Corvallis Climate Action Plan

Adopted by the Corvallis City Council

December 2016

CORVALLIS
ENHANCING COMMUNITY LIVABILITY

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INTRODUCTION AND OVERVIEW

Corvallis Takes Bold Steps to Address the Threats of Climate Change…

Scientific consensus is evident—warming of the global climate system is occurring, and the resulting impacts to natural systems, economic conditions and the well-being of communities throughout the world are increasing. Nations, states and communities across the globe are responding to this challenge. Corvallis has focused attention on this since the 1990s, and the community has undertaken many initiatives that have reduced fossil fuel consumption and greenhouse gas emissions. This Climate Action Plan (Plan) is an extension of those efforts.

In 2015, the Corvallis City Council adopted a Climate Action Goal for 2015-2016, which included "…adopting and beginning to implement a comprehensive, long-term climate action plan that will significantly reduce Corvallis' greenhouse gas emissions and foster Corvallis' resilience to the effect of climate change." The City Council appointed the Climate Action Task Force (Task Force) to develop the Plan. The Plan describes goals, targets, and evaluation criteria for strategies and actions to reduce greenhouse gas emissions. It also includes strategies and actions intended to help the community adapt and be resilient to the impacts of climate change. It is intended to serve as a guidance framework for future community and municipal actions.

Why Corvallis Should Act Now…

Corvallis cannot significantly impact the global warming problem on its own. Even achieving the local targets identified in this Plan will require State and federal actions to spur increased efficiencies and to curb the generation of carbon dioxide and other greenhouse gas emissions associated with power production, vehicles, economies and other core elements of our society. However, local action to address climate action is beneficial for several reasons.

- Corvallis climate action strategies will help the community prepare for potentially significant impacts that will test our infrastructure, emergency and social services, and our access to food, water and energy supplies.
- Corvallis climate action strategies will have economic, social, and environmental benefits to the community over time and will support other community livability objectives.
- Corvallis climate action strategies will add to the "critical mass" of local community climate initiatives, which collectively can cause changes in existing State and federal policy frameworks, trigger climate mitigation actions of other communities and change supply markets.
- Failure to act could leave the community increasingly vulnerable to fluctuations in the supply and cost of food, water and energy, and may heighten the disruption of services, commerce and quality of life that could result from disasters such as floods, landslides and wildfires.

Corvallis Greenhouse Gas Reduction Target Addresses Global Concerns…

According to the Intergovernmental Panel on Climate Change (Panel), which is the globally recognized leading authority on climate change, warming of the climate system is "unequivocal," human influence is clear, and recent human-caused emissions of greenhouse gases are the highest in history.[1] Recent unprecedented changes in the climate have had widespread impacts on human and natural systems. And, based on existing atmospheric greenhouse gas concentrations and ongoing emissions at today's levels, numerous challenging consequences are predicted to occur in the Willamette Valley and across the state.

[1] Climate Change 2014—Synthesis Report: Summary for Policymakers; IPCC; 2014; p.2.

The Panel has concluded that "the risks of abrupt or irreversible changes will increase as the magnitude of the warming increases,"[2] and that greenhouse gas concentrations must be reduced in order to stabilize climate conditions and avoid passing catastrophic tipping points. (A summary of scientific conclusions regarding climate change and anticipated impacts is further provided in Appendix 1, pp. 1-3.)

Nations and communities around the world have been tackling this challenge for several decades. The Paris Accord, reached by 195 nations and the European Union in 2015, established pledges to dramatically reduce global greenhouse gas emissions in order to curb global warming at 2°C (with a goal of capping it at 1.5° C) over preindustrial global temperatures. (See Appendix 1, pp. 3,4.) This Accord, along with State and federal actions that have been taken to address climate change, is a call to action.

CORVALLIS COMMUNITY GREENHOUSE GAS EMISSIONS WILL BE REDUCED BY 75% BELOW 1990 LEVELS BY THE YEAR 2050.

The Task Force considered targets for the United States (U.S.), the State of Oregon, and other communities before setting a target for Corvallis. Most targets that have been established to date are 75%-80% below 1990 levels by 2050. The U.S. has pledged to reduce emissions by 26-28% below 2005 levels by 2025. To accomplish this, the White House projects that "the U.S. target will roughly double the pace of carbon pollution reduction in the U.S. from 1.2% per year on average during the 2005-2020 period to 2.3-2.8% per year on average between 2020 and 2025." The long-term U.S. target is to reduce emissions by 80% below 2005 levels by 2050.

The Oregon Legislature set the following targets for the State in 2007:

- By 2010, arrest the growth of Oregon's greenhouse gas emissions and begin to reduce them;
- By 2020, achieve GHG levels that are 10% below 1990 levels; and
- By 2050, achieve GHG levels that are at least 75% below 1990 levels.

The Task Force set a target to reduce greenhouse gas emissions 75% by 2050 (as compared with 1990 levels), aligning with the State of Oregon target. This target equates to about a 3.2% reduction annually, factoring in projected population increases. (See Appendix 1, pp. 4-12 for additional information about how the Corvallis target was developed.)

Climate Action Goals…

The Task Force set the following goals to guide development and implementation of the Climate Action Plan:

Goal 1--The Climate Action Plan will establish and monitor greenhouse gas emissions reduction targets for the Corvallis community that guide short-, medium-, and long-term priority strategies and actions the City and community partners will undertake to achieve at least Corvallis' proportionate share (or some

[2] Climate Change 2014—Synthesis Report: Summary for Policymakers; IPCC; 2014; p.16.

other expression of commitment) of greenhouse gas mitigation. Periodic reporting and updates to the Climate Action Plan will enable the City to respond to changing conditions and needs.

Goal 2—The Climate Action Plan will reflect the urgent need to effect significant greenhouse gas emissions reductions in the near term by prioritizing, as highest and most immediate, actions which are relatively the most effective and readily achievable by the City organization and community partners.

Goal 3—The Climate Action Plan will support community preparation for anticipated climate change-related impacts (such as water shortages, severe weather events, and unpredictable energy prices and availability) and enhance the community's ability to adapt and be resilient.

Goal 4—The Climate Action Plan will seek and foster cooperative partnerships and leadership from local public institutions, private businesses, non-profit organizations, and community members, as well as regional, state and federal agencies and interests that can have a significant impact on the Climate Action Plan's success.

Goal 5—The Climate Action Plan will incorporate actions that achieve other co-benefits in addition to greenhouse gas emissions reductions, including:

- Energy efficiency and greater energy independence from fossil fuels
- Sound economic investments (positive cost-benefit or return on investments)
- Community livability
- Environmental quality and ecosystem resiliency
- Public health and well being
- Healthy local economy and local self-reliance
- Equity and accessibility for low income/disadvantaged community members

Climate Actions Will Have Multiple Community Benefits…

A primary focus of this Plan is to identify actions that will be most effective at reducing community greenhouse gas emissions at relatively low cost (per metric ton of CO_2 equivalent) or that will result in cost savings over time. However, as shown in Goal 5, above, the Task Force also emphasized other "co-benefits" of climate actions to the community. The Task Force established evaluation criteria for the potential actions that addressed the potential effectiveness and feasibility, financial and economic, environmental, and social impacts of the potential actions. (See Appendix 2, pp. 6-9 for additional information about the co-benefits evaluation criteria.)

Successful Climate Action Requires Community-wide Involvement…

Development of the Plan has involved City staff, community partners, topic area experts (including a team of technical consultants), and participation of many members of the community with a focus on identifying the most feasible, productive and cost-effective actions we can take now to reduce greenhouse gas emissions. The Task Force listened to public input at all of its meetings, and incorporated three phases of community involvement in the process. As the Plan moves forward into implementation, ongoing collaboration and partnerships among a variety of organizations and institutions will be needed, along with broad-based community participation. (See Appendix 2, pp. 15, 16 for additional information about how the Corvallis Climate Action Plan was developed.)

How Climate Actions Were Evaluated and Prioritized…

Hundreds of possible climate mitigation and adaptation actions were considered in the preparation of this Plan. The process of refining these actions and evaluating how well they met the Task Force goals was a multi-step process. It involved preliminary screening and input from staff and the Task Team members, and a more in-depth analysis of the highest ranked potential actions in order to determine their greenhouse gas reduction potential and relative cost. This is a critical step in order to ensure that available community resources are applied most effectively for the highest productive benefit.

The project technical consultant performed this analysis, using Corvallis-specific data where possible, to determine how much greenhouse gas the actions could eliminate in Corvallis and at what cost. Where local data was not readily available, the consultant used regional or national data. Some of the actions were determined by the consultant to be "unscalable" for cost or mitigation potential, for a variety of reasons (primarily due to the general nature of an action, unknown time frames, or unpredictable potential results). The technical consultant also applied the "co-benefits" evaluation criteria (described above) to the highest ranked actions. (See Appendix 2, pp. 4-9 for additional information on how the potential actions were evaluated.)

Because of the limited time frame and budget for this project, not all of the identified actions could receive this level of evaluation. Over 80 of the potential mitigation actions received detailed effectiveness evaluations. The highest ranked actions have been included in this Plan. The detailed analyses performed by the consultant are in a database now housed at the City of Corvallis for reference in developing specific implementation measures and plans.

Scope and Leadership Responsibilities…

The Plan includes *community* and *municipal operations* elements. The *community* element includes strategies and actions targeted at reducing greenhouse gas emissions throughout the areas and activities within the Corvallis urban growth boundary (UGB). Community strategies and actions relate to current and future urbanization and management of the lands within the UGB, as well as the provision of urban services. Strategies affecting agricultural, forest and other rural uses, services and development patterns outside the UGB are outside the City's current and projected jurisdiction and are, therefore, beyond the scope of this Plan.

For community actions that fall within the City's services or regulatory jurisdiction, the City will lead their implementation. Many of the climate mitigation and adaptation actions, however, are outside the City's regulatory jurisdiction. In these cases, other community service providers or organizations will need to lead the implementation of actions. This Plan *does not* mandate that external community partners perform identified actions--it *does* reflect the aspiration of the City Council and the Task Force that community partners will work together to achieve the goals and targets.

The *municipal operations* element includes strategies and actions that will reduce and mitigate greenhouse gas emissions associated with City of Corvallis municipal operations. It also includes actions the City can take to prepare City facilities, properties and services for the impacts of climate change over time. The City will lead all municipal operations climate actions. (See Appendix 2, pp. 1,2 for additional information on the scope of the Plan.)

Relationship to Other City Goals, Plans and Existing Actions Underway…

This Plan is one of several City Council undertakings for 2015-2016. The City Council also launched a Vision and Action Plan Goal, a Sustainable Budget Goal and a Housing Development Goal. The Task

Forces for these initiatives have coordinated their efforts to ensure consistency, and to leverage actions the plans may have in common to accomplish high priority objectives for the community. The resulting scope and schedule for implementing climate actions will need to align with City and community priorities and available resources, and with the City's provision of basic City services. (Go to http://www.corvallisoregon.gov/index.aspx?page=66 for more information on the Council goals.)

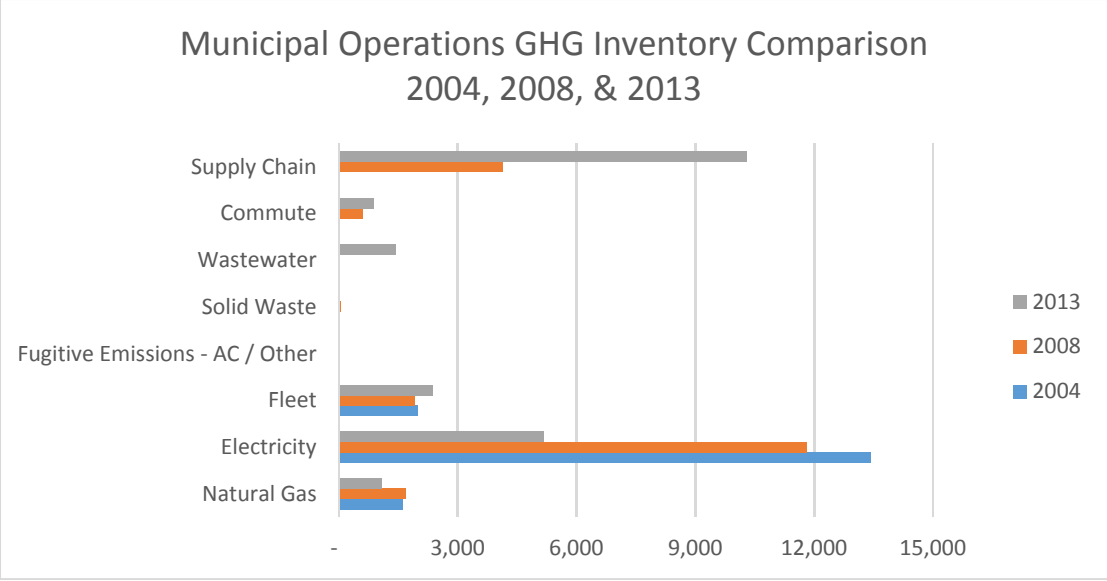
Other City and community plans will assist in implementing climate action objectives, and the strategies and actions identified in this Plan will likely impact many of them. For example, the Corvallis Comprehensive Plan (which relates to land use), the Transportation System Plan, the Stormwater Master Plan, the Urban Forestry Management Plan, and the Parks and Recreation Master Plan are all plans that either currently support, or that can be updated to support, implementation of climate mitigation and adaptation actions. In addition to supporting the implementation of high priority greenhouse gas reduction actions, these plans may help implement actions that would have relatively high co-benefits to the community, but which do not rise to the level of "high priority" in this Plan.

There also are existing plans and actions being undertaken throughout the community by a variety of other agencies and community organizations that will help meet the goals and targets of this Plan. (See Appendix 3, pp. 4-23 for information on existing plans, policies and actions that support this Plan.)

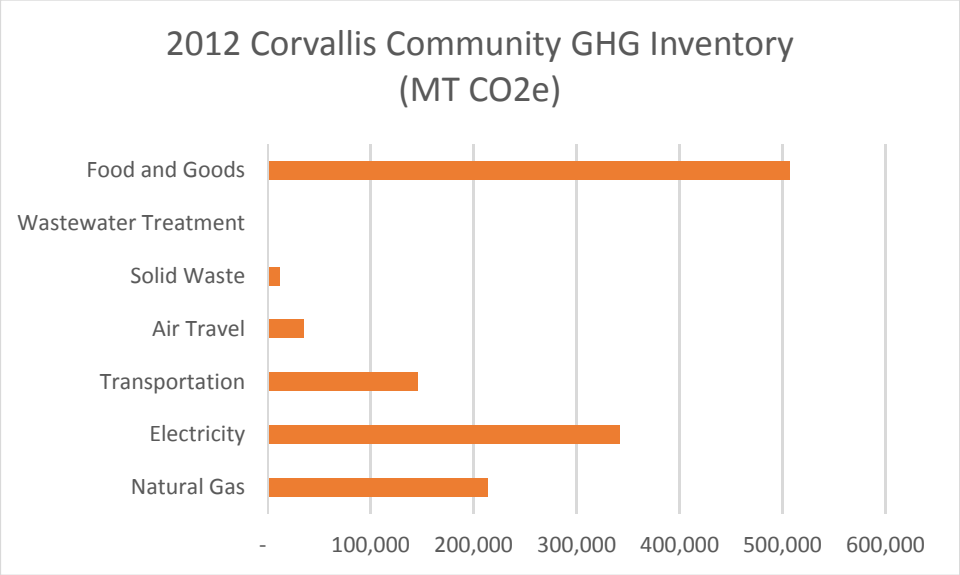
The Corvallis Carbon Footprint—A Starting Point…

Communities across the country maintain greenhouse gas inventories, which assist in identifying baseline emissions, targeting priority areas for emissions reductions, and tracking progress over time. The City of Corvallis conducted initial greenhouse gas emissions inventories for municipal operations in 2009 for the years 2004 and 2008, and recently completed an update for 2013. In 2013, the City completed an inventory for the 2012 Corvallis community emissions. (See Appendix 3, pp. 1-4 for additional information on Corvallis greenhouse gas inventories.)

Total greenhouse gas emissions generated by municipal operations in 2013 were 21,289 metric tons of CO_2 equivalent ($MTCO_2e$). The breakdown of inventoried emissions for 2008 and 2013 are shown below.



