) or by shifting more trips to public transit, biking, or walking.

The need for significant reductions in GHG emissions was weighed with the desire to model the outcomes of a wide variety of strategies. Therefore some emissions reduction assumptions, such as increasing carbon sequestration, have a small impact on total emissions. However, modeling these reductions provides information on their relative impact and informs the value of pursuing relevant strategies. Further, these ten target source reductions are interdependent, so reducing investment in one area may result in additional carbon offset by another target scenario. Listed in the table below are the ten emissions reduction assumptions modeled:

EMISSIONS REDUCTION ASSUMPTIONS MODELED

MODELING ASSUMPTION	EMISSIONS SOURCE
Improve building efficiency by an average of 10% by 2050	Electricity
Maximize onsite solar	Electricity
Maximize carbon sequestration of plants and trees	Sequestration
Halt all growth in natural gas emissions and include a 15% Hydrogen blend	Stationary combustion
Double the rate at which residents use biking and walking	Transportation
Double the rate of EV adoption	Transportation
Quadruple rate of transit ridership	Transportation
Reduce the amount of passenger vehicle traffic coming into and out of Salem by 40%	Transportation
Reduce the amount of traffic within Salem by 10%	Transportation
Transition to a zero-emissions bus fleet	Transportation

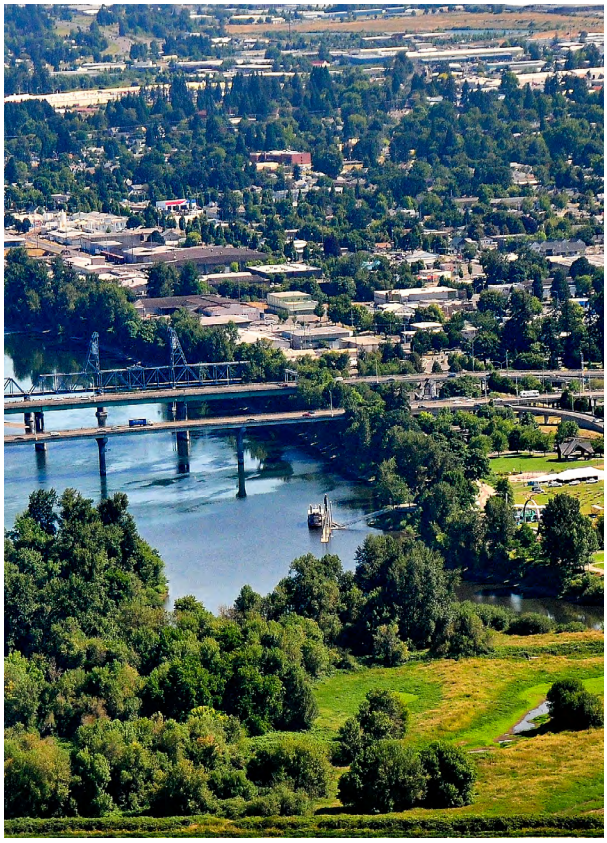
Table 1

The ten target emissions reductions led to a decrease of 428,000 $MtCO_2e$ in 2050 from forecast levels. Most of these reductions can be attributed to transportation (306,000 $MtCO_2e$ remaining in 2050, 47%), but reductions in natural gas also played an increasingly important role (179,000 $MtCO_2e$ remaining in 2050, 29%).

THE SCENARIO 1 PROJECTION RESULTED IN THE FOLLOWING OUTCOMES:

- 40% net reduction from 2016 levels by 2035
- 58% net reduction from 2016 levels by 2050

In this scenario, Salem would not meet its goal of reducing emissions 50% by 2035 and achieving net zero by 2050.



SCENARIO 1 GREENHOUSE GAS (GHG) EMISSIONS FORECAST

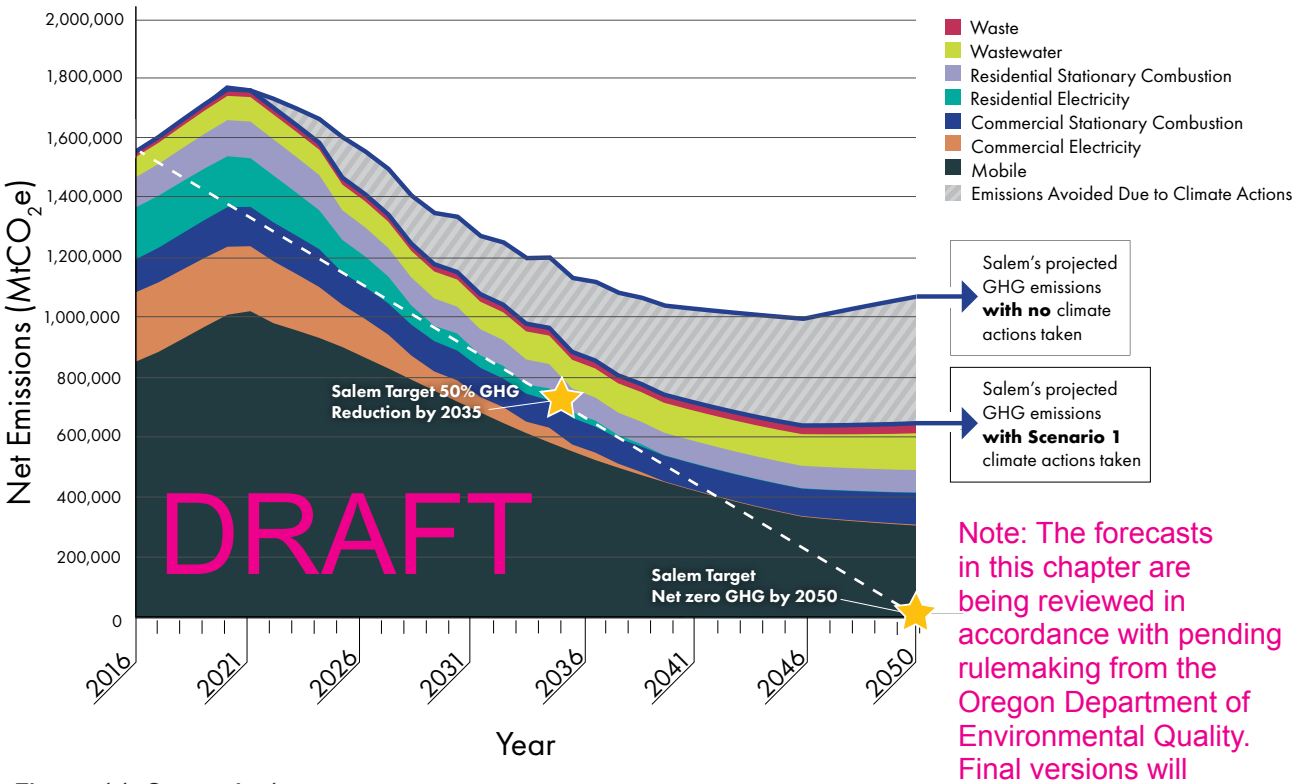


Figure 11: Scenario 1.