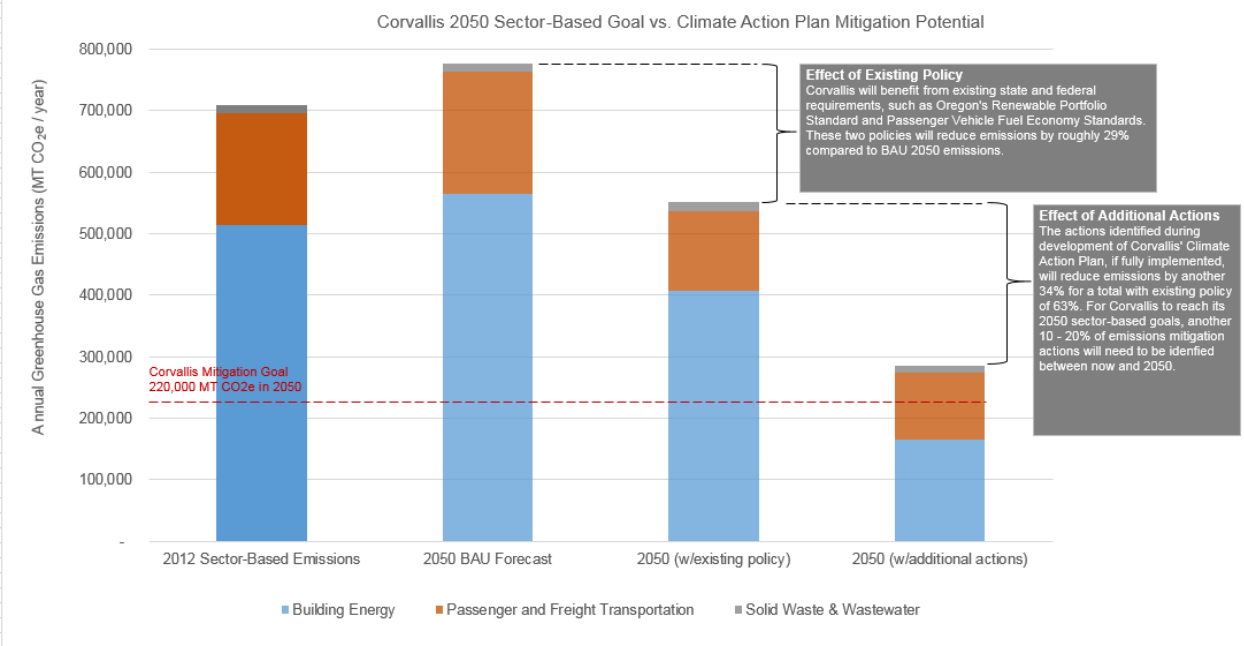
Total emissions in 2012 for the Corvallis community are estimated at 1,257,115 MT CO2e. The figure below summarizes the findings based on the five Basic Emissions Generating Activities plus Household and Government Consumption.



Greenhouse Gas Reduction Potential of the Corvallis Climate Action Plan…

The project's technical consultant estimates that the policies and actions already set into motion at the State and federal levels will account for emissions reductions of nearly 30% in Corvallis. These actions, such as requirements for reducing coal-fired electrical generation and increasing the fuel efficiency of automobiles, will significantly reduce Corvallis' greenhouse gas emissions. But those actions alone do not get the Corvallis community to its 75% emissions reduction target. The actions identified in this Plan, if fully implemented, will reduce emissions by another 34%.

For Corvallis to reach its 2050 targets, another 10-20% of emissions mitigation actions will need to be identified between now and 2050. The chart below compares the Corvallis community emissions inventory with a projected 2050 "business as usual" case, and shows estimates of how much the actions evaluated in this Plan could contribute to meeting the target, along with the estimates of reductions that will accrue through State and federal actions. Even if Corvallis succeeds in capturing the reductions available from the "high priority" actions evaluated in this Plan, we will still have more work to do to meet our target.



Note: For each action, conservative estimates of the greenhouse gas reduction potential were used.

Plan Implementation—What Happens Next…

The Climate Action Plan provides a solid foundation for pursuing effective community climate actions. Community partners that are poised and ready to assume leadership and act on actions identified in the Plan are encouraged to do so. However, more work needs to be done to achieve broad-based implementation of this Plan throughout the community.

The following are some of the specific steps to be considered as the community moves forward to implement the Plan:

- The greenhouse gas reduction target should be linked to community targets for reducing fossil fuel consumption, increasing reuse and recycling, etc. in order to translate greenhouse gas emissions to things to which people can better relate. An example might be a community-wide goal for people to reduce electricity use by X% by year Y.
- Oversight and coordination of community actions among the partner agencies is needed to identify willing lead community partners and to track the actions and resulting greenhouse gas reductions achieved over time. The mechanism for this needs to be identified.
- Municipal operations actions will need to be further reviewed by lead departments for timing, feasibility and resource requirements within the framework of budgets, capital improvement plans, and long-range housing, land use and transportation plans. This next step will aid the City in prioritizing and seeking funding for actions within the broader context of City functions and Council priorities.
- Communication strategies need to be developed and implemented to gain broader awareness, support and participation in climate change mitigation and adaptation actions.
- A schedule for reporting activities and progress toward the greenhouse gas reduction target to the City Council and other stakeholders, as well as a plan for periodic greenhouse gas emissions inventory updates, needs to be determined.

It will also be important to integrate implementation of this Plan with the other City and community goals, and within the resource capabilities of each community partner. Development of implementation plans to achieve the City Council's Climate Action Goal will be included in the Community Action Plan work that will be moving forward as part of the Imagine Corvallis 2040 Vision and Action Plan work.

The Climate Action Plan is Organized into Six Action Areas…

The strategies and actions in this Plan are categorized into the following six action areas:

- Buildings and Energy
- Land Use and Transportation
- Consumption and Waste
- Food and Agriculture
- Urban Natural Resources
- Health, Social Services and Community Well-Being

Each section includes a description of the action area, and the highest ranked strategies and mitigation and adaptation actions for the community and municipal operations elements of the Plan. The first three sections (i.e. Buildings and Energy, Land Use and Transportation, and Consumption and Waste) are the primary target areas for mitigation actions, because the Corvallis community can impact greenhouse gas emissions the most in these areas. (See Appendix 2, pp. 9-15 for detailed information on each of the six action areas.)

BUILDINGS AND ENERGY

What is in the Buildings and Energy Category?

The Buildings and Energy Category addresses energy used in residential, commercial and industrial buildings in Corvallis. Buildings use energy to make and operate them. While the environmental (including GHG emissions) impacts of construction are noticeable, the day to day energy use of a building after construction adds up to a much greater impact over a building's life, and can be overlooked as a source of long-term emissions and, therefore, an opportunity for mitigation. Building energy sources include the variety of sources used to generate electricity, as well as those sources that are deployed onsite for mechanical, heat and cooling purposes. These include methane, propane and sometimes liquid fuels and onsite renewables. Generally, commercial and residential building systems use energy for lighting, appliances, computers, mechanical systems for heating, ventilating and air conditioning, and other lifestyle-related choices. For industrial buildings, energy sources may be different, especially for heat, steam and other mechanical energy. Some of the other energy sources considered are wood waste and other energy dense waste products.

Why Does It Matter?

The emissions from buildings represent approximately 39 percent of the U.S. CO_2e emitted. (21% in residential, 18% in commercial). Residential buildings endure longer than other energy consuming systems (according to the Center for Climate and Energy Solutions), so retrofitting and planning for lower energy consumption, while keeping people comfortable in changing conditions can make a significant impact on building-related GHGs. According to the U.S. Environmental Protection Agency, in developed nations, people spend up to 90% of their lives in buildings, so incorporating passive systems such as insulation into buildings is essential to provide comfort and greater energy efficiency in both colder and hotter conditions. There are also co-benefits that can result from increasing energy efficiency and reducing fossil fuel use, such as reduced energy bills (from home weatherization), and decreased environmental and health impacts from off-setting fossil fuel use with renewable resources and conservation.

The tables below contain the high priority actions in this category. The strategies and actions in the tables are in an order that reflects input from Task Teams, Reviewers, and the public based on greenhouse gas reduction potential and the approved evaluation criteria. Additional actions, which have not been as thoroughly vetted and have not been scaled for greenhouse gas reduction potential, can be found in Appendix 4.

STRATEGIES AND ACTIONS
BUILDINGS & ENERGY
COMMUNITY
MITIGATION

STRATEGY	ACTION
Energy Conservation, Efficiency, and Renewables	Increase deployment of energy efficiency improvements (such as weatherization, solar attic vents, daylighting, shading, insulation of foundations, fuel efficient appliances, etc.) in new and existing buildings, as well as onsite renewables for commercial and residential sectors.

STRATEGY	ACTION
Home Performance Ratings	Implement an energy performance rating program for homes, so prospective buyers and renters make informed decisions on future energy use/cost.
Promote Electric and Lower-Carbon Fueled Vehicles	Accelerate transition to electric vehicles.
Federal/State Policy Advocacy	Increase Renewable Energy Portfolio Standards for electric utilities.
Carbon Pricing	Promote policies at the local, state and federal level that implement carbon-based fees or taxes.
Local Renewables Development	Support distributed solar energy development.
Energy Conservation, Efficiency, and Renewables	Increase smaller housing options to reduce energy consumption, environmental impacts of construction and consumption of goods/materials.
Water Conservation and Efficiency	Increase deployment of water efficiency measures of existing buildings and new construction.
Building Preservation	Promote adaptive reuse of historic or older buildings and weatherize to code.

STRATEGIES AND ACTIONS
BUILDINGS & ENERGY
COMMUNITY
ADAPTATION

STRATEGY	ACTION
Energy Conservation, Efficiency, and Renewables	Encourage passive daylight, shading, ventilation, insulated building envelopes, etc.
Water Conservation and Efficiency	Increase deployment of high efficiency toilets.
Water Conservation and Efficiency	Increase appropriate use of grey water to off-set production of potable water.

STRATEGIES AND ACTIONS
BUILDINGS & ENERGY
MUNICIPAL OPERATIONS
MITIGATION

STRATEGY	ACTION
Energy Conservation, Efficiency, and Renewables	Energy audits of City facilities and feasibility studies to determine passive to active systems to reduce energy and fuels in buildings.
	Convert remaining applicable City facility lights to LEDs , prioritized by cost-effectiveness.
	Implement cost-effective building system upgrades and integrate energy efficiency improvements into all applicable capital improvement

STRATEGY	ACTION
	projects. Target efficiency improvements where the highest energy usage and losses are occurring.
	Identify and target water efficiency improvements where the highest water usage and losses are occurring.
Purchasing	Shift towards 100% renewable and / or carbon free electricity. Purchase Blue Sky Power as an interim measure.
Energy Management	Develop and implement utility performance management plans, including performance tracking for all City-owned buildings and facilities.
	Evaluate natural gas and methane use and practices at the Wastewater Treatment Plant. Analyze and implement strategies to increase methane reuse for vehicle fuel, heating buildings or for other beneficial purposes.
	Evaluate feasibility for solar installation and collecting heat from spill water at the aquatic center.
Funding	Identify internal and external funding sources to finance energy-efficiency upgrades in City facilities. Explore "climate bonds" as one funding mechanism.
Targeted Outreach	Share high priority, cost-effective operational actions with other large business and institutional entities, along with life-cycle cost analyses and GHG reduction information.
Green Buildings	Design/construct all new City facilities to meet or exceed LEED Gold energy and water efficiency standards.

STRATEGIES AND ACTIONS
BUILDINGS & ENERGY
MUNICIPAL OPERATIONS
ADAPTATION

STRATEGY	ACTION
Asset Management	Consider climate change impacts in evaluating asset life / replacements and repairs.
Wastewater Facilities Management	Consider new systems approach for the Wastewater Treatment Plant to increase its resiliency and avoid power outages in flood events. Evaluate potential to reduce demand for nutrient processing at the WWTP by employing Low Impact Development (LID) techniques and installing residential and commercial reuse systems.
Resiliency	Complete a feasibility study and plan for onsite and rooftop solar electric and hot water for City buildings.

LAND USE AND TRANSPORTATION

What is in the Land Use and Transportation Category?

The Land Use and Transportation Category considers the use of land and its proximity to other uses, which sets the demand for transportation and the vehicles (or not) that move goods and people. This is true for residential, commercial, industrial, and institutional sectors. Whether it is industrial uses for moving materials and supplies in and goods out, running errands, commuting to work, or accessing services and recreational opportunities, how the community develops will determine the transportation infrastructure needed to serve the land uses. For example, increased urban density and mixed uses can result in reduced reliance on automobiles for local services.

The transportation infrastructure can enable or prevent certain travel modes and vehicle types from functioning. The modes range from active transportation such as walking and biking to mass transit such as buses to personal vehicles to freight and utility vehicles. Behind each of these modes are varying sources of energy with their own GHG footprints and range from food, to liquid fuels to electricity. This category addresses the relationships between land use patterns and transportation requirements, and seeks to identify actions that can reduce community GHGs by reducing fuel consumed, and therefore, GHGs emitted through the transportation system.

Why Does It Matter?

Transportation fuels are the source of 26% of U.S. emissions. Vehicles and energy sources are changing rapidly and provide the community with genuine options for GHG reduction and climate change adaptation. Fleet fuel economy improvements, switching to alternative fuels and electric vehicles, and transitioning to a built environment and modes of travel that reduce reliance (and vehicle miles traveled) on single occupancy vehicles, can significantly reduce the community's long-term GHG emissions, air pollution, and result in other co-benefits to the community. For example, a 2012 report by the Union of Concerned Scientists showed the pollution equivalency to miles per gallon of electric vehicles (EVs) based upon regional electric grid mixes. Given that Renewable Energy Portfolio standards continue to rise, the MPG equivalency of EVs will rise over time.

The tables below contain the high priority actions in this category. The strategies and actions in the tables are in an order that reflects input from Task Teams, Reviewers, and the public based on greenhouse gas reduction potential and the approved evaluation criteria. Additional actions, which have not been as thoroughly vetted and have not been scaled for greenhouse gas reduction potential, can be found in Appendix 4.

STRATEGIES AND ACTIONS
LAND USE & TRANSPORTATION
COMMUNITY
MITIGATION

STRATEGY	ACTION
Land Use/Development to Reduce Car Dependency	Increase transit-oriented, walkable, node-oriented, mixed-use development that includes housing and services.
Transportation Demand Management	Reduce vehicle miles traveled and single occupancy vehicle trips and ownership.

STRATEGY	ACTION
Transportation System Management	Reduce idling and congestion.
Facilitate Active Transportation	Expand network of bike and pedestrian corridors, and enhance visual and physical safety protection measures.
Carbon Pricing	Promote policies at the local, state and federal level that implement carbon-based fees or taxes.
Electric and Lower-Carbon Fueled Vehicles	Accelerate transition to electric and other higher efficiency and low-carbon fueled vehicles.
Transportation Demand Management	Develop land use and transportation system alternatives that will reduce long-term GHG emissions.
Transit	Increase the Corvallis Transit System's level of service.

STRATEGIES AND ACTIONS
LAND USE & TRANSPORTATION
COMMUNITY
ADAPTATION

STRATEGY	ACTION
Flood Protection	Plan to maintain accessibility throughout Corvallis by all transportation modes.
Pavement Reduction	Reduce street widths where appropriate and increase water absorption and urban greenspace.
Fire Prevention	Limit new development in high-risk areas.
Urban Heat Reduction	Manage public rights-of-way to reduce urban heat concentrations.
Land Use / Development	Contain the urban growth boundary (UGB) to protect farm land (outside UGB) and accommodate new population growth (inside UGB).
Land Use / Development	Increase applications of "low impact development" (LID).

STRATEGIES AND ACTIONS
LAND USE & TRANSPORTATION
MUNICIPAL OPERATIONS
MITIGATION

STRATEGY	ACTION
Purchasing and Specifications	Require carbon footprint when specifying concrete and/or asphalt in large quantities for projects.
Fleet Fuel Efficiency	Right size transit, heavy duty and light duty vehicles, increase fuel efficiency and use of low carbon fuels and electricity. Consider electric vehicles and hybrids where duty cycle allows - especially sedans.
Transportation Demand Management	Allow telecommuting when and where appropriate. Promote employee use of alternate commute modes, including carpooling, transit system, walking and biking.
Design Standards	Evaluate street design to encourage alternate modes while maintaining access for emergency vehicles.
Purchasing and Specifications	Incorporate contractor fuel efficiency / emissions standards into bids and contracts to ensure construction contractors working for the City use fuel efficient, low polluting vehicles and equipment.

STRATEGIES AND ACTIONS
LAND USE & TRANSPORTATION
MUNICIPAL OPERATIONS
ADAPTATION

STRATEGY	ACTION
Flood / Fire Protection	Prepare transportation system for long duration events (e.g., weather, outages etc.).
	Review standards for stormwater management for anticipated climate change impacts (e.g., increased flooding).
	Evaluate flood potential for roads, bike paths and sidewalks.

CONSUMPTION AND WASTE

What is in the Consumption and Waste Category?

The Consumption and Waste Category considers everything in the lifecycle of consumer goods from extraction of raw materials to manufacturing, packaging, distribution, product use and associated energy and resource demands and finally, disposal. Although "embodied" GHG emissions are in everything we buy due to the energy used to produce and transport them, they are mostly invisible and therefore are discounted (unless they are goods like appliances or other products that require energy to operate). That energy is produced somehow, generating some level of GHGs. Reusing, buying used, buying durable products, recycling and recovering energy from materials that cannot be re-used can significantly reduce the GHGs associated with product manufacturing. Diverting food and vegetative waste from the garbage/landfill, composting, anaerobic digestion and landfill gas capture and use can reduce GHG emissions by preventing the "fugitive emissions" associated with organic matter decay. Biomethane also can be used as a local source of lower carbon fuels for hauling fleets.

Why Does It Matter?

The consumption of goods, foods, and services typically makes up about half of a community's GHG emissions. Most consumption emissions occur elsewhere and are often overlooked because of this. Wiser consumption, like purchasing locally or buying more durable goods, can reduce emissions by decreasing the travel required to get the product to you or by lessening the need for replacement goods in the future. Waste comprises a smaller portion of the community's GHG emissions (< 1%). Finding ways to convert "waste" into beneficial uses, like recovering methane from Coffin Butte Landfill, or composting home food and yard waste also can result in environmental and economic co-benefits for the community.

The tables below contain the high priority actions in this category. The strategies and actions in the tables are in an order that reflects input from Task Teams, Reviewers, and the public based on greenhouse gas reduction potential and the approved evaluation criteria. Additional actions, which have not been as thoroughly vetted and have not been scaled for greenhouse gas reduction potential, can be found in Appendix 4.

STRATEGIES AND ACTIONS
CONSUMPTION & WASTE
COMMUNITY
MITIGATION

STRATEGY	ACTION
Waste Reduction--Materials	Increase recycling.
Waste Reduction--Food	Reduce the volume of food waste generated and sent to the landfill.
Reuse and Repair	Promote reuse and repair.
Procurement	Increase purchasing of materials containing recycled material content, that have reduced packaging, and that can be returned to the manufacturer for remanufacturing, reuse, or full recycling.
Federal / State Policy Advocacy	Increase product stewardship.

STRATEGY	ACTION
Carbon Pricing—Materials Related	Promote policies at the local, state and federal level that implement carbon pricing related to product and materials life cycles (e.g., emissions cap or carbon tax), including imports (border adjustment mechanism / carbon tariff if necessary).

STRATEGIES AND ACTIONS
CONSUMPTION & WASTE
COMMUNITY
ADAPTATION

STRATEGY	ACTION
Materials Management	Maintain and plan for infrastructure and service adequacy for materials management under warming conditions and extreme events.
Model Programs	Increase resource efficiency in schools and other organizations.

STRATEGIES AND ACTIONS
CONSUMPTION & WASTE
MUNICIPAL OPERATIONS
MITIGATION

STRATEGY	ACTION
Purchasing	Evaluate elements of supply chain that have highest impact to carbon footprint - prioritize efforts accordingly.
	Procure major purchases based on total ownership / lifecycle cost, with priority given to low carbon content, especially lower carbon paving, throughout the supply chain. Include maintenance and operations in setting procurement guidance (see DEQ's low carbon purchasing toolkit for local government). Evaluate the need for paving at City-owned facilities and use environmentally friendly alternatives where possible.
	Establish a local forum for sharing best low carbon purchasing practices (include purchasing experts from major institutions like hospital, schools, and county).
	Cut paper use 10% each year, ultimately reducing paper use by 25%.
	Review Urban Sustainability Director's Network Toolkit for new procurement actions.
Federal / State Policy Advocacy	Support state efforts to develop a consumption-based GHG inventory methodology and to adopt standards, incentives, and / or mandates for carbon foot-printing and labeling of products.
	Participate actively in the process to develop state and federal product stewardship programs and legislation. Support opportunities for producers to develop responsible manufacturing, product and package design and reuse of recovered materials.

FOOD AND AGRICULTURE

What is in the Food and Agriculture Category?

The Food and Agriculture Category includes everything related to our food production, delivery and distribution. It can also relate to local food distribution networks that support low income people or people with restricted mobility, and that divert food from the waste stream. Farms of all types serve Corvallis directly, and are a driver in the Corvallis area's economy because of agricultural exports.

Why Does It Matter?

Farms are a source of income and food for much of the Corvallis community. Changing physical conditions due to climate change may require new crops and/or new cropping regimes and agricultural practices due to weather, pests, weeds, and water availability. Local food production also may change due to changing availability or cost of food transported into the community from elsewhere. A general shift in food consumption toward an increasingly plant based diet can reduce GHG emissions generated by the meat and dairy sectors, which are significantly more GHG producing that plant-based agriculture. Agriculture may provide a carbon sequestration opportunity and agricultural practices are evolving to include methods that are less fuel and carbon-based chemical intensive. In a resource-constrained world, local agriculture could focus on feeding the local community as a first priority. Severe climate events could impact the local food supply, which may impact disadvantaged community members disproportionately. In a more optimistic scenario, Corvallis' agriculture segment of the economy can continue to prosper and create incomes. There are also co-benefits that can result from strategies such as community gardens that can support community livability and provide increased food security to some community members, and from local agricultural practices that generally improve the environment.

The tables below contain the high priority actions in this category. The strategies and actions in the tables are in an order that reflects input from Task Teams, Reviewers, and the public based on greenhouse gas reduction potential and the approved evaluation criteria. Additional actions, which have not been as thoroughly vetted and have not been scaled for greenhouse gas reduction potential, can be found in Appendix 4.

STRATEGIES AND ACTIONS
FOOD & AGRICULTURE
COMMUNITY
MITIGATION

STRATEGY	ACTION
Food Purchasing	Increase purchasing of local, low carbon content food alternatives throughout the community.
Food Production Methods	Reduce GHG intensive inputs and retain carbon and other nutrients on agricultural land.
Food Awareness	Increase public knowledge and awareness of the impacts of food purchasing and dietary choices on climate.

STRATEGIES AND ACTIONS
FOOD & AGRICULTURE
COMMUNITY
ADAPTATION

STRATEGY	ACTION
Local Food System	Increase participation in and accessibility to local food programs, including community supported agriculture (CSA) programs, and encourage neighborhood-scale food production.
Edible Landscapes	Model and promote edible landscaping and gleaning.

URBAN NATURAL RESOURCES

What is in the Urban Natural Resources Category?

The Urban Natural Resources Category addresses the natural systems that support the soil, air, water, plants, and animals in the city. Urban natural systems addressed in this CAP include: streams, their riparian areas and contributing watersheds; drinking water sources; natural and constructed drainage features that filter, retain, and clean stormwater; wetlands; wooded natural areas; vegetated open space areas; and the inventory of trees that create an "urban forest."

Why Does It Matter?

The collective community maintenance and management of urban natural resources contributes to GHG emissions in only a very modest way, and can offset the release of GHGs in a modest way as well, through sequestration of carbon and cooling the environment. However, protecting, maintaining and enhancing natural resources within the urban environment can support the community's preparedness and resiliency to predicted impacts of climate change. Increased heat, drought, extreme weather events predicted to occur in the coming decades will challenge our infrastructure and services, and may threaten community health and the adequacy of local vegetation, habitat and water supplies that sustain local communities. Wetlands, healthy streams and drainageways, and open areas that provide groundwater recharge can help mitigate flash peak stormwater/flood flows that might otherwise overwhelm constructed infrastructure, and can help maintain groundwater aquifers and water quality in the face of prolonged drought. In warmer conditions, urban forests provide local heat reduction and can provide relief in hot weather for high risk populations without access to air conditioned spaces, such as low income people and those with limited mobility. Vegetation provides soil retention and water filtration, which can help urban infrastructure functions, prevent landslides and bank failures, and protect wildlife habitat. All of these environmental and natural resource protection strategies provide general livability and sustainability co-benefits to the community.

The tables below contain the high priority actions in this category. The strategies and actions in the tables are in an order that reflects input from Task Teams, Reviewers, and the public based on greenhouse gas reduction potential and the approved evaluation criteria. Additional actions, which have not been as thoroughly vetted and have not been scaled for greenhouse gas reduction potential, can be found in Appendix 4.

STRATEGIES AND ACTIONS
URBAN NATURAL RESOURCES
COMMUNITY
MITIGATION

STRATEGY	ACTION
Carbon Storage	Manage lands for carbon storage.

STRATEGIES AND ACTIONS
URBAN NATURAL RESOURCES
COMMUNITY
ADAPTATION

STRATEGY	ACTION
Funding	Establish a range of diverse, stable, long-term funding sources for the acquisition, maintenance, restoration, and preservation of prime natural areas.
Urban Heat Reduction and Drought Tolerance	Protect existing trees and increase new tree planting and climate appropriate vegetation on private and public lands and rights-of-way.
Natural Assets and Habitat Connectivity, and Water Quality Protection	Develop more complex and broader floodplains that include wetlands and a diverse matrix of habitats.
Water Supply and Conservation	Increase focus on water conservation and options for appropriate alternatives to potable water usage.

STRATEGIES AND ACTIONS
URBAN NATURAL RESOURCES
MUNICIPAL OPERATIONS
MITIGATION

STRATEGY	ACTION
Integrated Pest Management	Improve Landscaping Manual and Integrated Pest Management Policy and Plan for all city facilities and train staff. Consider need for inputs such as water and manage towards zero.
Equipment and Fuels	Create policy for electric lawn mowers, chain saws, leaf blowers and weed eaters.
Forest Management	Ensure that the City's watershed forest is managed for carbon storage over time, consistent with water quality and other ecosystem values.
	Expand opportunities to maintain carbon in wood by using wood from urban forest management for products with long lives.

STRATEGIES AND ACTIONS
URBAN NATURAL RESOURCES
MUNICIPAL OPERATIONS
ADAPTATION

STRATEGY	ACTION
Urban Forest Management / Fire Prevention	Evaluate urban forest management policies and practices to address susceptibility to increase risk of wildfires, such as reducing fuel loads in understory of fire prone habitats.
Natural Resources Asset Management	Update / maintain natural features inventories to support monitoring and management of climate-sensitive and other significant natural resources.
	Evaluate and monitor street trees and vegetation, modify species selections as appropriate to address climate change. Include OSU lands in natural resource planning.

STRATEGY	ACTION
	Create a landscaping policy for our facilities that considers options for using native vegetation, firewise / waterwise landscaping and rain gardens.
	Leverage local, state, and federal partners for a more comprehensive approach to natural resource management in the City.
	Create both large and small networks of natural areas with diverse functions and habitats.
	Implement a trial "Park Pesticide Free" designation for select parks.
	Create more community gardens.
	Require use of native species in all public projects.
Stormwater Management	Reduce piped stormwater flows and peaks by incorporating public stormwater assets that infiltrate, store and slow peak stormwater flows.
Infrastructure Planning and Management	Update water, stormwater and wastewater master plans to address climate change. Context should include framing stormwater and wastewater as resources including planning to expand the use of reclaimed water for irrigation and other non-potable uses.
	Retrofit city facilities with Green Infrastructure.
	Train staff to maintain green infrastructure (which have different skills and methods than traditional infrastructure maintenance) and provide adequate tools.
Urban Heat Reduction	Modify design standards and specifications to ensure field coordination and field change approvals do not preclude trees in the right-of-way.
Codes and Design	Evaluate codes (both City and County) for conflicting regulations with regard to adaptation projects. Improve consistency across jurisdictional boundaries.
Public Well-being	Update Parks Master Plan to include planned access throughout community to Parks and Recreation facilities as cooling areas.
Watershed Planning	Partner with local, regional, and state agencies to encourage water conservation and efficiency and expand and diversify the water supply.
	Consider the expansion of ongoing maintenance in conjunction with increased implementation of existing natural resources.
	Expand senior capstone project concept with OSU to identify larger projects that address this issue .

HEALTH, SOCIAL SERVICES AND COMMUNITY WELL-BEING

What is in the Health, Social Services and Community Well-Being Category?

The Health, Social Services and Community Well-Being Category addresses community health, care and assistance programs, emergency services, and preparedness (or risk management) for potential/predicted negative community impacts of climate change. Changing conditions (such as increases in temperature, extreme weather, and fires), regulations and energy sources will create new and sometimes unanticipated changes that will affect people in many ways. The need to mitigate emissions creates opportunities to create health through active modes. The ability to adapt requires monitoring of the range of disease and carriers of disease, such as the West Nile Virus carried by mosquitoes farther north.

Why Does It Matter?

Changing conditions such as increased energy costs, will disproportionately affect the lower income populations. Migration of people, flora and fauna may introduce new challenges such as fauna-carried diseases, and loss of existing native habitats that maintain natural system functions. More extreme weather events may threaten lives, such as elderly or health-compromised people in prolonged heat waves. Prolonged and extreme rains, or rapid snow melt can cause flooding and landslides, and heat waves and droughts may bring wildfires that threaten neighborhoods at the urban-wildland interface. There are also co-benefits that can result from strategies that promote increased community awareness and preparedness for things like hazards, disasters, and disease vectors, and the availability of services in the community to provide support.

The tables below contain the high priority actions in this category. The strategies and actions in the tables are in an order that reflects input from Task Teams, Reviewers, and the public based on greenhouse gas reduction potential and the approved evaluation criteria. Additional actions, which have not been as thoroughly vetted and have not been scaled for greenhouse gas reduction potential, can be found in Appendix 4.

STRATEGIES AND ACTIONS
HEALTH, SOCIAL SERVICES & COMMUNITY WELL-BEING
COMMUNITY
ADAPTATION

STRATEGY	ACTION
Community Health--Research and Planning	Address community health impacts of climate change and the capacity for treatment.
Emergency Preparedness (Responders / Service Providers)	Address emergency response needs related to the impacts of climate change.
Community Awareness and Individual Preparedness	Increase community's awareness of potential risks and adaptive actions they can take.

STRATEGIES AND ACTIONS
HEALTH, SOCIAL SERVICES & COMMUNITY WELL-BEING
MUNICIPAL OPERATIONS
ADAPTATION

STRATEGY	ACTION
Education / Emergency Preparedness	Educate City staff on Climate Action Plan and identify what role departments play in addressing health and social service needs.
Prepare for Fuel Shortages	In case of power outages, ensure operability of backup generators and other vital systems; investigate transition to non-fossil fuel alternatives.

CORVALLIS CLIMATE ACTION PLAN

APPENDIX 1

Climate Change Background and Framework for Development of Long-Term and Interim Greenhouse Gas Emissions Reduction Targets for Corvallis

ISSUE:

As part of the foundation for development of a community climate action plan (CAP) for Corvallis, the City Council-appointed Climate Action Task Force (CATF) is recommending establishment of a greenhouse gas (GHG) reduction target (or targets). This issue paper provides a science-based context, as well as background on the global, national, state and other local efforts to address GHG reduction targets. Three potential frameworks for determining GHG emissions reduction targets are discussed in this paper as points of reference and a context for the CATF's consideration of a target for the Corvallis CAP. The CATF reviewed the matter at its February 2, 2016 meeting and set a recommended preliminary target and interim targets in alignment with the targets set by the State of Oregon.

BACKGROUND:

Summary of Scientific Conclusions:
According to the UN administered Intergovernmental Panel on Climate Change (IPCC)[3], which is recognized globally as the leading authority on climate change, warming of the climate system is "unequivocal," human influence is clear, and recent human-caused (anthropogenic) emissions of GHGs (primarily carbon dioxide) are the highest in history.[4] Recent unprecedented changes in the climate have had widespread observed impacts on human and natural systems, such as:

- Warming of the atmosphere and oceans, changes in weather patterns, increased drought and wildfires;
- Acidification of the oceans and resulting loss of aquatic life and damage to fisheries;
- Rising sea levels and resulting hazards to and displacements of communities; and
- Diminishing snowpack and glaciers leading to loss of fresh water supplies for drinking and irrigation.