Note: The forecasts in this chapter are being reviewed in accordance with pending rulemaking from the Oregon Department of Environmental Quality. Final versions will be made available in November.

WHY WASN'T THE TARGET MET?

Given that the Scenario 1 target reductions did not achieve the target goals, it is worthwhile to examine the remaining GHG emissions to understand their sources. The projected remaining emissions in 2050 fall into the following categories:

1. WASTE

Waste comprises a small fraction of remaining emissions (33,000 $MtCO_2e$, 5%). No change in per-capita landfill emissions was assumed, which means that as the population grows, materials are disposed of at the same per-person rate and that the material is sent to the landfill and Covanta at the same proportion as 2016. Programs that address per-capita waste generation or that reduce landfill emissions could further reduce GHG emissions. A number of strategies in the CAP could impact GHG emissions from waste.

2. WASTEWATER

Wastewater GHG emissions (121,000 $MtCO_2e$, 19%) were projected to grow with the population, and it was assumed that additional growth was entirely connected to the wastewater treatment system. It was also assumed that wastewater in the future was treated using the same methods as today. Operational changes in wastewater treatment or capture and use of methane could lead to a reduction or elimination of wastewater emissions depending on GHG protocol guidance.

3. NATURAL GAS

Commercial (105,000 $MtCO_2e$, 16%) and residential (74,000 $MtCO_2e$, 12%) natural gas constitute a third of the remaining emissions projected in 2050. Although eliminating natural gas would remove these emissions, no comparable city has yet enacted a comprehensive natural gas ban that terminates current connections. Natural gas bans that eliminate future growth are becoming more common, and Salem would be ahead of its peers and most cities in the U.S. if it were to enact this kind of ban. Additionally, these models assumed that offset natural gas did not result in an increased electricity emissions factor (although it did lead to increased electricity use). Fully offsetting natural gas with electricity for all uses might lead to an increase in the electricity emissions factor due to a need for increased electricity generation capacity.

NW Natural is seeking several opportunities to reduce emissions by blending in clean hydrogen that could eventually constitute 15% of the fuel mix. This hydrogen is produced through hydrolysis, an energy-intensive process that can be employed when there is excess energy available on the grid. With increases in solar and wind generation, periods of excess generation are becoming increasingly common. Hydrolysis acts like a battery to store excess energy in hydrogen which can then be burned as clean fuel. NW Natural is also pursuing extensive customer efficiency opportunities and is seeking a 47% efficiency improvement from 2002 by 2037. These two activities, combined with elimination of new natural gas hookups, reduces emissions by 155,000 $MtCO_2e$ from the 2050 forecast.

NW Natural is also pursuing renewable natural gas, which is methane sourced from biogenic sources such as landfills, wastewater treatment, and dairies. This methane would have otherwise been released directly to the atmosphere from activities already taking place. NW Natural is planning to switch entirely from fossil fuel natural gas to renewable natural gas. Burning methane releases carbon dioxide, which is a far less potent greenhouse gas than methane itself. By burning methane that otherwise would have been released, NW Natural would reduce total GHG emissions. However, these sources are largely outside of Salem's jurisdiction, and GHG protocol guidance today does not include

detailed guidelines for renewable natural gas. Therefore, while emissions at the state level would decline due to this activity, Salem would not account for this change at a local level. Guidance may change in the future, which could lead to a reduction or elimination of these emissions.

4. TRANSPORTATION

Transportation emissions are the largest remaining contributor to total emissions in 2050 (306,000 $MtCO_2e$, 47% of total remaining emissions). Although there are many strategies to reduce GHG emissions, there are also many sources of transportation emissions. Emissions from heavy-duty trucking are projected to make up the majority of GHG emissions from transportation in 2050 (149,000 $MtCO_2e$, 49%), followed by emissions from non-resident passenger vehicles (101,000 $MtCO_2e$, 33%). These emissions are particularly challenging to reduce because most strategies target residential passenger vehicles, and Salem's ability to directly impact heavy trucking vehicle miles traveled (VMT) or miles per gallon (MPG) is far more limited, as is Salem's ability to reduce non-resident traffic. These emissions assume heavy trucking remains dependent on fossil fuels, which may change as electric options or other fuels become available. However, those changes would likely be driven by federal, state, or market forces rather than Salem. Although this model assumes 100% electric vehicle (EV) adoption in Salem by 2050, there are out-of-jurisdiction vehicles that are not subject to the EV rate used in the model. Removing all internal-combustion engine vehicles before 2050 is unlikely, although federal, state, or market forces might eliminate these emissions further than the model shows. The remaining emissions come from light trucking, commercial vehicles, and air travel, and can be eliminated in much the same way as heavy-trucking and passenger cars—by switching to cleaner fuels or batteries.