The Industrial Revolution marked the beginning of the dramatic increase in anthropogenic GHG emissions. Between 1880 and 2012, global average temperature increased by approximately 0.85° centigrade (C).[5] Since the 1950s, the rate of change of anthropogenic GHG emissions has increased dramatically. Similarly, the rates of increase in global average temperature and sea level have accelerated. The IPCC estimates that over half the increase in global average temperature during this period was due to anthropogenic causes, predominantly resulting from increased fossil fuel combustion related to economic and population growth.[6]

[3] The Intergovernmental Panel on Climate Change (IPCC) is the leading international body for the assessment of climate change. It is a scientific body representing the collective scientific review and input of thousands of scientists world-wide, under the administration of the United Nations. IPCC assessments provide a scientific basis for governments at all levels to develop climate-related policies. See IPCC - Intergovernmental Panel on Climate Change
[4] Climate Change 2014—Synthesis Report: Summary for Policymakers; IPCC; 2014; p.2
[5] Climate Change 2014—Synthesis Report: Summary for Policymakers; IPCC; 2014; p.2
[6] Climate Change 2014—Synthesis Report: Summary for Policymakers; IPCC; 2014; pp. 3-5

Warming can also be accelerated by the loss of natural carbon sinks and positive feedback loops. While carbon dioxide accumulates in the atmosphere and ocean, the Earth's biome has the ability to sequester some of this carbon in soil, plants and trees. However, human and climate induced forest and wetland loss are decreasing the capacity of this type of carbon sequestration. Positive feedback loops accelerate warming. For example, the increase in dark surface area (which absorbs sunlight more readily) due to the loss of large areas of more reflective ice and snow leads to increased heat absorption, causing further ice and snow loss and warming.

Reducing GHG emissions now can mitigate, but will not stop significant warming from affecting natural and human systems for a long period of time. Based on existing atmospheric GHG concentrations and emissions at today's levels, a study of likely consequences of climate change in the Upper Willamette River Basin identified several important changes that are expected to affect communities in that geographic region. These include:

- Increased average annual temperatures of 6° to 8° F (~3°-4° C) by the end of the century;
- Reduced snowpack and resultant lower and warmer stream flows in summer;
- Increased demand for water for agricultural uses;
- Reduced hydroelectric power generation capacity (due to lower stream flows in summer) and increased summer demand for electricity;
- Increased storm intensity, flooding, wildfires and landslides
- Higher rates of heat-related illness, exhaustion, asthma, and respiratory diseases.[7]

While GHGs are usually expressed as Carbon dioxide (CO_2) and CO_2 equivalents (CO_2e), the following gases and groups of gases are of primary concern for their effects on global temperatures and are named in The Kyoto Protocols:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur hexafluoride (SF_6)
- Nitrogen trifluoride (NF_3)

Given its proximity to the Upper Willamette River Basin study area, the Corvallis community can reasonably expect similar impacts locally. "Climate Change in the Northwest—Implications for Our Landscapes, Waters, and Communities" (2013) provides a detailed analysis and conclusions about key regionally consequential risks and anticipated impacts in the Northwest.[8]

The IPCC has concluded that "the risks of abrupt or irreversible changes will increase as the magnitude of the warming increases,"[9] and that GHG concentrations must be reduced in order to stabilize climate conditions and avoid passing catastrophic tipping points. To accomplish this, dramatic reductions in human-generated GHG emissions are needed. Adaptive and risk-management measures also are necessary to address the increasing problems and risks associated with the climate changes that already have and will continue to occur.

There is scientific consensus that the global average temperature increase (above pre-industrial temperatures) must be capped at 1.5°-2.0° C in order to avoid catastrophe climate change. If no action is

[7] Preparing for Climate Change in the Upper Willamette River Basin of Western Oregon: Co-Beneficial Planning for Communities and Ecosystems;" US Department of Agriculture, Climate Leadership Initiative, and National Center for Conservation Science and Policy, 2009.
http://static1.1.sqspcdn.com/static/f/551504/6420038/1270512823240/willamette_report3.11FINAL.pdf

[8] Dalton, M. M., Mote, P. W., Snover, A. K., [Eds.]. 2013; "Climate Change in the Northwest—Implications for Our Landscapes, Waters, and Communities," Washington D.C: Island Press.
http://cses.washington.edu/db/pdf/daltonetal678.pdf

[9] Climate Change 2014—Synthesis Report: Summary for Policymakers; IPCC; 2014; p. 16

taken, referred to as "business as usual", global average temperature will increase at least 4°C by the year 2100. In order to cap the global temperature increase to 2.0° C, atmospheric concentrations of GHGs would have to decrease from current levels, which exceed 400 parts per million (ppm), to about 350 ppm. The longer CO_2 concentrations remain at greater than 350 ppm, the greater the risk that excessive and rapid warming will exceed levels that human social systems and infrastructure are prepared to handle. Therefore, in addition to dramatic reduction in future GHG emissions, CO_2 currently concentrated in the atmosphere must be removed and sequestered through reforestation or yet-to-be invented technologies.

Global, National, and State Context for GHG Emissions Reduction Goals:

Nations around the world, as well as states and local governments around the U.S., began to focus on GHG emissions reduction targets over twenty years ago. In 1993 the United Nations Environment Program and the International Council for Local Environment Initiatives (ICLEI) initiated the Cities for Climate Protection Campaign to facilitate GHG emissions reductions at the local government level. The first global pact—the Kyoto Protocol—was ratified by 141 countries in 2005. The information below describes the current global, national and state context, and provides examples of targets from Oregon communities that have enacted plans to combat climate change. While not an exhaustive inventory, this information is intended to help frame a range of alternatives for consideration in setting a community target for Corvallis.

Global:

The 2015 United Nations Climate Change Conference, held in Paris, resulted in a negotiated agreement on the reduction of climate change, which was adopted by consensus on December 12, 2015 by all 195 participating nations and the European Union. The agreement is driven by a science-based limit of global warming to 2°C above pre-industrial levels. In addition, wording was added to the agreement to stress a "best effort" of participating nations to limit warming to 1.5°C. Nations around the world submitted GHG reduction commitments for interim target dates ranging from 2025 to 2030 in order to ensure they establish a reduction trajectory that can ultimately lead to achievement of the 2050 targets. While the agreement states this 2°C limit as motivation, the Intended Nationally Determined Contributions (INDC), or voluntary pledges of emissions cuts by nation, are projected to limit average global temperatures to 2.7°C warming.[10] Examples of commitments submitted by several countries to the United Nations Framework Convention on Climate Change (UNFCCC) in advance of the Paris Conference are provided in Figure 1 below.

Figure 1. Intended Nationally Determined Contribution (INDC) (to GHG reductions)—Select Countries Submittals to the UNFCCC prior to the 2015 Paris Climate Change Conference

Country	Target Emissions Reduction	Year Target Reduces Below	Year to Achieve Target
United States	--26-28%	2005	2025
European Union	40%	1990	2030
Norway	40%	1990	2030
Switzerland	50%	1990	2030
Mexico	25-40%	2013	2030
United Kingdom	50%	1990	2027
Germany	40% 55%	1990 1990	2020 2030

[10] Climate Action Tracker is an independent scientific analysis produced by a consortium of four research organizations: Climate Analytics, ECOfys, New Climate Institute, and Potsdam Institute for Climate Impact Research; more information at https://climateactiontracker.org/

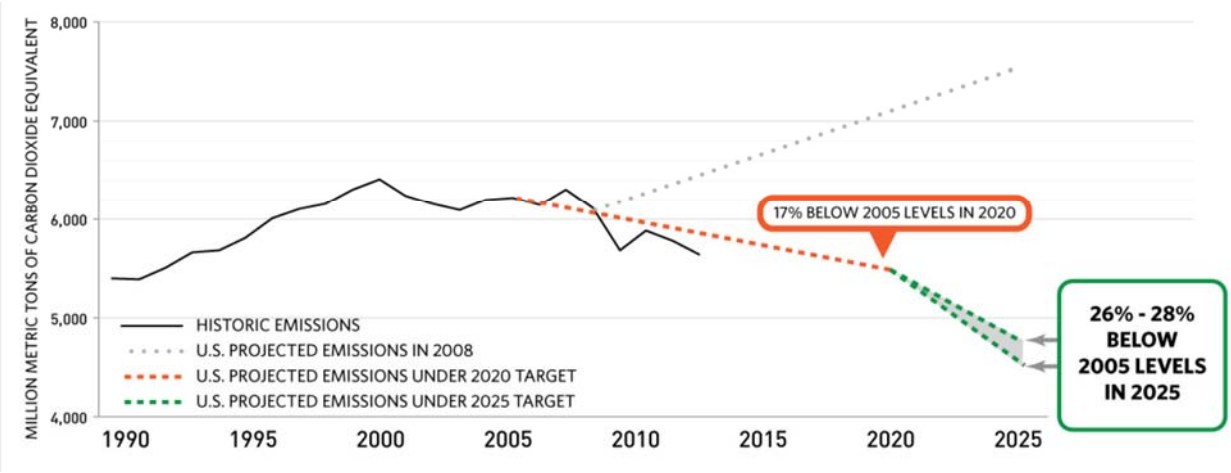
According to the Climate Action Tracker (CAT), the INDCs submitted to the UNFCCC by the end of 2015 represent 187 countries, which comprise 98% of the global population and about 95% of global GHGs. Another 3% of global GHG emissions come from global air travel and shipping.

It is important to note that while the Paris Agreement represents important quantitative targets for global emissions reductions, it does not contain explicit, legally binding country specific reduction targets and it has yet to be officially ratified by enough participating countries.

National – U.S.:

President Obama submitted the U.S. GHG reduction target commitment to the UNFCCC on March 31, 2015. The U.S. INDC submittal declared a commitment to reduce GHG emissions levels to 26-28% of 2005 levels by 2025. "The U.S. target will roughly double the pace of carbon pollution reduction in the U.S. from 1.2% per year on average during the 2005-2020 period to 2.3-2.8% per year on average between 2020 and 2025."[11] The reduction target was based on an analysis of cost-effective pollution reductions achievable under the Clean Power Plan (CPP), and establishes the path to achieve GHG emissions of 80% by 2050. The U.S. INDC GHG reduction targets are shown in Figure 2. below.

Figure 2. U.S. Emissions Under 2020 and 2025 Targets



Source: U.S. INDC, 2015

The CPP is the legal mechanism to reduce U.S. GHG emissions and is administered by the EPA. It requires individual states to meet emissions reduction targets through a variety of pathways. Currently, state level compliance begins in 2022. It is important to note that though the US Supreme Court has ruled that the EPA can regulate CO_2 as a pollutant, the specific legal framework used by the EPA to require and enforce emissions targets (as part of the CPP) has been challenged by 26 states and is currently scheduled for review by the US Supreme Court.

State Actions:

According to the Center for Climate and Energy Solutions, there are now twenty states in the U.S. that have established GHG emissions reduction targets, most of which have established targets of 75-80% below 1990 or more recent base line years by 2050. California was the first to establish a target, and has recently established the most aggressive target in the country. California and Oregon summaries are provided below.

[11] Fact Sheet: U.S. Reports its 2025 Emissions Target to the UNFCCC; White House Office of the Press Secretary; March 31, 2015

Information on the other state's targets can be found at http://www.c2es.org/us-states-regions/policy-maps/emissions-targets.

California:
In 2006, the California legislature enacted the Global Warming Solutions Act (AB-32), which established statewide policies and programs to reduce GHG emissions to 1990 levels by 2020. This was the first comprehensive state-enacted set of climate change mitigation policies in the country.[12] Through adoption and statewide implementation of the 2008 Climate "Scoping Plan," tracking emissions over time, and completing a 2014 Scoping Plan update, California has demonstrated that is on track to meet the 2020 target. In April, 2015, Governor Jerry Brown issued Executive Order B-30-15, which issued the most aggressive target in the nation to date—a 40% reduction below 1990 levels by 2030.[13] This interim target will put the state on track to meet the 2050 goal of 80% below 1990 levels. The Scoping Plan is currently being updated to reflect B-30-15.

Oregon:
The 2007 Oregon Legislature enacted HB3543 which established climate protection goals for the state and created the Oregon Global Warming Commission (OGWC) to coordinate state and local efforts to reduce Oregon's GHGs consistent with Oregon's goals. The HB3543 GHG reduction targets are as follows:

By 2010, arrest the growth of Oregon's GHG emissions and begin to reduce them
By 2020, achieve GHG levels that are 10% below 1990 levels
By 2050, achieve GHG levels that are at least 75% below 1990 levels.

These targets were based on the assessment of the IPPC on GHG reductions necessary to avoid dangerous interference with the climate system—60-80% below 1990 levels. That target is based on limiting CO_2 to double the level that existed prior to 1750.[14]

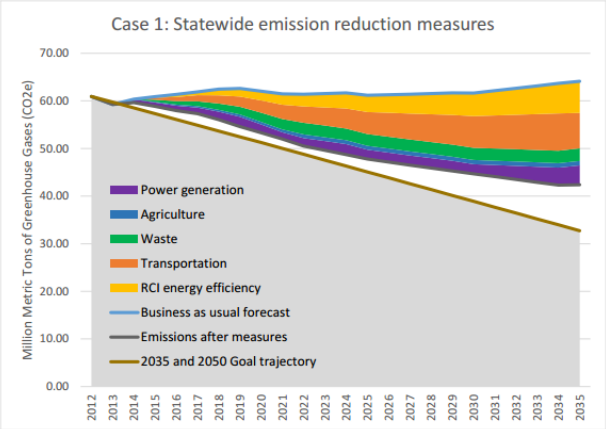
In its 2015 Biennial Report to the Legislature, the OGWC reported that Oregon's GHG emissions are now nearly back to 1990 levels of 61 million metric tons of CO_2 equivalent ($MMTCO_2e$) (i.e. the 2010 target). However, the state projects "Oregon's 2020 emissions to be 11 $MMTCO_2e$ above the target level set by the legislature for that year (i.e. 51 $MMTCO_2e$), with the gap between emissions and our goals widening each year to 2050 and beyond unless additional action is taken to contain and drive down emissions."[15] In order to get the state on a track that can ultimately achieve the 2050 target, the OGWC is recommending that an interim target be set for 2035, by a straight line projection between the 1990 emissions level (56.177 $MMTCO_2e$) and a 2050 goal of 14.2 $MMTCO_2e$ (i.e. 75% reduction from 1990 levels). This would create a 2035 interim target of 44% below 1990 levels (32.7 $MMTCO_2e$).[16] Oregon's GHG reduction targets will require an average annual reduction of 3.76%.

This goal would be roughly similar to California's target. It should be noted that the state also has concluded that even with the implementation of a range of measures that reduce emissions from buildings (commercial and residential), industrial processes, transportation (of people and freight), materials, agriculture, waste, and the generation of electricity, the state will likely fall short of achieving the 2035 interim target unless carbon pricing mechanisms are added to the mix.[17] Figure 3. below depicts the OGWC's projections of

[14] Oregon Global Warming Commission website—Keep Oregon Cool; more information at http://www.keeporegoncool.org/content/goals-getting-there
[15] Oregon Global Warming Commission Biennial Report to the Legislature 2015; Oregon Global Warming Commission; September, 2015; p.6
[16] Oregon Global Warming Commission Biennial Report to the Legislature 2015; Oregon Global Warming Commission; September, 2015; p.8
[17] Oregon Global Warming Commission Biennial Report to the Legislature 2015; Oregon Global Warming Commission; September, 2015; p.6

available and reasonably possible future emissions reductions that could be achieved and the gap between the 2035 interim target and what is achievable without placing a value or price on carbon.

Figure 3. Statewide Emission Reduction Measures



	2015	2020	2025	2030	2035
BAU forecast	60.9	62.0	61.2	61.6	64.1
Emissions after measures	59.0	54.0	48.7	45.8	43.4
Emission reduction measures:					
Transportation	0.5	2.7	5.0	7.2	8.7
RCI energy efficiency	0.2	1.5	2.7	3.6	4.9
Power generation	0.8	1.7	1.9	2.0	4.1
Agriculture	0.2	0.5	0.8	0.9	0.9
Waste	0.2	1.5	2.0	2.1	2.2
Total Reductions	1.9	8.0	12.4	15.8	20.8
2035 Goal Trajectory	57.3	51.2	45.1	38.9	32.7
Gap to meet goal	1.7	2.8	3.7	6.9	10.6

Note: All Units are in Million Metric Tons of Carbon Dioxide Equivalent.
Source: Staff Presentation to the Oregon Global Warming Commission; September, 2015

Local Actions:

Although the U.S. never ratified the Kyoto treaty, by 2007, 500 mayors across the country had signed the U.S. Mayors Climate Protection Agreement (Mayors Agreement) committing to strive to meet or exceed the GHG reduction targets set in the Kyoto Protocol. The Mayors Agreement established the first local GHG reduction targets at the local level—a 7% reduction over 1990 levels by 2012. Sixteen Oregon mayors have signed the Mayors Agreement. The cities of Portland and Eugene have adopted CAPs, and the City of Ashland is beginning an effort to develop a CAP as well.

Portland/Multnomah County:

The City of Portland began addressing climate change with the 1993 adoption of the Carbon Dioxide Reduction Strategy. This was followed by joint Portland and Multnomah County plans adopted in 2001 and 2009. Through these efforts, Portland and Multnomah County established a goal of reducing GHGs by 80% over 1990 levels by 2050, with an interim target of 40% by 2030 (which is the same as California's target). As a result of their collective efforts and a shrinking economy, GHG emissions in 2013 were 14% below 1990 levels while the population during the same period had increased by 31%.[18]

The Portland/Multnomah County CAP was updated in 2015, and the 2030 and 2050 GHG targets were not changed. Achieving the 2030 and 2050 targets will require an average annual decrease of 1.5% per year from 2013 to 2030, and a 1.8% decrease per year from 2030 to 2050. In order to accomplish these objectives, the Portland/Multnomah County CAP translates GHG emissions reductions to a "carbon budget," and focuses on primary generators of GHGs in the Portland/Multnomah County area, including:

- Energy used in buildings and industry--60% of total emissions;
- Fuels used in transporting people and goods--37% of total emissions; and
- Methane from the landfills that accept waste from residents and businesses--1% of total emissions.

[18] Climate Action Plan 2015—Local Strategies to Address Climate Change; City of Portland and Multnomah County; 2015

In developing a carbon budget for these GHG emission sources, many assumptions were made about future energy sources, conversion to electric vehicles and increases in energy efficiency, among other things. Carbon emissions are allocated on a per capita basis, and population projections are used to determine future emissions due to community growth. Portland and Multnomah staff developed and modeled Scenarios to determine energy use and GHG emissions reduction targets in each sector. The resulting sector-based and per capita-based GHG emissions reduction targets are shown in Figures 4. and 5. below.

Figure 4. Portland/Multnomah County Sector-Based Reductions in GHG Emissions to Meet Targets

Sector (in metric tons CO_2e)	1990	2012	Percent Change from 1990	2030	Percent Change from 1990	2050	Percent Change from 1990
Building energy	5,512,000	4,772,000	-13%	3,707,000	-33%	1,112,000	-80%
Transportation	2,979,000	2,830,000	-5%	1,661,000	-44%	655,000	-78%
Waste disposal	498,000	93,000	-81%	40,000	-92%	10,000	-98%
Sub-total	8,989,460	7,695,000	-14.4%	7,695,000	-40%	1,777,000	-80%
Food and goods		*9,400,000					
Total		17,095,000					

Source: Portland/Multnomah CAP, 2015, pp.20, 36, 37.
*Note: This data is from 2011 and does not have associated reduction targets.

Figure 5. Portland/Multnomah County Per Capita Reductions to Meet Targets

	1990	2012	Percent Change from 1990	2030	Percent Change from 2012	2050	Percent Change from 2012
Population	584,000	766,000	31%	923,000	20%	1,148,000	+50%
Per capita carbon emissions (metric tons)	15	10	-35%	6	-42%	2	-85%
Natural gas (therms per capita)	390	350	-10%	300	-14%	140	-61%
Electricity (kWh per capita)	13,000	11,000	-15%	8,630	-20%	4,130	-62%
Passenger miles per day per capita	17	17	-1%	12	-29%	6	-64%

Source: Portland/Multnomah CAP, 2015, p.20

These sector- and per capita-based targets are only provided for illustrative purposes to show the magnitude of change that will be necessary in a metropolitan area like Portland, which has aggressive GHG emissions reduction programs in place. They also reflect the fact that GHG reduction opportunities will vary across the sectors and that sector targets will vary accordingly. The assumptions, projections and scenarios modeled are not directly transferrable to Corvallis and Benton County.

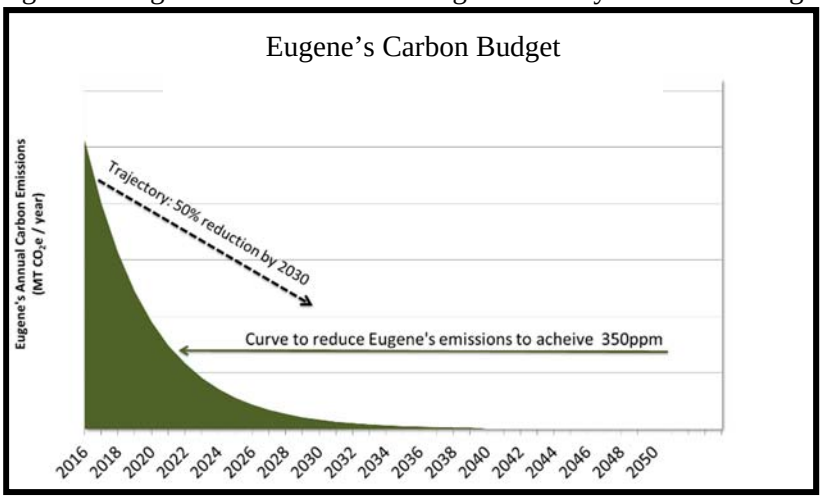
Eugene:
The City of Eugene adopted the Community Climate and Energy Action Plan for Eugene in 2010. In that plan, the City set GHG emissions reduction goals as they were previously established by the state of

Oregon---10% below 1990 levels by 2020, and 75% below 1990 levels by 2050.[19] Eugene tracks community fossil fuel use and emissions annually. The City has reduced fuel consumption by an average of 2% annually, and is on a trajectory that, if sustained, will meet its goal of a 50% reduction in fossil fuel consumption by 2030. In 2014, the Eugene City Council passed a Climate Recovery Ordinance, which, among other things, calls for the City to develop a carbon budget for GHG emissions reductions consistent with achieving 350 ppm of CO2 in the atmosphere.

The City is in the process of developing a localized community carbon budget, based on what has been declared to be *scientifically necessary* as opposed to what may be *feasible* given resource allocation and cultural acceptance. Eugene developed the carbon budget by downscaling the global carbon budget developed by climate scientists at NASA's Goddard Institute for Space Studies and Columbia University.[20] Based on Eugene's preliminary calculations, annual GHG emissions reductions will need to be well beyond those required to meet the current community goal of reducing fossil fuel use 50% by 2030.

This magnitude of reductions will not be possible for Eugene to achieve on its own. Federal and state policies and programs, and the implementation of new technologies not readily available today would have to complement Eugene community efforts to reduce GHG emissions. In addition, reducing atmospheric concentrations to 350 ppm will require drawing CO2 out of the atmosphere through reforestation. Therefore, an amount of carbon sequestration through reforestation will be included in the carbon budget. Eugene's preliminary projections of emissions reductions needed to meet the 350 ppm target is shown in Figure 6. below. Please note that this graph is based on preliminary information and the estimated numeric data and annual percentage reductions necessary to meet the 350 ppm scenario are not available. Matt McRae, Climate and Energy Analyst for the City of Eugene will provide additional background and a current status of Eugene's carbon budget development process.

Figure 6. Eugene GHG Reduction Target vs. Analysis Carbon Budget



Source: City of Eugene

[19] Community Climate and Energy Action Plan, 2010; City of Eugene; p.7

[20] Hansen J, Kharecha P, Sato M, Masson-Delmotte V, Ackerman F, Beerling DJ, et al., 2013; Assessing "Dangerous Climate Change": Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature. PLoS ONE 8(12): e81648. Doi:10.1371/journal.pone.0081648. (Source of citation—City of Eugene staff)

DISCUSSION:

What does this all mean for Corvallis?

The CATF set the following goal to guide development and implementation of a CAP that can achieve a fair share of GHG emissions mitigation.

> *The CAP will establish and monitor GHG emissions reduction targets for the Corvallis community that guide short-, medium-, and long-term priority strategies and actions the City and community partners will undertake to achieve at least Corvallis' proportionate share (or some other expression of commitment) of GHG mitigation. Periodic reporting and updates to the CAP will enable the City to respond to changing conditions and needs.*

Determining a "proportionate share" reduction target for Corvallis is an imprecise analytical exercise. Differences in GHG emissions reporting methods, assumptions, baseline years, and other factors across national, state and local governments make it difficult to evaluate where Corvallis' GHG emissions can be placed on the continuum from 1990 to 2050 relative to others. A complicating factor is that Corvallis' first year of community energy consumption and GHG emissions data—2012—is a baseline that cannot accurately be correlated with the historical and projected GHG emissions reduction curves generated by the City of Portland and to the State of Oregon, for example. Therefore, determining what a GHG reduction target similar to the state (i.e. 75% below 1990 levels) or Portland (i.e. 80% below 1990 levels) with reasonable accuracy is not possible.

As described above, there are three readily available frameworks Corvallis could use to set interim and long-term GHG emissions reduction targets that would roughly approximately Corvallis' proportionate or "fair" share. At this stage, Corvallis' CAP development process is focused on total community GHG emissions. Additional analysis will be needed to identify sector-based reduction potentials. A description and review of these options is provided below.

1) National framework: Corvallis could set targets based on the national reduction commitments expressed in the U.S. INDC: 1.2% per year on average through 2020, then doubling to 2.3-2.8% per year on average between 2020 and 2025 as an interim target. The U.S. INDC states that this trajectory would result in an 80% reduction by 2050. We were unable to locate information that would provide an indication of how GHG emissions from cities (which vary greatly across the nation in terms of efforts to reduce fossil fuel consumption and GHG emissions) would fit into the federal picture, so selecting this option as a proxy for Corvallis' proportionate share would require judgment that the reductions could and should be distributed equally across the country.

2) State framework: Corvallis could set targets based on the Oregon statewide model. This requires estimating where Corvallis is on the state GHG reduction trajectory between the baseline of 1990 levels and the state target (75% reduction of 1990 levels), and determining the reductions needed from Corvallis' baseline of 2012 GHG emissions to what Corvallis' 2050 reduction target would be. This analysis is shown in Figures 7. and 8. below. To estimate this, we used historic population data and State of Oregon population projections to correlate the Oregon GHG emissions estimates with Corvallis. The relevance of this framework to Corvallis requires an assumption that the Corvallis community is similar to the rest of the state regarding per capita GHG emissions.

   Using the estimated emissions based on Oregon per capita emissions, Corvallis would need to reduce GHG emissions by 3.52% annually from 2013 to 2050 to meet the state target. Using Corvallis actual inventoried GHG emissions in 2012, the average annual GHG emissions reduction percentage would be reduced to 3.175%. As with the state target, and based on the state's modeling

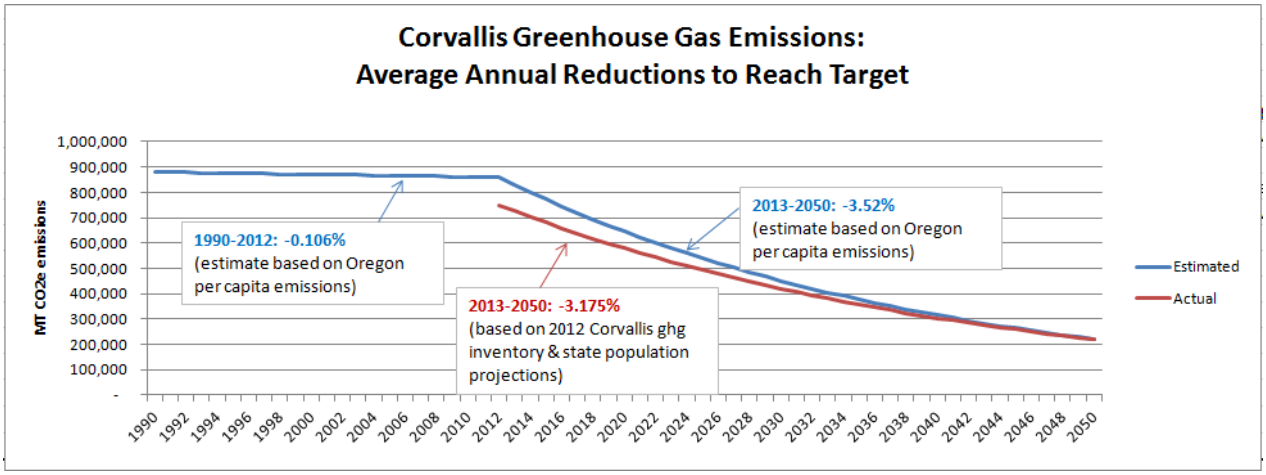
of projected feasible GHG reduction assumptions, this reduction target is not considered possible without significant state and federal policy and program changes including carbon pricing at $60 per ton of CO_2e.[21]

Figure 7. Corvallis GHG Emissions and Reductions Needed to Meet a 75% Reduction Target.

Oregon and Corvallis Emissions Estimates in $MTCO_2e$	1990	2012	Percent Change from 1990	2035	Percent Change from 1990	2050	Percent Change from 1990
Oregon emissions	56,177,000	60,900,000	8.4%	32,700,000	-44%	14,200,000	-75%
Oregon per capita emissions	19.6	15.6	-20.4%	6.6	-66.3%	2.5	-87.2%
Corvallis emissions (estimated based on state per capita)	880,186	859,959	-2.3%	377,137	-57.2%	220,047	-75%
Corvallis emissions (2012 inventory)	Unavailable	749,845	-14.8%	357,013*	-59.4%	220,047*	-75%
Corvallis per capita emissions (based on 2012 inventory)	-	13.6	-	5.5	-	3.11	-

Sources: State of Oregon GHG inventory data and population projections; Corvallis Community GHG Inventory, 2012
*Based on Corvallis population projections and the estimated 1990 Corvallis emissions.

Figure 8. Average Annual Corvallis GHG Emissions Reductions Needed to Meet a 75% Reduction Target.



3) Carbon budget framework: Corvallis could calculate theoretical targets based on Corvallis' share of a theoretical global per capita carbon budget, which, combined with reforestation and other carbon sequestration efforts, would achieve an atmospheric concentration of 350 ppm. This would entail using the City of Eugene's peer-reviewed methodology and equations for assigning a per capita-based carbon budget to the population of Corvallis. It is safe to assume that the resulting GHG emissions reduction curve would look similar to the Eugene curve shown in Figure 6. Above.

[21] Oregon Global Warming Commission Biennial Report to the Legislature 2015; Oregon Global Warming Commission; September, 2015; p.9

While the carbon budget framework illustrates what will be needed at a global scale to restore the atmosphere to 350 ppm of CO_2e, applying this framework to Corvallis will result in a purely aspirational goal at this time.

As noted above, Matt McRae will provide a more detailed review of the carbon budget framework and how Eugene is considering incorporating it into its community Climate and Energy Action Plan strategies.

CONCLUSIONS:

Given that Corvallis GHG emissions data begins at 2012, and given the differences across GHG emissions inventory methods, it makes it difficult to determine how much progress Corvallis has made relative to other cities, states and the nation. We have insufficient data to accurately benchmark emissions reduction targets to 1990, which leaves a span of 22 years of unknown energy consumption and GHG emissions data. And, differences in inventory methods make it difficult/expensive to correlate Corvallis to other communities. However, we can conclude that Corvallis has been actively pursuing energy efficiency improvements and decreased reliance on fossil fuels for many years.