BREAKDOWN OF REMAINING GHG EMISSIONS

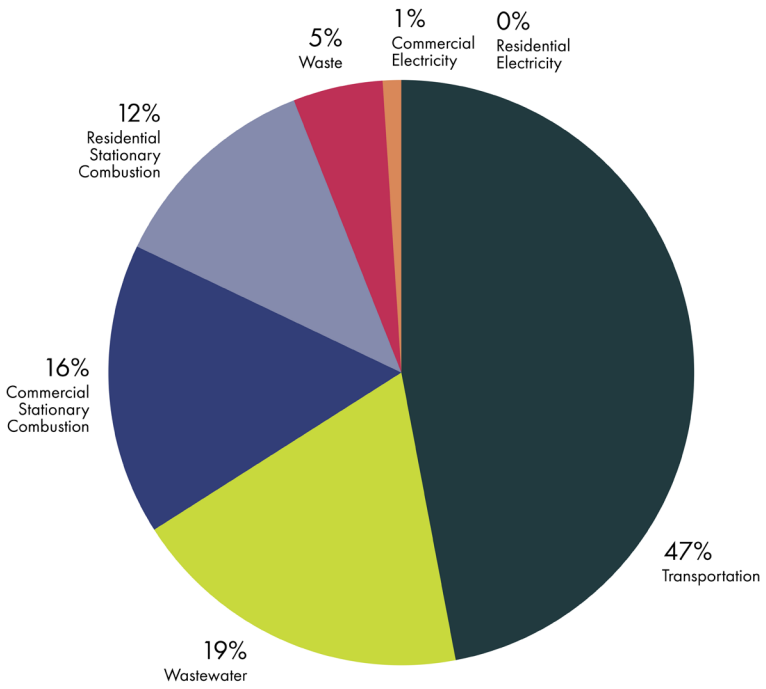


Figure 12: Breakdown of remaining GHG emissions in 2050 in Scenario 1 after achieving all ten target reductions.

SCENARIO 2

The results of Scenario 1 show that reaching net-zero emissions by 2050 will require more significant reductions in GHG emissions. To that end, a second model was run to show what it would take to meet Salem's emissions reduction goals.

In the Scenario 2 model, an analysis was performed to drive down the remaining GHG emissions from Scenario 1 to hit both the 2035 and 2050 goals for the purposes of better understanding where more effort may need to be applied in order to achieve these goals. It is important to note that there are many possible iterations of the model that could lead to the reduction targets; the results presented here are but one possible outcome.

Achieving the outcome of Scenario 2 requires attaining the same ten target reductions modeled in Scenario 1, plus attaining nine more emissions reduction outcomes. Thus, Scenario 2 assumes the following targets are achieved:

1. Improve building efficiency by an average of 10% by 2050
2. Maximize onsite solar
3. Maximize carbon sequestration of plants and trees
4. Halt all growth in natural gas emissions
5. Double the rate of EV adoption
6. Double the rate at which residents use biking and walking
7. Quadruple the rate of transit ridership
8. Reduce the amount of passenger vehicle traffic coming into and out of Salem by 40%
9. Reduce the amount of traffic within Salem by 10%
10. Transition to a zero-emissions bus fleet
11. Halt the entry of non-resident internal combustion engine traffic
12. Halt the entry of internal combustion engine heavy trucking
13. Halt internal combustion air traffic
14. Ensure a 100% renewables-only electricity grid
15. Remove all fossil fuel-derived natural gas systems in the built environment

REDUCTION VALUES USED TO DRIVE OUTCOMES IN SCENARIO 2

YEAR	Halt the entry of non-resident internal combustion engine traffic	Halt the entry of internal combustion engine heavy trucking	Halt internal combustion air traffic
2030	100%	100%	100%
2031	90%	90%	90%
2032	80%	80%	80%
2033	70%	70%	70%
2034	60%	60%	60%
2035	50%	50%	50%
2036	40%	40%	40%
2037	30%	30%	30%
2038	20%	20%	20%
2039	10%	10%	10%
2040	5%	5%	5%
2041	0%	0%	0%
2042	0%	0%	0%
2043	0%	0%	0%
2044	0%	0%	0%
2045	0%	0%	0%
2046	0%	0%	0%
2047	0%	0%	0%
2048	0%	0%	0%
2049	0%	0%	0%
2050	0%	0%	0%

Table 2: Percentage of 2016 emissions projected to decrease by year in order to achieve Scenario 2.

16. Remove all other building fossil fuels (e.g. propane, diesel) in the built environment
17. Achieve zero waste through circular economy, compost, recycling
18. Capture all wastewater emissions
19. Halt all septic emissions by requiring locations on septic to join centralized wastewater treatment

In the Scenario 2 modeling, remaining transportation emissions were driven down by 10% aggressively between 2030-2040, natural gas and other building fossil fuels were phased out between 2040-2050, and waste and wastewater were phased out from 2030-2050 (Table 2).

THE SCENARIO 2 PROJECTION RESULTED IN THE FOLLOWING OUTCOMES:

- 57% reduction from 2016 levels by 2035
- Net zero emissions by 2050.

REDUCTION VALUES USED TO DRIVE OUTCOMES IN SCENARIO 2

YEAR	Ensure a 100% renewables-only electricity grid	Remove all fossil fuel-derived natural gas systems in the built environment	Remove all other building fossil fuels (e.g. propane, diesel) in the built environment	Achieve zero waste through circular economy, compost, recycling	Capture all wastewater emissions	Halt all septic emissions by requiring locations on septic to join centralized wastewater treatment
2030	100%			100%	100%	100%
2031	95%			95%	95%	95%
2032	90%			90%	90%	90%
2033	85%			85%	85%	85%
2034	80%			80%	80%	80%
2035	75%			75%	75%	75%
2036	70%			70%	70%	70%
2037	65%			65%	65%	65%
2038	60%			60%	60%	60%
2039	55%			55%	55%	55%
2040	50%	100%	100%	50%	50%	50%
2041	45%	90%	90%	45%	45%	45%
2042	40%	80%	80%	40%	40%	40%
2043	35%	70%	70%	35%	35%	35%
2044	30%	60%	60%	30%	30%	30%
2045	25%	50%	50%	25%	25%	25%
2046	20%	40%	40%	20%	20%	20%
2047	15%	30%	30%	15%	15%	15%
2048	10%	20%	20%	10%	10%	10%
2049	5%	10%	10%	5%	5%	5%
2050	0%	0%	0%	0%	0%	0%

Table 2: Continued

Neither the Scenario 1 or 2 models includes carbon offsets, virtual power purchase agreements (VPPAs), or other options for achieving net zero through increasing investment in carbon sinks outside of tree planting within Salem's geographic boundary. Carbon offsets could be considered as a strategy for Salem to reach net zero emissions, but would likely be cost-prohibitive. In 2021, lower-range offsets typically cost between $6-$15 USD/$MtCO_2e$. With Scenario 1 showing close to 600,000 $MtCO_2e$ remaining in 2050, the annual cost to the City of Salem to offset those emissions in today's dollars would range from $3.9M - $9.7M per year. Options for carbon offsets vary, but the most common is to fund reforestation and afforestation efforts. VPPAs are more complex and can result in profits over the long term. Funding is likely better spent on projects to reduce or sequester carbon emissions locally. The most likely outcome to achieve net zero will probably include some carbon offsets or other similar strategies to offset hard-to-eliminate niche GHG emissions sources.

Technological solutions that cannot yet be quantified may play an important role by 2050, as would actions that may be deemed infeasible today for technological or political reasons.

With strategic planning, determined resolve, collaborative partnerships, and collective will, the Salem community can achieve significant progress in reducing emissions and becoming a climate-smart city.

SCENARIO 2 GREENHOUSE GAS (GHG) EMISSIONS FORECAST

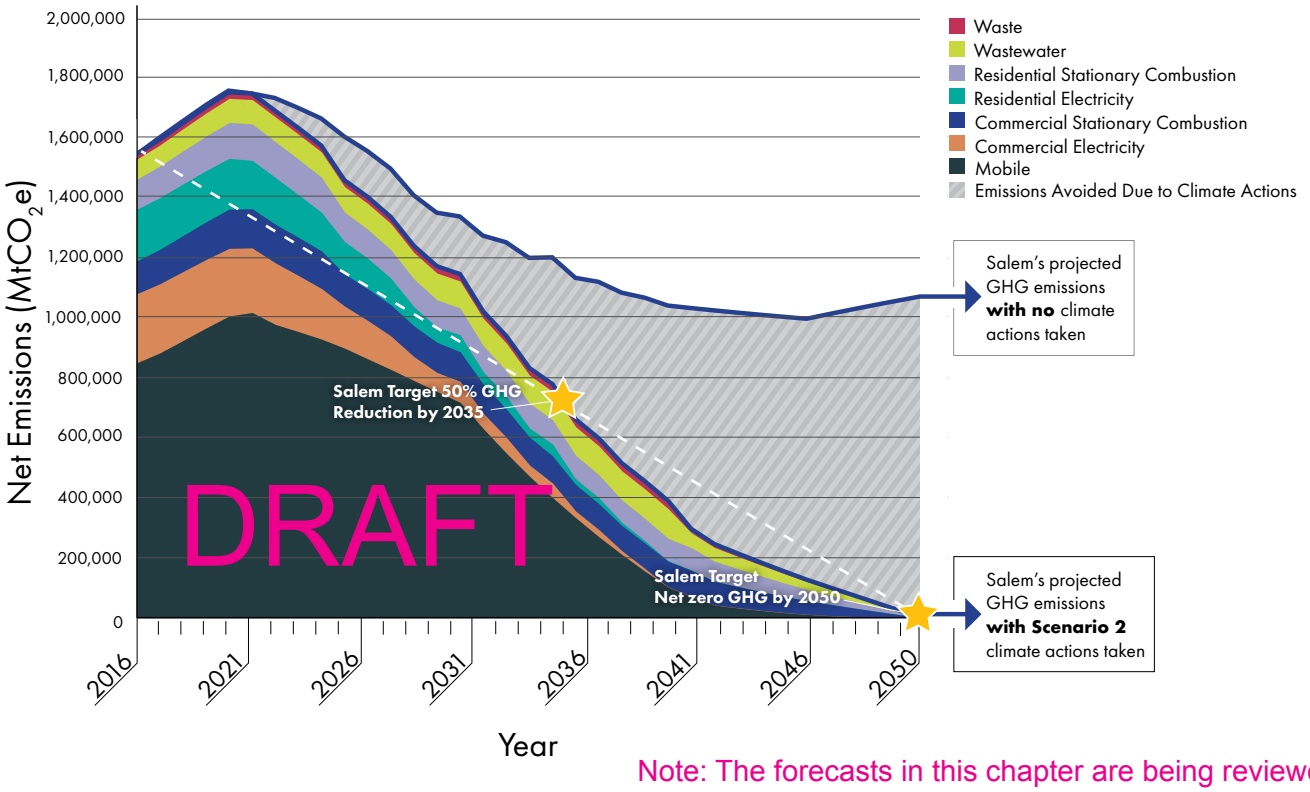


Figure 13: Remaining emissions under Scenario 2.

Note: The forecasts in this chapter are being reviewed in accordance with pending rulemaking from the Oregon Department of Environmental Quality. Final versions will be made available in November.

8

Tracking Progress

TRACKING PROGRESS

Regular tracking of key metrics is essential to ensuring that Salem is making progress toward its goals.

Assessing the status of all strategies in Salem's climate action plan will be critical to realizing the vision of being resilient to climate change and achieving the goals to reduce GHG emissions. An internal tracking document should be created for all responsible parties to easily share updates and view progress made related to implementing strategies, becoming more resilient to climate change, improving equity, and reducing GHG emissions in Salem. This tracking document may also serve as the source for updates provided to the community via an online dashboard, GIS maps, and other communication channels.

Regular tracking of GHG emissions is essential to ensure that Salem is making progress toward its goals of 50% reduction by 2035 and net-zero emissions by 2050. As a best practice, emissions should be estimated consistently over time using the same methods, data sources, boundaries, and assumptions. Salem's 2016 greenhouse gas inventory was prepared with the widely-used Global Protocol for Community Scale Greenhouse Gas Emission Inventories (GPC). This protocol should continue to be used for subsequent GHG emissions inventories.

Over the 30-year time horizon of Salem's long-term goal, maintaining consistent evaluation practices will likely become increasingly challenging. Salem may need to consider updating its original inventory if there are changes in the City's boundaries, improvements in GHG methodology that warrant a re-evaluation, changes in data accuracy that

warrant a re-calculation or use of a new data source, or discovery of errors and/or incorrect assumptions in the original inventory. Any changes, or decisions to maintain previous inventory assumptions, will need to be well-communicated to the community and well-documented.

The interval at which Salem inventories emissions should be decided upon early and should be kept as consistent as possible throughout the time period of the plan. It is recommended that Salem update its GHG inventory every two years, with additional inventories in the goal years of 2035 and 2050. Salem should make these updates

publicly available and should include an overview that tracks overall progress as more data points are available. This will provide a clear picture of Salem's emissions trajectory.