For example, a 2008 partnership of the Energy Trust of Oregon and the Corvallis Sustainability Coalition implemented $112,000 of residential energy efficiency improvements. The Corvallis City Council adopted a "Community Energy Strategy: A 2020 Framework" in 2010, which recognized Corvallis' long-term efforts and incorporated many strategies and actions to significantly reduce energy consumption by 2020. Over the years, many solar installations have occurred, offsetting fossil fuel generated GHG emissions. Corvallis was recognized for its accomplishments by becoming the first city to be named the EPA's Green Power Community of the Year. Finally, the "Take Charge Corvallis" project that is being implemented as part of the City of Corvallis' climate action goal, also is a strong indicator the Corvallis is making steady and substantial progress toward GHG emissions reductions.

Therefore, it is safe to assume that the community has made steady progress in reducing GHG emissions, and that on a per capita basis, Corvallis is more similar to the "deep carbon" reducing cities like Portland, and less similar to cities and states across the country that have not made increased resource efficiency and decreased fossil fuel consumption a priority. However, no specific targets have ever been established and the results of the community's efforts have not been measured over time. Based on the assumptions made in setting the national and statewide GHG emissions reductions, it is important to recognize that achieving targets of 75% or 80% GHG emissions reductions (from 1990 levels), as contemplated in Oregon and across the country, will require new state and federal programs and policies to be successfully implemented. In other words, Corvallis cannot achieve this level of GHG emission reductions without an enabling state and federal policy context. For example, the U.S. target assumes dramatic reductions will be achieved through the wide-spread reduction in GHGs generated by coal plants. The regulations that will drive this change are currently tied up in the courts. In Oregon, the Global Warming Commission has recognized that new state and federal policies would need to be adopted, as well as a carbon pricing strategy, in order to realize the energy efficiency gains and fuel source transitions needed to meet the state target.

CORVALLIS CLIMATE ACTION TASK FORCE (CATF) ACTIONS:

On February 2, 2016, the CATF heard presentations on this topic from Jessica Shipley, staff to the Oregon Global Warming Commission, and Matt McRae, Project Manager for the City of Eugene Climate and Energy Action Plan. After reviewing this material and considering the presentations, the CATF decided by consensus to recommend a preliminary target and interim targets for Corvallis that align the community's targets with the State of Oregon's.

On September 27, 2016, the CATF reviewed public comments received throughout the public outreach process and revisited the preliminary GHG emissions reduction target. The CATF reaffirmed its conclusion that aligning with the State of Oregon target is prudent and did not revise the target for the Corvallis CAP.

CORVALLIS CLIMATE ACTION PLAN

APPENDIX 2

Climate Action Plan Elements, Plan Development Process and Evaluation Criteria

ISSUE:

The Corvallis City Council and the Climate Action Task Force (CATF) established goals and project guidance for development of the Climate Action Plan (CAP). It also is important to establish a common understanding of the CAP elements, terminology and process for development of the CAP consistent with the CATF-established goals. This paper details the elements that make up the CAP, defines terms for the purposes of their use in the Corvallis CAP, and describes the criteria established by the CATF to evaluate and prioritize the CAP actions identified and refined throughout the planning effort.

SCOPE:

The City Council and the CATF established the scope of the CAP at the outset of the process. The CAP incorporates both municipal operations component for the City of Corvallis and a broader community component. Both components of the CAP address actions intended to reduce future and past greenhouse gas (GHG) emissions. This mitigation will help the City and the community prepare for and adapt to impacts of climate change that are now underway and that will accelerate in the coming decades. The components of the CAP are described below.

CAP Community Component:

The community plan component of the CAP addresses the collective inventory of GHG emissions generated throughout the city limits and areas of its jurisdiction or service provision. The "City of Corvallis 2012 Community Greenhouse Gas Inventory Report," completed in 2012, serves as the baseline of GHG emissions information against which future actions will be developed to meet the CATF's GHG emissions reduction target. Because GHGs are generated and can be mitigated across all sectors of the community, the City cannot solely develop or implement a community CAP without the partnership and participation of the broader community. The City will play a significant role in implementing the community elements of the plan through its programs and services. However, other government and non-government agencies, businesses, non-profit organizations and citizens also will have roles to play in implementing a CAP that will succeed in reducing community-wide GHG emissions. In fact, many of the strategies and actions are outside the scope of City services and will necessarily be led by willing community partners. Therefore, development of the community plan has included broad solicited involvement from external stakeholders.

The City solicited participation from a broad spectrum of public institutions and agencies, businesses, industries, non-profit organizations, utilities, and experts to serve as representatives of potential external partners who could join in identifying, prioritizing and implementing strategies and actions associated with the climate action goals. The community CAP will serve as a road map that can assist in future planning, interagency cooperative efforts, and as a basis to develop public-private partnerships in the interest of achieving meaningful GHG emissions reductions. However, it should be noted that a CAP that is adopted only by the City of Corvallis will not be a mandate or binding on any other community entity.

CAP Municipal Operations Component:

The municipal operations plan component of the CAP addresses internal municipal functions only. The "Greenhouse Gas Inventory for Municipal Government Operations," completed in 2009 for 2008 and updated for the year 2013, serves as the baseline of GHG emissions information against which future actions will be developed to meet the CATF's GHG emissions reduction target. Strategies and actions included in the municipal operations plan also will support the community plan by reducing fossil fuel consumption and GHG emissions, and by achieving co-benefits to the community, like improving safety, conserving community water supplies, and even potentially reducing some of the long-term and life-cycle costs of services to the community. The municipal operations plan also may support the community plan by providing examples of high priority strategies and actions that can be implemented in other similar organizations in the community to reduce GHG emissions.

CAP BUILDING BLOCKS—UNDERSTANDING THE CAP COMPONENTS AND TERMINOLOGY:

Across the spectrum of climate action plans that have been developed across the state and the nation, there is no standardized use of terms, formats or content. Therefore, it is important that a common definition or description of terms be developed for the Corvallis CAP to enhance clear communication and achieve common understandings. The Corvallis CAP includes the following terms and elements, with the understanding that other communities may define the framework for their plans differently.

- Goals
- Targets
- Strategies
- Actions
- Implementation Measures

Goals:

Development of the Community and Municipal Operations CAP is guided by a set of goals established by the CATF. They are an expression of desired outcomes for the plan and apply to all of the CAP elements. Goals provide the highest level overarching direction to set what the CAP is intended to achieve. All CAP targets, strategies, actions and implementation measures should ultimately be consistent with the goals. The goals are described in the Overview section of the CAP.

Targets:

Targets are specific performance outcomes that relate to defined timeframes or specific dates and specific actions or strategies. Strategies and actions are developed to enable achievement of established targets. For example, the CATF has recommended greenhouse gas reduction targets to aim for in developing and implementing the CAP. The CATF set the Community GHG reduction targets to mirror the targets established by the State of Oregon, as follows:

- Reduce GHG emissions by 10% below 1990 levels by 2020;
- Reduce GHG emissions by 44% below 1990 levels by 2035; and
- Reduce GHG emissions by 75% below 1990 levels by 2050.

The background on how these targets were established is found in Appendix 3.

Strategies:

Strategies are focused areas or categories of actions and may define or direct modes of accomplishing specific actions. For example, a strategy might be "residential energy efficiency" and could be implemented through a partnership with a utility that could result in many actions from weatherization, to re-lamping to ductless heat pump installations. Strategies provide helpful organizing principles under which numerous actions and implementation measures may fit. It should be noted that many CAPs use the terms "objectives" and "strategies" almost interchangeably. For the purpose of clarity, the Corvallis CAP will only use the term strategies.

Actions:

Actions are specific statements of "what" needs to be done in a given strategy. For the purposes of the CAP, actions are identified that can mitigate climate change by reducing GHG emissions, and that support the community in adapting to local physical impacts of climate change that are occurring already and will accelerate regardless of mitigation actions taken from this point forward. Actions also may promote or create "co-benefits" for the community in addition to achieving varying degrees of GHG mitigation or preparedness. Co-benefits include things like improvements to general environmental or ecosystem health, water and air quality, community health and wellbeing, and social equity.

Implementation Measures:

Implementation measures are tasks which describe "how" the actions will be accomplished. Actions can have multiple implementation measures that will each have varying degrees of effectiveness, and are prioritized accordingly.

Climate Mitigation Actions vs. Adaptation, Preparedness and Resiliency Actions:

Both climate mitigation and climate adaptation actions and implementation measures (including actions that address community preparedness and resiliency) address climate change. The difference is that mitigation actions aim to reduce or prevent the generation of greenhouse gas emissions within the community or that are related to activities that occur within the community (like the manufacture and transport of goods and services that the community consumes). In contrast, adaptation actions prepare a community for the unavoidable chronic, accumulated or acute impacts of climate change, such as extreme weather events and sea level rise. Climate mitigation and adaptation actions are not always mutually exclusive and can have benefits in both areas.

Figure 1. below illustrates some examples of actions that relate to mitigation, adaptation or both.[22] Please note that this is for illustrative purposes only—not all of the actions identified have applicability to Corvallis.

[22] Climate Smart Communities Climate Action Planning Guide; prepared by VHB Engineering, Surveying and Landscape Architecture, P.C. for the State of New York: New York Skate Energy Research and Development Authority (NYSERDA), Department of State, Department of Environmental Conservation, Department of Health, Department of Transportation, and the Public Service Commission; March, 2014, p. 5.

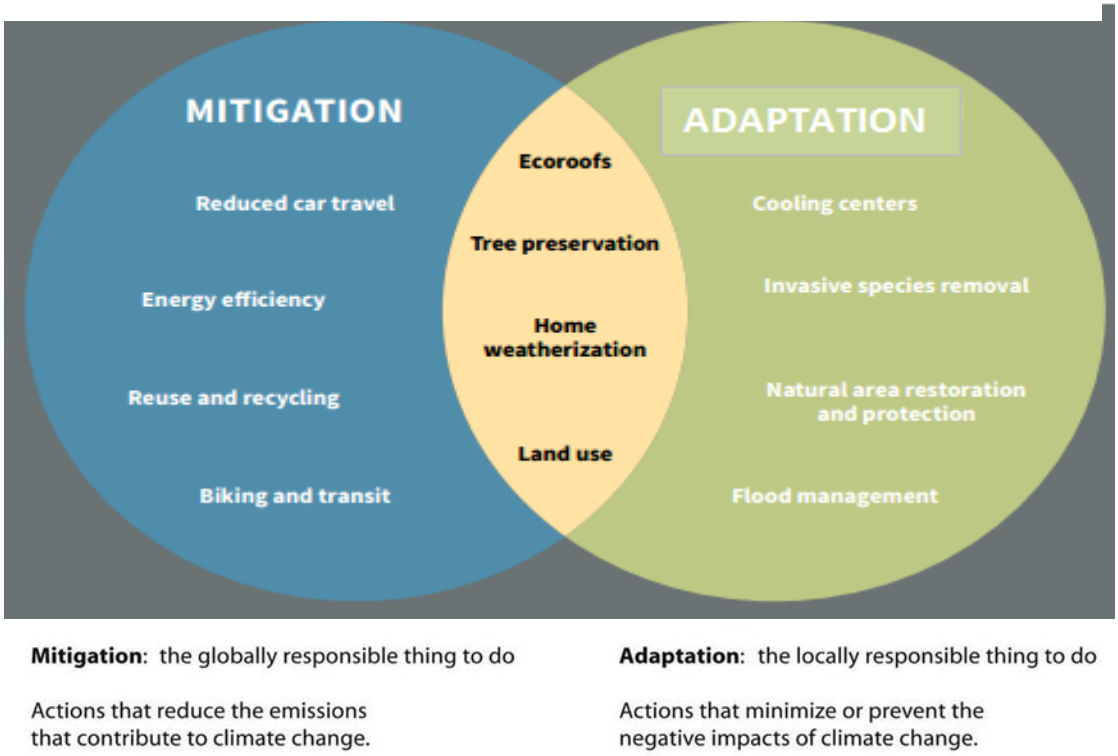


Figure 1. Climate Mitigation vs. Climate Adaptation

Source: Natural Resources Canada's Climate Change Adaptation Initiatives and City of Portland Climate Action Plan 2015.

PRIORITIZING THE ACTIONS AND IMPLEMENTATION MEASURES:

The process of prioritizing potential actions and implementation measures is a multi-step process. In order to initially prioritize actions, the cost effectiveness of GHG mitigation potential was roughly assessed for each action. This exercise provided an initial lens to determine which actions have the greatest potential to reduce GHGs. The next step is to evaluate actions and implementation measures on their merit beyond GHG mitigation potential and score their capacity to contribute co-benefits and other important considerations (e.g., duration of benefit, life-cycle value). That step requires the development of evaluation criteria.

GHG Mitigation Potential:

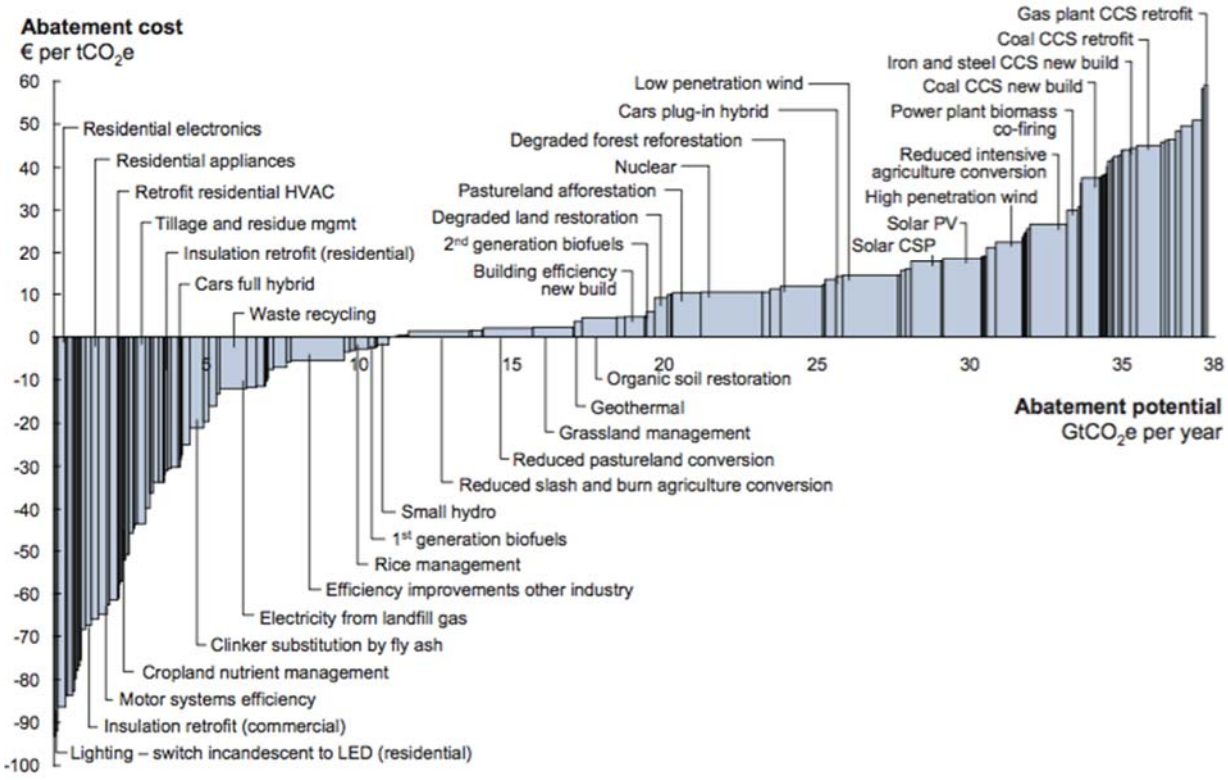
Marginal greenhouse gas abatement cost curves (MACCs) were used to provide the initial lens for the cost effectiveness of GHG mitigation actions for Corvallis. McKinsey & Company first published a MACC in 2007 comparing mitigation options for the global economy. The McKinsey curve and subsequent MACCs are helpful because they graphically convey both the cost of mitigation and the total mitigation potential of an action or block of actions. Ultimately, MACCs can signal the mitigation options that can make the most significant reduction in emissions while being cost effective. Given the context and types of actions Corvallis is assessing, the following MACCs were evaluated:

- Oregon Greenhouse Gas Marginal Abatement Cost Curve (Oregon Department of Energy)

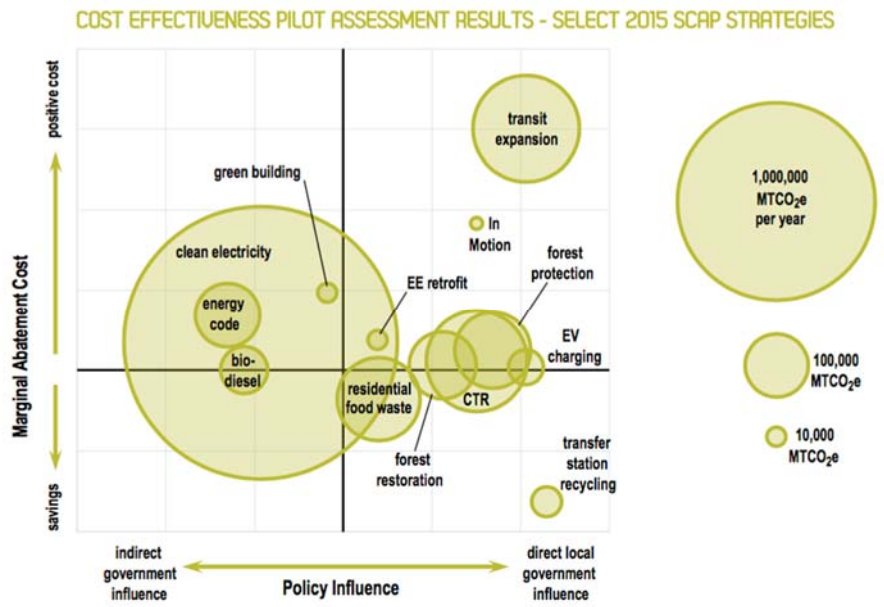
- Pathways to a Low-Carbon Economy (McKinsey & Company)
- King County Strategic Climate Action Plan
- University of Washington Climate Action Plan

How they work:

MACCs are organized graphically on a X-Y axis. Action bars are shown left to right with the least expensive options on the left and the most expensive options for reducing GHGs on the right. The width of the bar shows the potential emissions reductions possible by employing that action. The horizontal axis shares the potential number of metric tons that could be achieved in a future year (e.g., 2022, 2035) and the vertical axis shows the cost of mitigation (in terms of cost per ton). Actions on the left side of the graph below the horizontal axis (negative cost in value) are cost saving measures that not only reduce GHG emissions but also reduce operational costs.



Source: http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/pathways-to-a-low-carbon-economy



Source: King County Climate Action Plan, 2015
http://your.kingcounty.gov/dnrp/climate/documents/2015_King_County_SCAP-Full_Plan.pdf

One of the main limitations of abatement curves is that they are susceptible to dynamic changes to models and assumptions. Cost estimates used in MACCs are imprecise, in part because they make a number of assumptions based on the assumed project context, which changes over time. For instance, solar PV prices have dropped significantly since 2009, while at the same time becoming more efficient. Additionally, abatement curves assume different levels of policy pathways and support from state and federal programs. Also, abatement curves often compare different timeframes (e.g., 2022 vs. 2035), mitigating a metric ton of carbon.

A MACC assessment is focused on GHG emissions and does not evaluate additional relevant factors and co-benefits outside of GHGs emissions reductions. The use of abatement curves is not meant to be a standalone analysis but rather to set the stage for evaluating actions by a comprehensive set of criteria. The following section describes additional evaluation criteria used to assess potential climate actions.

Evaluation Criteria:

The evaluation criteria are tools that provide a framework to assess potential climate mitigation actions for their ability to achieve or implement the overarching goals, targets, and strategies of the CAP. A set of preliminary criteria were developed by staff and the consultants based on review of the CAP goals and a growing base of climate action planning standard guidance and practices. The CATF reviewed and modified (added to) the criteria at their March 29, 2016 meeting. The resulting criteria are described below. In addition to the GHG mitigation potential ranking conducted as a "pre-sort," additional evaluation criteria fall into four major categories, including: effectiveness and feasibility, financial, co-benefits—people, and co-benefits—local ecosystems. The evaluation criteria that capture community co-benefits address the larger issues of community "livability" and "sustainability." The rating scheme applied uses "1," "2," and "3" ratings with "1" being best. The ratings help characterize, compare and prioritize the actions. The evaluation criteria and scoring metrics are provided below.

Effectiveness Criteria:

Duration of Benefits. – *How long will this action provide its benefit before stopping?*

(Could be mitigation or adaptation benefits, but may not apply to all adaptation actions):

"1" = Long term--Benefits last greater than 50 years
"2" = Mid-term--Benefits last 21-50 years
"3" = Short term—Benefits last 0-20 years

Implementation Time -- *How long will the action take to implement before it provides benefit?*

(Most important for mitigation actions because mitigation that occurs now has a much greater benefit related to achieving the target than mitigation that won't result for several years. There is more time flexibility in implementing adaptation measures because impacts of climate change are happening over a span of decades):

"1" = Action can be accomplished within next 5 years
"2" = Action will take 5 to 20 years to accomplish
"3" = Action will take longer than 20 years to accomplish

Mitigates and Adapts in One Action – *The Action provides for a decrease in greenhouse gas emissions and provides for resilience to a changing physical climate.*

"1" = Does both well
"2" = Does one better than the other
"3" = Does only one

Leverages Existing Efforts – *This action can share resources or be included into an existing program of set of activities. Reduces or eliminates upfront or ongoing costs.*

"1" = Already planned or underway; can easily be added to existing effort; or can easily be accommodated within current funding levels
"2" = Existing plans (e.g. CIP) support and can accommodate action
"3" = Needs new approval, funding, and possibly enabling policy

Political Support – *Will this action and the resources required have elected or administrative support to implement it?*

"1" = Aligns with existing policies
"2" = Likely to be supported
"3" = Unlikely to be supported in next 5 years

Community Participation/Acceptance – *Will the action have support, in the form of participation or acceptance, from the community?*

"1" = High participation – greater than 50%
"2" = Moderate participation – 25% to 50%
"3" = Low participation – less than 25%

Financial Criteria:

(Keep in mind that the actions are also ordered by cost per volume of GHGs mitigated as an effectiveness/cost-effectiveness ranking that is calculated in the "pre-sorting" process described above.)

Life Cycle Value – *What is the **total** cost/benefit of ownership or implementation? Includes upfront costs, operation and maintenance costs, decommissioning costs and any revenues or income made.*

"1" = Small upfront investment extends asset and operating costs are less expensive than existing
"2" = Higher upfront capital cost, but lower life cycle cost of ownership
"3" = Higher total life cycle cost

Revenue Generation or Cost Avoidance – *Will this action reduce existing costs or add new revenues?*

"1" = New revenue or cost reductions
"2" = Revenue neutral/break-even over time
"3" = Increased costs over time

Infrastructure – *What changes are necessary to community infrastructure (roads, water/wastewater treatment plants, supply and waste piping etc.) due to this action?*

"1" = Zero or minor changes required
"2" = Major modifications required
"3" = Total replacement required

Co-benefits—People:

Health and Safety – *Will the action promote ongoing health and/or provide for protection from acute hazards?*

"1" = Promotes health and wellbeing or prevents disease or protects during acute events within Corvallis.
"2" = Promotes health and wellbeing or prevents disease or protects during acute events outside of Corvallis (indirect benefit)
"3" = No or unknown health and safety benefits

Air Quality – *Will the action also reduce local air toxics that can harm human health?* (Please note that this is grouped with "people" because of the significant impact air quality can have on human health)

"1" = Expected improvement
"2" = No change
"3" = Gets worse

Jobs – *Will the action directly or indirectly create jobs? Note that temporary jobs and "permanent" jobs should be considered differently.*

"1" = New jobs expected locally as a result of the action
"2" = The action may cause new jobs to replace other jobs lost locally, or add jobs to the broader economy (indirect job benefit)
"3" = Unknown impact or lost jobs predicted

Distribution of Benefits (Opportunities for Social Equity) – Will the actions provide benefits to everyone in the community?

"1" = Improves equitable access to mitigation and adaptation opportunities throughout the community
"2" = Equal across neighborhoods/community sectors
"3" = Serves selected members of the community but not all

Scope of Community *Adaptation* Benefits – *How broadly will the adaptation benefits extend?*

"1" = City/County
"2" = State
"3" = Nation

Co-benefits—Local Ecosystem:

Water Quality, Supply – *Does the action directly enhance or protect our drinking water supply or potential other sources?*

"1" = Expected improvement
"2" = No change
"3" = Gets worse

Natural System Function (sequestration, soil health, bank stability, flood control, water filtration, habit function, urban heat management) – *Will the action provide benefit for local ecosystems, whether it has a direct connection to human wellbeing or not?*

"1" = Restores or enhances degraded conditions
"2" = Supports or protects existing conditions/functions
"3" = Degrades conditions

CAP Categories:

The categories described below are focus areas for mitigation and adaptation strategies, actions, and implementation measures. The categories defined in the Corvallis CAP mirror or closely follow the categories established in many (perhaps the majority) of plans that have been developed throughout the country. While each category is a relatively distinct segment of focus, there is necessarily some overlap between and amongst them. This is a result of the interconnectedness of community impacts and benefits and should be expected to simplify the designation of responsibilities and resources to implement them. The following descriptions and discussion points under each category are intended to generally illustrate the category, why it is important, the scope and types of strategies that are generally included for mitigation and adaptation purposes and some implementation considerations that should be factored into implementation plans for climate action. The descriptions are not intended to be exclusive, but rather to provide an understanding of the categories.

Buildings and Energy:

What is it? This category addresses energy used in residential, commercial and industrial buildings in Corvallis. Buildings use energy to make them and to operate them. While the environmental (including GHG emissions) impacts of construction are noticeable, the day to day energy use of a building after construction adds up to a much greater impact over a building's life, and can be overlooked as a source of long-term emissions and, therefore, an opportunity for mitigation. Building energy sources include the

variety of sources used to generate electricity, as well as those sources that are deployed onsite for mechanical, heat and cooling purposes. These include methane, propane and sometimes liquid fuels and onsite renewables. Generally, commercial and residential building systems use energy for lighting, appliances, computers, mechanical systems for heating, ventilating and air conditioning, and other lifestyle-related choices. For industrial buildings, energy sources may be different, especially for heat, steam and other mechanical energy. Some of the other energy sources considered are wood waste and other energy dense waste products.

Why does it matter? The emissions from buildings represent approximately 39 percent of the US CO_2e emitted. (i.e., 21% in residential, 18% in commercial). Residential buildings endure longer than other energy consuming systems (according to the Center for Climate and Energy Solutions), so retrofitting and planning for lower energy consumption, while keeping people comfortable in changing conditions can make a significant impact on building-related GHGs. According to the U.S. Environmental Protection Agency, in developed nations, people spend up to 90% of their lives in buildings, so incorporating passive systems such as insulation into buildings is essential to provide comfort and greater energy efficiency in both colder and hotter conditions. There are also co-benefits that can result from increasing energy efficiency and reducing fossil fuel use, such as reduced energy bills (from home weatherization), and decreased environmental and health impacts from off-setting fossil fuel use with renewable resources and conservation.

What is the scope of actions for this element/category? New and old buildings, energy sources/generation, retrofits and devices for adaptation and efficiency, and on-site energy generation and storage.

What types of strategies mitigate GHG emissions or support adaptation in this element/category?

- Strategies that promote better weatherized outer shells and those that promote energy savings in the residential, commercial, and industrial sectors represent some of the most cost-effective options.[23] (Both mitigation and adaptation)
- Strategies that promote conversion of fossil fuel-derived energy sources to renewable energy sources. (Mitigation mostly)
- Strategies that engage state and federal policies and programs to impact efficiency standards, fuel sources and prices paid for fossil fuels. (Both mitigation and adaptation)
- Sources of energy that are local and do not depend on fossil fuel systems or interstate infrastructure to deliver power to the area. (Adaptation)
- Water efficiency inside the building that may reduce the need for scarcer water over time. (Adaptation)

Implementation and effectiveness considerations.

- In considering and prioritizing GHG reduction strategies, even in cases where electricity is relatively inexpensive and has relatively low GHG emissions, reducing consumption and/or redirecting the newly created margin of low carbon power toward carbon intensive uses, such as transportation or heating, helps manage a community's overall carbon (or GHG) footprint. Overlooking efficiency improvements reduces the pace of mitigation and families' ability to stay comfortable in chronic or acute cold or hot temperatures.
- Efforts should be made to strike a balance between investment in transitional technologies such as more efficient uses of natural gas and technologies that may need to develop further or reduce in cost before mass deployment such as onsite energy storage. Where funding can be identified,

[23] Oregon Global Warming Commission 2015 Biennial Report to the Legislature, p. 39.

investing in long-term solutions can avoid two transitions costs and bring greater GHG reduction gains.

Land Use and Transportation:

What is it? This category considers the use of land and its proximity to other uses, which sets the demand for transportation and the vehicles (or not) that move goods and people. This is true for residential, commercial, industrial, and institutional sectors. Whether it is industrial uses moving materials and supplies in and goods out, running errands, commuting to work, or accessing services and recreational opportunities, how the community develops will determine the transportation infrastructure needed to serve the land uses. For example, increased urban density and mixed uses can result in reduced reliance on automobiles for local services.

The transportation infrastructure can enable or prevent certain travel modes and vehicle types from functioning. The modes range from active transportation such as walking and biking to mass transit such as buses to personal vehicles to freight and utility vehicles. Behind each of these modes are varying sources of energy with their own GHG footprints and range from food, to liquid fuels to electricity. This category addresses the relationships between land use patterns and transportation requirements, and seeks to identify actions that can reduce community GHGs by reducing fuel consumed, and therefore, GHGs emitted through the transportation system.

Why does it matter? Transportation fuels are the source of 26% of US emissions. Vehicles and energy sources are changing rapidly and provide the community with genuine options for GHG reduction and climate change adaptation. Fleet fuel economy improvements, switching to alternative fuels and electric vehicles, and transitioning to a built environment and modes of travel that reduce reliance (and vehicle miles traveled) on single occupancy vehicles, can significantly reduce the community's long-term GHG emissions, air pollution, and result in other co-benefits to the community. For example, a 2012 report by the Union of Concerned Scientists showed the pollution equivalency to miles per gallon of electric vehicles (EVs) based upon regional electric grid mixes. Given that Renewable Energy Portfolio standards continue to rise, the MPG equivalency of EVs will rise over time.[24]

What is the scope of actions for this category? Land use policies; transportation systems and infrastructure; accessibility, efficiency and safety of bike and pedestrian infrastructure. Travel modes and vehicles, and fueling/energy infrastructure, delivery and production for use in Corvallis vehicles.

What types of strategies mitigate GHG emissions or support adaptation in this element/category?

- Strategies that encourage and support conversion of fleets to more efficient and/or renewably powered vehicles. (Mitigation mostly)
- Strategies that promote reduced vehicle miles traveled. (Mitigation and adaptation if energy sources disrupt or may be limited)
- Strategies that transition neighborhoods to mixed-use neighborhoods with goods, services and employment centers within walking/biking distance. (Both)

Implementation and effectiveness considerations.

- Changes in land use policies and zoning can have a substantial long-term impact. However, the resulting changes in the built environment and supporting infrastructure that in turn can result in GHG

[24] State of Charge—Electric Vehicles Global Warming Emissions and Fuel Cost Savings across the United States; Anair, Don and Mahmassani, Amine; June, 2012

emissions reductions and increased resiliency to climate change impacts can take a very long time. Transportation infrastructure often needs modification, and increased mass transit service needs urban density and increased ridership to achieve GHG emissions reductions. Given that mitigations are needed more now given the pace of climate change than tomorrow, these should be considered for timing of benefit.

- Promotion/increases of active travel modes (i.e. biking and walking) can generate health and livability co-benefits as well as adaptation resiliency benefits. Considerations of safety must be paramount to encourage large scale movement of people in corridors with other modes.
- Alternative liquid fuels have limits to scaling based on availability and desirability of feedstocks. However, local low-carbon sources of energy should be considered essential for both resiliency and mitigation and are solutions that are deployed right now.
- Electric vehicles are highest efficiency options, including embedded and lifecycle energy consumption, for commute vehicles and nearly all of the uses for a vehicle other than occasional long distance trips.