Reporting can occur directly via the City of Salem's website or through a reporting platform. If the City of Salem decides to adopt a third-party reporting system, the Carbon Disclosure Project (CDP) offers one avenue for robust reporting. The CDP includes GHG inventories from other cities that have entered data into the City Inventory Reporting and Information System (CIRIS) tool. Either way, it is essential that this data is readily available and clearly articulated to the public. Care should also be taken to provide GHG updates in accessible and inclusive modes of communication.

In addition to tracking emissions, it is recommended that the City of Salem establish a baseline of community equity metrics. These data would be tracked over time to provide data showing how Salem residents are faring across a range of indicators related to income, race, health, housing, language access, disaster recovery and more. Though this City effort will inform far more than the Climate Action Plan, it is recommended that variables related to equity and climate impacts are regularly tracked and reported, and that new strategies to address identified needs are added to the Climate Action Plan implementation as needed.

RECOMMENDATIONS FOR TRACKING PROGRESS

- Create an internal tracking document for the City and partners to track progress on implementing Climate Action Plan strategies.
- Update Salem's greenhouse gas (GHG) inventory every two years or as often as possible using the Global Protocol for Community Scale Greenhouse Gas Emission Inventories. Make these updates readily available and clearly articulated to the public. Ensure that the inventory is updated for the goal years of 2035 and 2050.
- Document and communicate to the community any changes to GHG inventory methodology or data that may become necessary over time.
- Establish a baseline of community equity metrics and track and report these data over time.
- Add new strategies to address community equity to the Climate Action Plan implementation as they are identified over time.
- Use an online dashboard tool to communicate goals and progress toward achieving them.

9

Implementation Recommendations

IMPLEMENTATION RECOMMENDATIONS

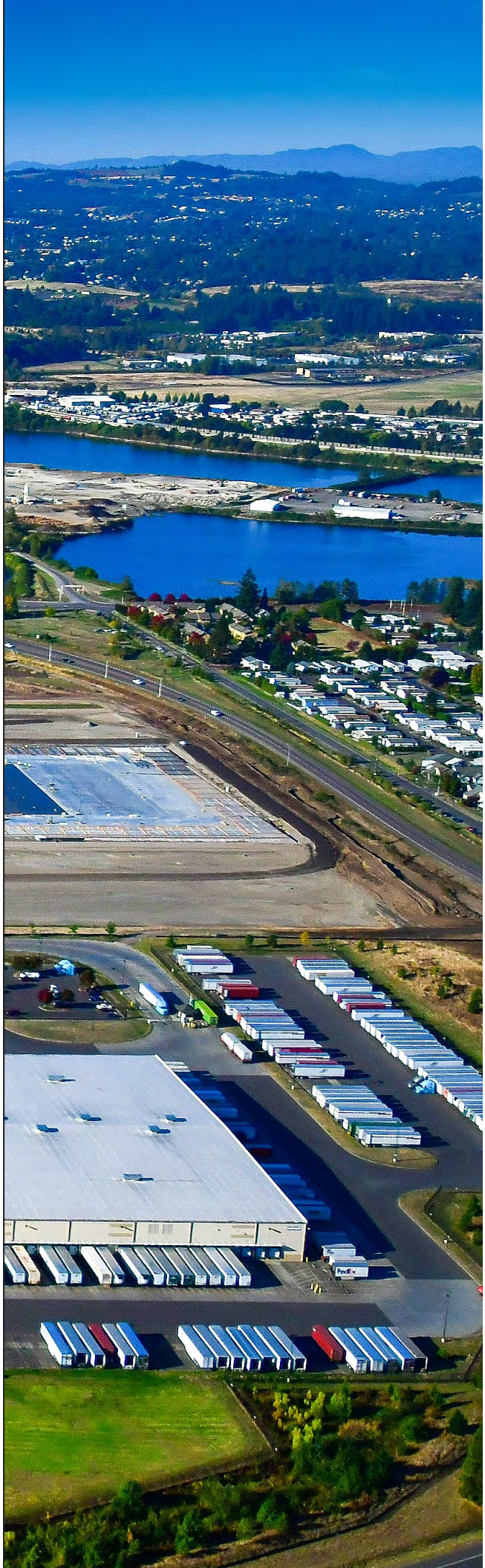
A clear and effective governance structure must first be established before successful implementation of strategies in this climate action plan can occur. City of Salem employees, business leaders, community group members, and individual residents all have a role in implementing strategies from this plan, adapting to changing conditions, and working together to build community-wide resilience to climate change and meet Salem's GHG reduction goals. Because recommended strategies in this plan involve multiple responsible parties, span a variety of timelines, and will require coordination of resources, it is necessary that a point person is designated/hired to guide the implementation process. Guiding the implementation of this climate action plan also includes the responsibility of building and maintaining strong partnerships with entities including but not limited to the State of Oregon, Mid-Willamette Valley Council of Governments (MWVCOG), Cherriots, neighborhood associations, local non-profit organizations, and businesses.

The implementation point person, in partnership with City of Salem employees and stakeholders, should support and coordinate efforts across departments, businesses, agencies, community-based organizations, and timelines. Recognizing the importance of collaboration, it is also recommended that an implementation work group is established and charged with facilitating implementation efforts in conjunction with, and supported by, the City of Salem point person. The implementation work group should meet

regularly to share progress updates, resources, assist each other with barriers, and celebrate successes.

The Benefit-Cost Analysis Report (see Appendix 6) provides valuable information that can help inform implementation of the ten strategies studied. This information can be used to inform policy decisions that may come before the Salem City Council, or highlight avenues for further exploration.

In addition to local partners and the recommended strategies in this plan that are specific to Salem, the State of Oregon is moving quickly to take more action on climate change and it will be vital for the City of Salem to keep up with new rule-making, regulations, goals, and targets. The City's point person should



be responsible for staying up to date with changes at the state-level, understanding how to access resources from the state, and leading implementation efforts at the local level.

All processes and outcomes related to the implementation of this plan should center equity. Multiple strategies in the Community action area should be implemented during the establishment of a governance structure described in this section of the plan, to ensure equitable access, participation, and results. Intentionally and thoughtfully engaging historically excluded communities during initial implementation and throughout future planning and implementation efforts related to climate action is one such strategy to prioritize. Salem's community vision of being a cohesive and caring city, where engaged community members of diverse backgrounds work together to achieve climate goals can be realized through the identification and use of guiding equity principles and evaluation criteria that measure progress towards a more equitable Salem.

As Salem progresses with its GHG emissions reductions and as recommendations from the State of Oregon evolve, the City must maintain clear and consistent communication with residents. Regular tracking and reporting of GHG emissions, as described in the previous Tracking Progress section, should be shared with residents in accessible communication and media outlets. Ongoing tracking and reporting allows the City and partner organizations the ability to make necessary adjustments to strategies in this plan and implement new strategies that were not possible today. As with all implementation efforts, communication about progress should be inclusive and accessible.

SUMMARY OF IMPLEMENTATION RECOMMENDATIONS

1. Hire an FTE coordinator to lead implementation of this Climate Action Plan. Provide funding for the person and the program. Responsibilities should include, but are not limited to, the following duties:
   - Guide the implementation process and manage the status of implementation initiatives.
   - Identify new information from the State of Oregon that affects Salem's climate action efforts, e.g., new rule-making, regulations, goals, and targets.
   - Identify and access new sources of funding, including local, state, and federal grant opportunities.
   - Track and report progress toward implementing the recommended strategies and achieving the City's GHG reduction goals.
   - Coordinate working group (see below).

2. Establish an implementation working group. A charge for the working group may include the following responsibilities:
   - Provide regular status updates on strategy implementation progress.
   - Collaboration amongst members to share resources and remove barriers to better implement strategies.

3. Prioritize equity at the onset of implementation efforts. While building the governance structure described in the first two steps, the following recommendations should be followed:
   - Charge the working group described above or otherwise hold them accountable (i.e., through the establishment of a specialized equity task force) for ensuring equitable access, participation, and results with implementation efforts.
   - Prioritize inclusion of historically excluded communities during implementation and future planning efforts.

4. Communicate with Salem residents.
   - Provide clear and consistent updates to community members.
   - Ensure that updates to community members are accessible (e.g, culturally appropriate and responsive, available in multiple languages, and shared in channels that residents commonly utilize).
   - Collaborate with partner organizations and community groups to distribute information related to Salem's climate action plan.

5. Track and report emissions at regular intervals.
   - Update Salem's GHG inventory every two years or as often as possible.
   - Use an online dashboard tool to communicate progress toward the emissions reduction goal.

6. Update the Climate Action Plan every five years.
   - Regular assessment of the progress Salem has made toward its goals will be necessary. As the implementation process proceeds, new information will influence direction in ways that should be formally reviewed and incorporated. New GHG forecasts should be made according to new information that is obtained, which will portray a clear pathway for Salem's future progress.

10

Community Action: Everyone Has a Role to Play

COMMUNITY ACTION

Everyone has a role to play.

Reducing GHG emissions to the extent necessary to avoid the worst impacts of climate change will require actions at all levels. While individual efforts may seem insignificant compared with large-scale actions, personal lifestyle changes can help shift social norms.[32] The more people make individual changes, the more their networks are encouraged to do the same, which results not only in a greater impact, but also puts pressure on larger entities and builds momentum for more systemic change.

Salem's consumption-based greenhouse gas inventory (see Appendix 2) measured the emissions associated with the goods and services purchased and used by Salem residents. This analysis showed that the purchase, driving, and disposal of vehicles is the largest source of emissions when measured through a consumptive lens. One of the most important ways that individuals can reduce emissions is to drive less and own fewer gasoline-powered vehicles and equipment.

The second-largest source of consumption-based emissions in Salem was the consumption of food and beverages. Emissions from this category include those associated with meat consumption, especially beef, which has a large carbon footprint due to all the inputs associated with growing cattle feed, the methane released in manure and through rumination, and transporting product to stores. Therefore, another important step individuals can take to reduce emissions is to eat a plant-based diet.

For the average resident, making choices regarding consumption can be a tangible way to reduce greenhouse gas emissions, minimize the amount of material you send to the landfill, and eliminate unnecessary expenditures. Below are some of the most impactful actions you can take in your own life to contribute to Salem's efforts to mitigate climate change.

ACTIONS FOR INDIVIDUALS

1. OPT FOR ACTIVE TRANSPORTATION.

Transportation represents approximately 29% of emissions in the U.S.[33] Opting to use alternative modes of transportation, such as busing, walking, biking, or sharing a ride, is one of the top ways to reduce your impact. [34]

2. REDUCE DRIVING TRIPS IN GASOLINE-POWERED VEHICLES.

When you need to drive, reduce the effects of driving by combining trips, working from home/videoconferencing when possible, or buying an electric vehicle next time you're in the market for a car.

3. AVOID UNNECESSARY AIR TRAVEL.

Carbon emissions from one long flight are often more than the total emissions of the average person in many countries for an entire year, and aviation is one of the fastest growing sources of pollution.[35]

4. EAT A PLANT-BASED DIET.

The livestock industry is responsible for about 14.5% of global greenhouse gas emissions, and cattle (both meat and dairy production) accounts for 65% of that. [36]

5. BUY LOCAL, IN-SEASON FOODS.

Fresh produce in the grocery store often travels a long way to arrive in Salem, so purchasing local foods that are in season (or growing your own!) eliminates significant transportation emissions.

6. IMPROVE THE EFFICIENCY OF YOUR HOME.

When you're looking to make changes in your home, consider upgrading your appliances to be more efficient, replacing natural gas furnaces with electric heat pumps, using more effective insulation, and installing LED light bulbs or smart thermostats. Creating more shade by adding trees, awnings, lattices or vines; and adding an evaporative cooler or whole house fan can all make big differences in reducing cooling needs in the summer. Sealing leaks and replacing windows will reduce heating needs in the winter. All of these strategies can save you energy and money in the long-term.

7. CONSERVE ENERGY AND WATER AT HOME.

Simple actions like turning off lights, unplugging appliances, limiting laundry loads, and minimizing use of heating and cooling can add up to both resource and cost savings.

8. INSTALL OR PURCHASE RENEWABLE ENERGY.

If you have the financial capability, consider installing solar panels on your roof or accessing solar energy through a community solar project.

9. REDUCE NATURAL GAS USAGE.

When possible, replace natural gas-powered appliances like furnaces, stoves, and water heaters with electric alternatives.

SALEM'S PER CAPITA EMISSIONS COMPARED WITH OTHER CITIES[38]

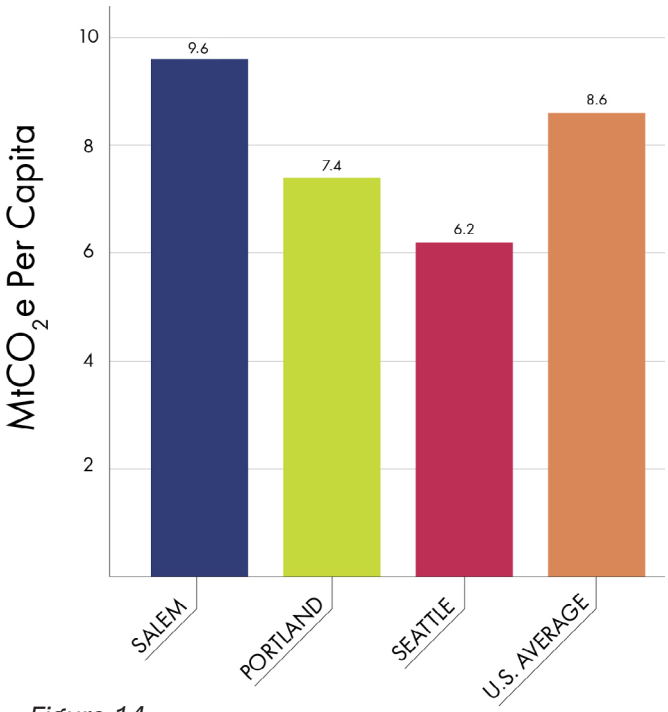


Figure 14.

10. REDUCE WASTE (ESPECIALLY FOOD WASTE).

Materials sent to landfills directly release methane gas into the atmosphere, and food waste accounts for 6% of global emissions.[37] Reduce, recycle, or compost instead!

11. BUY LESS STUFF.

Clothes and other consumer goods are often discarded after little use because of fast fashion and planned obsolescence. Reduce consumption by purchasing second-hand items, sharing tools, or repairing broken items rather than throwing them away.

12. LEARN ABOUT AND PURSUE ACTIONS THAT ADDRESS INTERSECTIONALITY.

The effects of climate change disproportionately fall on Black, Indigenous, and people of color, people living with disabilities, people living below the poverty line, the elderly, and other historically marginalized groups, making it all the more important to integrate social justice into our environmental work and daily actions.

13. SUPPORT ELECTED OFFICIALS, POLICIES, AND ORGANIZATIONS DOING THE LARGE-SCALE WORK.

To meet the challenge of curbing climate change before it's too late, governments and large entities must also take action. Supporting those who are leading the way helps push us forward faster and more effectively.

To get a more precise understanding of the carbon emissions your lifestyle generates, you can use a carbon footprint calculator that will measure the impact of things like the heating and cooling needs of your home, your diet, your car and air travel, and more. (One free example is carbonfootprint.com.)

Some of the individual changes mentioned require financial investments that just aren't feasible for many people, and that's okay. The important thing is to start where you are and take action whenever and wherever you can. Being mindful of the impact of your actions on the planet and fellow humans, investing in the Salem community, and building relationships with your neighbors all contribute to our collective resilience and our thriving future.

ACTIONS FOR ORGANIZATIONS AND EMPLOYERS

Salem is unique in hosting the state capitol and many state agencies. These organizations can work together and with the City on initiatives to reduce GHG emissions, such as active commuting programs, telecommuting, energy efficiency, purchasing, and more.

Organizations and businesses have an essential role to play in responding to climate change.[39] Below are some of the larger scale actions these entities can take.

1. ENCOURAGE ACTIVE TRANSPORTATION.

Make biking, busing, carpooling and walking easy for employees through flexible work-from-home policies,

infrastructure for employees who bike or walk (like showers, protected bike racks or bike lockers), employee discounts for bus fare, carpool matching, incentives, and more. Institute policies that encourage the use of videoconferencing tools rather than frequent business travel.

2. MEASURE YOUR CARBON FOOTPRINT.

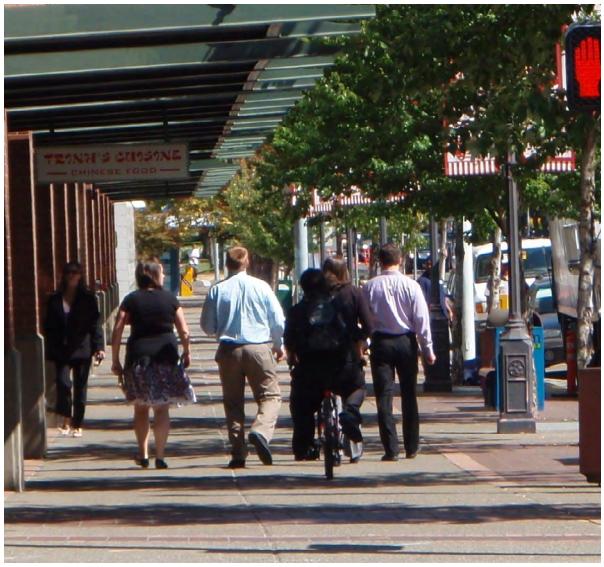
Knowing your own emissions impact is the first step toward making reductions. Set up a regular interval for assessing your organization's GHG inventory, set emissions reduction targets, and monitor your progress toward those goals. Even better: share your progress with your clients or customers. About one-fifth of the world's largest public companies have committed to net zero emissions.[40]

3. REDUCE CONSUMPTION.

Reduce energy and water consumption by making upgrades to your building if you own it (like replacing lights with LEDs). Whether you own or not, managing office energy use is critical to reducing consumption. Set thermostats a few degrees higher in summer and lower in winter; close vents in unused spaces; turn off unneeded lights; and make sure to use energy efficient computers and appliances. Create a culture of conservation among your employees, monitor your energy usage monthly, set reduction goals, and report your progress to your customers.

4. PURCHASE SUSTAINABLY.

Take a closer look at your supply chain and consider the ethical and environmental impacts of the purchases you make (like compostable containers vs. styrofoam, or 100% recycled content paper) and the suppliers and vendors you hire. Work to reduce transportation emissions throughout the supply chain.



5. REDUCE WASTE.

Improve your waste infrastructure by ensuring that recycling (and composting, if available) containers are present wherever landfill bins are located. Increase awareness among your employees about the importance of correctly sorting waste.

6. ENCOURAGE NEW BEHAVIORS.

Implement targeted sustainability initiatives by engaging your employees in campaigns, competitions, or other opportunities to learn and change behaviors.

7. SPEAK UP.

The business community has an influence. Work with your elected officials to encourage the development of renewables and divest from fossil fuels.

1 out of 5

OF THE WORLD'S LARGEST PUBLIC COMPANIES HAVE COMMITTED TO NET ZERO EMISSIONS.

11

Conclusion

CONCLUSION

Achieving the City's GHG reduction goals will require a shared vision and an all-hands-on-deck approach.

The Salem community is well-positioned to make innovative progress toward its climate goals. With this Climate Action Plan serving as a comprehensive roadmap, and the support of residents and key agencies, Salem can embark on implementing an array of strategies that will reduce emissions and improve resilience to climate change.

Leadership, partnership and collaboration will be key to the successful implementation of this plan. Achieving the City's GHG reduction goals will require a shared vision and an all-hands-on-deck approach. Government agencies, businesses, neighborhoods and individuals must be willing to adopt new ways of doing things and be willing to adapt over time.

Regular tracking and reporting of GHG emissions will reflect the community's progress toward its goals and allow the City to make adjustments as time goes on.

At each step of the way, equitable representation and inclusive engagement will ensure that every Salem resident will have the chance to participate in the transition to a climate-smart city of 2050.

"I hope we can have a plan in place to be more prepared for future events, looking out for all neighbors, even those who are unhoused. I would like to be confident that my community has a plan going forward, to have less of a carbon footprint as a City and be flexible with more progressive changes as the climate crisis becomes worse."
— Salem resident

12

Glossary

GLOSSARY

Adaptation is the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities.[41]

Adaptive capacity refers to the level of ability a community has to leverage relationships, social constructs, and knowledge to adjust to changing conditions in the community and/or greater society or world.

Carbon dioxide equivalent (CO_2e) is a measure used to compare the emissions from various greenhouse gases on their global-warming potential by converting gases into the equivalent effect of releasing carbon dioxide. For example, a unit of carbon dioxide equals one unit of carbon dioxide equivalent, whereas a unit of methane, which has a global-warming potential of 25 is equivalent to 25 units of carbon dioxide equivalent.

Carbon neutral refers to the net quantity of carbon dioxide released from operations being zero. Carbon neutrality can be achieved by releasing no carbon dioxide or by balancing carbon dioxide emissions with offset activities, such as sequestration.

Closed-loop system. A system of handling production supply chains in which materials at the end of their product life are re-used, recycled or re-manufactured into new products such that no waste is created.

Co-benefits are advantages to the community that any climate action strategy may have beyond reducing emissions. The strategies in this plan specifically take into account the co-benefits of public health, mobility choice, environmental quality, resilience, local economic development, and community equity.

Community equity means all residents have the opportunity to participate and thrive in an inclusive society. This requires rectifying unequal access to resources and opportunities caused by historic and current systems of oppression and exclusion related to race, income, ability, gender, sexual identity, and other factors. An equitable community overcomes disparities by providing increased levels of support to community members based on their needs. In Salem, it is a priority to advance equity in decision-making processes and the outcomes of those processes, including policies, investments, practices, and procedures. Strategies with the Community Equity indicator have the potential to increase equity in Salem by addressing systems and practices that have historically disadvantaged groups of Salem residents and by maximizing benefits for frontline communities.

Environmental quality is integrally connected to individual and community wellbeing and refers to the health of our air, water, and land. Strategies with the Environmental Quality indicator have the potential to improve the health of Salem's air, water, and land.

Frontline communities. People of color, immigrants, refugees, and lower-income residents who have increased exposure and sensitivity to hazards and a reduced capacity to adapt due to systemic and institutional racism and classism.

GHG Protocol. Greenhouse gas protocol, commonly referred to as GHG Protocol. The GHG Protocol is a global framework for measuring and reporting greenhouse gases.

Greenhouse gases (GHG) trap heat in the atmosphere and contribute to climate change. Examples of greenhouse gases include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (such as hydrofluorocarbons).

Local economy refers to employment opportunities and the production, buying, and selling of goods and services in Salem. Strategies with the Local Economy indicator are those that can contribute to the health or growth of Salem's economy by benefiting local businesses, encouraging entrepreneurship, creating jobs, and keeping money in Salem.

A **metric ton** is a unit of mass equal to 1,000 kilograms.

Mitigation refers to a human intervention to reduce the sources or enhance the sinks of greenhouse gases (GHGs).[42]

Mobility choice is connected with public health and environmental quality and refers to Salem residents and visitors having access to multiple ways of moving throughout the city and not having to rely only on individual ownership of vehicles. Strategies with the Mobility Choice indicator have the potential to increase mobility choice by providing safe and convenient access to transportation options such as walking, biking, carpooling, taking public transit, and working from home.

Public health refers to the protection of a community's health and the prevention of problems before they happen through educational programs, policies, services, and research. Strategies with the Public Health indicator have the potential to improve the physical and mental health of Salem's communities.

Representative concentration pathways (RCPs) refer to the possible scenarios resulting from greenhouse gas emissions and land use practices over time. RCP8.5 is a high-emission scenario that is frequently used as a "business-as-usual" scenario.

Resilience is the ability of people and their communities to anticipate, accommodate and positively adapt to or thrive amidst changing climate conditions and hazard events. Resilient communities enjoy a high quality of life, reliable systems, and economic vitality, and they conserve resources for present and future generations.[43]

Strategies in this CAP refer to the recommended actions for implementation throughout Salem to reduce greenhouse gas emissions and increase climate resilience. Strategies are nested under "Objectives" in the Climate Action Strategy List (see Appendix 8). The term "strategy" in this plan is differentiated from "scenarios," which refer to the modeling of possible future GHG emissions pathways; "targets" refer to emission reduction outcomes that were modeled (see Chapter 7).

Vehicle Miles Traveled (VMT) measures the amount of travel for all vehicles in a geographic region over a given period of time, typically a one-year period. It is calculated as the sum of the number of miles traveled by each vehicle.[44]

Zero waste is defined as diverting 90% of waste from landfills through waste reduction, composting, recycling and reusing.

13

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