Consumption and Waste:

What is it? This category considers everything in the lifecycle of consumer goods from extraction of raw materials to manufacturing, packaging, distribution, product use and associated energy and resource demands and finally, disposal. Although "embodied" GHG emissions are in everything we buy due to the energy used to produce and transport them, they are mostly invisible and therefore are discounted (unless they are goods like appliances or other products that require energy to operate). That energy is produced somehow, generating some level of GHGs. Reusing, buying used, buying durable products, recycling and recovering energy from materials that cannot be re-used can significantly reduce the GHGs associated with product manufacturing. Diverting food and vegetative waste from the garbage/landfill, composting, anaerobic digestion and landfill gas capture and use can reduce GHG emissions by preventing the "fugitive emissions" associated with organic matter decay. Biomethane also can be used as a local source of lower carbon fuels for hauling fleets.

Why does it matter? The consumption of goods, foods, and services typically makes up about half of a community's GHG emissions. Most consumption emissions occur elsewhere and are often overlooked because of this. Wiser consumption, like purchasing locally or buying more durable goods, can reduce emissions by decreasing the travel required to get the product to you or by lessening the need for replacement goods in the future. Waste comprises a smaller portion of the community's GHG emissions (< 1%). Finding ways to convert "waste" into beneficial uses, like recovering methane from Coffin Butte Landfill, or composting home food and yard waste also can result in environmental and economic co-benefits for the community.

What is the scope of actions for this category? Individual and organizational purchasing patterns. Individual and organizational waste management and recycling systems. Purchasing locally produced goods and services.

What types of strategies mitigate GHG emissions or support adaptation in this element/category?

- Reduce/share goods; (Mitigation and adaptation)
- Repair and re-use working objects; (Mitigation and adaptation)
- Buy used, buy recycled content, durable and energy efficient; (Mitigation) and
- Recycle after useful life, compost, recover energy. (Mitigation and adaptation)

Implementation and effectiveness considerations.

- It is important to keep in mind that while robust recycling is an important consideration, modification of the how and what of consumption of goods on the front end makes the greatest impact on GHG emission reductions.

Urban Natural Resources:

What is it? This category addresses the natural systems that support the soil, air, water, plants, and animals in the city. Urban natural systems addressed in this CAP include: streams, their riparian areas and contributing watersheds; drinking water sources; natural and constructed drainage features that filter, retain, and clean stormwater; wetlands; wooded natural areas; vegetated open space areas; and the inventory of trees that create an "urban forest."

Why does it matter? The collective community maintenance and management of urban natural resources contributes to GHG emissions in only a very modest way, and can offset the release of GHGs in a modest way as well, through sequestration of carbon and cooling the environment. However, protecting, maintaining and enhancing natural resources within the urban environment can support the community's preparedness and resiliency to predicted impacts of climate change. Increased heat, drought, extreme weather events predicted to occur in the coming decades will challenge our infrastructure and services, and may threaten community health and the adequacy of local vegetation, habitat and water supplies that sustain local communities. Wetlands, healthy streams and drainageways, and open areas that provide groundwater recharge can help mitigate flashy peak stormwater/flood flows that might otherwise overwhelm constructed infrastructure, and can help maintain groundwater aquifers and water quality in the face of prolonged drought. In warmer conditions, urban forests provide local heat reduction and can provide relief in hot weather for high risk populations such as low income people and those with limited mobility - without access to air conditioned spaces. Vegetation provides soil retention and water filtration, which can help urban infrastructure functions, prevent landslides and bank failures, and protect wildlife habitat. All of these environmental and natural resource protection strategies provide general livability and sustainability co-benefits to the community.

What is the scope of actions for this category? Natural resources/systems within the Corvallis urban growth boundary, and neighborhoods throughout the city.

What types of strategies mitigate GHG emissions or support adaptation in this element/category?

- Strategies that achieve significant watershed and riparian restoration can provide water quantity and quality when there is more population pressure and challenged supplies or storage of water. (Adaptation)
- Deciduous trees near buildings can provide shade in warm months and sunlight access in cold months. (Mitigation and Adaptation)

Implementation and effectiveness considerations. Passive infrastructure systems that work with natural systems tend to cost less over time and are more adaptable to future conditions (e.g. natural stormwater management systems and pervious vegetative areas to support groundwater supplies). Vegetation management needs to consider existing conditions and predicted changes in climate conditions. The benefits of trees relate more to community resiliency and adaptation than mitigation because the length of time it takes and the amount of carbon sequestration achieved per dollar spent is not effective at the local level.

Food and Agriculture:

What is it? This category includes everything related to our food production, delivery and distribution. It can also relate to local food distribution networks that support low income people, people with restricted mobility, and that divert food from the waste stream. Farms of all types serve Corvallis directly, and are a driver in the Corvallis area's economy because of agricultural exports.

Why does it matter? Farms are a source of income and food for much of the Corvallis community. Changing physical conditions due to climate change may require new crops and/or new cropping regimes and agricultural practices due to weather, pests, weeds, and water availability. Local food production also may change due to changing availability or cost of food transported into the community from elsewhere. A general shift in food consumption toward an increasingly plant based diet can reduce GHG emissions generated by the meat and dairy sectors, which are significantly more GHG producing that plant-based agriculture. Agriculture may provide a carbon sequestration opportunity and agricultural practices are evolving to include methods that are less fuel and carbon-based chemical intensive. In a resource constrained world, local agriculture could focus on feeding the local community as a first priority. Severe climate events could impact the local food supply, which may impact disadvantaged community members disproportionately. In a more optimistic scenario, Corvallis' agriculture segment of the economy can continue to prosper and create incomes. There are also co-benefits that can result from strategies such as community gardens that can support community livability and provide increased food security to some community members, and from local agricultural practices that generally improve the environment.

What is the scope of actions for this category? Corvallis metropolitan area and surrounding agricultural lands. Farms and food providers to the local community. Local non-profit service providers/food pantries, etc.

What types of strategies mitigate GHG emissions or support adaptation in this element/category?

- Capturing methane from animal waste (Mitigation)
- Reduction in the use of high carbon intensity nitrogen manufactured in other communities (Mitigation)
- Carbon sequestration and soil building through no-till practices (Mitigation and adaptation)
- Selecting crop types or new crops that can grow in the future conditions without the need for additional resources, such as irrigation from surface or ground water (Adaptation and Mitigation)

Implementation and effectiveness considerations.

The level of effort and resources required vs. the benefits gained for GHG emissions mitigation and climate change adaptation should be carefully considered. There is clearly resiliency, cultural and community development benefits from investing effort in a robust local food production and supply system, however, it should be recognized that these efforts cannot be expected to produce significant GHG mitigations in the near-term.

Health, Social Services and Community Wellbeing:

What is it? This category addresses community health, care and assistance programs, emergency services, and preparedness (or risk management) for potential/predicted negative community impacts of climate change. Changing conditions (such as increases in temperature, extreme weather, and fires), regulations and energy sources will create new and sometimes unanticipated changes that will affect people in many ways. The need to mitigate emissions creates opportunities to create health through active modes. The

ability to adapt requires monitoring of the range of disease and carriers of disease, such as the West Nile Virus carried by mosquitoes farther north.

Why does it matter? Changing conditions such as increased energy costs, will disproportionately affect the lower income populations. Migration of people, flora and fauna may introduce new challenges such as fauna-carried diseases, and loss of existing native habitats that maintain natural system functions. More extreme weather events may threaten lives, such as elderly or health-compromised people in prolonged heat waves. Prolonged and extreme rains, or rapid snow melt can cause flooding and landslides, and heat waves and droughts may bring wildfires that threaten neighborhoods at the urban-wildland interface. There are also co-benefits that can result from strategies that promote increased community awareness and preparedness for things like hazards, disasters, and disease vectors, and the availability of services in the community to provide support.

What is the scope of actions for this category? Mostly, this category address adaptation and resilience action. Consideration of emergency management measures and actions that ensure the availability of social service life lines and access to medical services are part of expected adaptation needs. However, if the community transitions to eating a more local and plant-based diet, and toward increased walking and biking as modes of transportation, the results can include long-term GHG emissions reduction and a healthier and resilient group of people.

What types of strategies mitigate GHG emissions or support adaptation in this element/category?

- Encouragement of active transportation and eating more plants. (Mitigation and adaptation)
- Establishment of Emergency response protocols to deal with landslides, wildfire and or flooding. (Adaptation)
- Surveys of data and assets to determine where the physical hazards or disease patterns that may emerge under the future conditions. Planning accordingly. (Adaptation)

Implementation and effectiveness considerations.

- In developing emergency plans and social services that will support adaptation to predicted climate change impacts, it will be important to consider all neighborhoods and communities within the city and their levels of service.
- Although scientific studies show that the type of food we consume impacts on GHG emissions (i.e. animal-based food (meat and dairy) is a much higher intensity producer of GHGs than plant-based agriculture), the public's willingness to fundamentally shift their dietary patterns as a means to address the local GHG emissions reduction target is at best a significant uncertainty. Investing efforts and resources in persuading people to change their diets would, at best, produce long-term rather than short-term GHG mitigation benefits.

<u>CAP DEVELOPMENT AND PUBLIC OUTREACH PROCESS:</u>

The City Council and the CATF established a time frame for development of the CAP that requires completion (i.e. adoption by the City Council) by December 31, 2016. They also established a scope and process that includes significant involvement from City staff, local community partners, interested stakeholders, and the general public. The process to develop the plan within the time frame was necessarily focused and time constrained. Tools were developed by staff and the project consultant to support efficient and effective identification, evaluation and prioritization of actions and implementation measures.
Six "Task Teams" were created to work on each of the six categories of the CAP (see "CAP Categories" above). The Task Teams were composed of City staff throughout the organization, as well as

representatives from major public institutions, non-profit service organizations, businesses and industries that are either service providers in the community, may be impacted significantly by climate change and mitigation efforts, or who have the potential to help in the community's efforts to reduce greenhouse gas emissions in significant ways. The City staff and external partners on the Task Teams were either topic experts or have access to multiple topic experts in their organizations to support development of the plan.

The Task Teams were provided with background documents to help in understanding the science and the goals for the CAP, as well as tools to help them identify potential climate change mitigation or adaptation actions and to evaluate them based the evaluation criteria described above. The Task Teams were provided with an inventory of many typical climate change mitigation and adaptation actions that are being implemented by local communities throughout the nation. The actions were "pre-sorted" based on their GHG mitigation potential as described above.

Staff and the project consultant collected, assembled and ordered the Task Team-recommended actions by the effectiveness and cost-effectiveness metrics. Each Task Team met in a half-day workshop with the project staff and consultant to discuss, clarify and prioritize their recommended high priority actions. The results were combined, and actions were refined. The resulting strategies and actions were then sent to a group of external "Reviewers" who were asked to review, collect suggestions/ideas from interest groups they are part of, and provide that input to the City. Staff and the project consultant compiled all of the feedback, and refined and reprioritized the actions using each stage of input. The potential actions that rose to the top of the list in each of the categories were then evaluated in detail by the consultant for their GHG reduction potential relative to the municipal and community emissions inventories, and the cost per metric tonne of CO_2. The consultant also applied the evaluation criteria to the highest priority actions using best professional judgment and considering input gained from the Task Teams.

In August and September, the broader CATF convened three public outreach sessions. At these sessions the Corvallis community was invited to learn and comment on the potential climate change mitigation and adaptation strategies as well as the goals, GHG reduction target, and evaluation criteria. All input received at these sessions and online was forwarded to the CATF for their initial consideration. The CATF final review and guidance for preparing a draft CAP for City Council consideration occurred on October 25, 2016.

CORVALLIS CLIMATE ACTION PLAN

APPENDIX 3

The Community Context for Developing the Corvallis Climate Action Plan: Existing Conditions, Strategies, Policies, Plans, and Practices

ISSUE:

This paper describes the context for the development of a Climate Action Plan (CAP) in Corvallis. It includes summaries of existing greenhouse gas (GHG) inventories for the City's municipal operations and for the community. It also includes background information on local efforts and strategies to quantify or reduce greenhouse gas emissions or address and mitigate the impacts of rising greenhouse gas emissions. These efforts and strategies include both previous and existing policies, plans, practices, and programs that affect the community's greenhouse gas emissions or mitigate its impacts by the municipal and county governments, local non-profits, local businesses, and state, regional, and national organizations and government entities.

This document is not all-inclusive, but is representative of a significant amount of input that was provided by stakeholders throughout the development of the CAP. It provides a look at higher-profile, community-wide efforts conducted mainly by the City of Corvallis, Benton County, the Corvallis Environmental Center, and the Corvallis Sustainability Coalition through government-funded or government-supported programs.

CITY OF CORVALLIS:

The City of Corvallis has been engaged in climate change issues since at least the year 2000, when the City committed to the Cities for Climate Protection Campaign. By 2005, the City had signed on to the Mayors Climate Protection Agreement and the City Council passed a resolution committing to purchasing renewable energy for the organization and encouraging community members to do the same. In 2008, the Corvallis Energy Challenge, Oregon's first community energy project, was underway with leadership from the Corvallis Sustainability Coalition and Energy Trust of Oregon. Additionally, the City joined ICLEI – Local Governments for Sustainability, to advance its climate protection efforts. In 2009, the City completed its first organizational greenhouse gas inventories.

In 2010, the community was recognized for its use of renewable energy and awarded the U.S. Environmental Protection Agency's (EPA) first Green Power Community of the Year award, and was awarded an EPA Climate Showcase Communities grant. That three-year grant created several programs that are still working to reduce energy use in the community: Take Charge Corvallis and Classrooms Take Charge. Additionally, funding from the grant supported the Community Greenhouse Gas Inventory, conducted in 2013 by City staff. Also in 2010, the City Council's Energy Strategy Ad Hoc Committee (ESAHC) completed the Community Energy Strategy "in a context of increasing urgency and a strong sense that we need to begin acting now to increase our energy security and reduce our contribution to global climate change." The 10-year plan focuses on energy conservation and efficiency, renewable and/or low carbon energy sources, and local clean energy business. The ESAHC also compiled existing energy and sustainability policies, and conducted a gap assessment to determine where City could be doing more to achieve community energy goals.

GREENHOUSE GAS INVENTORIES:

Greenhouse gas inventories provide a starting point and periodic points of comparisons to track how communities and organizations are progressing in achieving GHG reductions in accordance with established targets.

The City of Corvallis conducted initial GHG emissions inventories for its own operations in 2009 for the years 2004 and 2008. The City recently completed an update using 2013 data. A GHG emissions inventory for the community was completed in 2013 using 2012 data. Methodologies and results are summarized below.

Municipal Operations Greenhouse Gas Inventories:

The 2004 and 2008 municipal operations inventories were conducted at the same time in order to establish an initial year (2004) and comparison year (2008). They both followed the Local Government Operations Protocol, which was developed as a collaboration of The Climate Registry (TCR), the California Air Resources Board (CARB), the California Climate Action Registry (CCAR, now the Climate Action Reserve), and ICLEI—Local Governments for Sustainability. Emissions data were then collated and calculated using ICLEI's Clean Air and Climate Protection (CACP) 2009 software program, which was obsolete by the time the 2013 inventory was started. The 2013 inventory used the same Local Government Operations Protocol, but a version updated in 2010.

The data sets available for 2004 and 2008 were different, so only a partial comparison is possible. During 2008, City of Corvallis emissions from fuel and power use by buildings and vehicles were 20,198 Metric Tonnes of Carbon Dioxide Equivalent (MT CO_2e). This represented a 2% increase over 2004 in Scope 1 emissions (i.e. direct emissions from owned or controlled sources) and Scope 2 emissions (i.e. indirect emissions from the generation of purchased energy). Scope 3 emissions (i.e. all other indirect emissions other than those from Scope 2, which include all lifecycle emissions from the supply chain of goods and services procured, for example) were not included in the 2004 data. Therefore, Scope 3 emissions for the organization can only be compared from 2008 to 2013.

In 2013, total GHG emissions rose to 21,289 MT CO_2e, a 5.4% increase over 2008 emissions. (This comparison includes Scope 3 emissions as well as Scopes 1 and 2). The reasons for the increased emissions are difficult to pinpoint due to differences in the methodologies used to estimate emissions, variations in emission sources included, and the now-obsolete software used in the 2004 and 2008 inventories made data access impossible. The chart below summarizes the emissions data for 2004, 2008 and 2013. While some areas of emissions, such as electricity and stationary combustion went down over this time period (as should be expected from the significant energy efficiency improvements, reductions in fossil fuel usage for electricity production, and the economic recession that occurred during this time period), some areas (such as wastewater and the supply chain) increased markedly for reasons we cannot attribute to actual changes in City operations. The breakdown of inventoried emissions for 2004, 2008 and 2013 are shown in Figure 1 below.

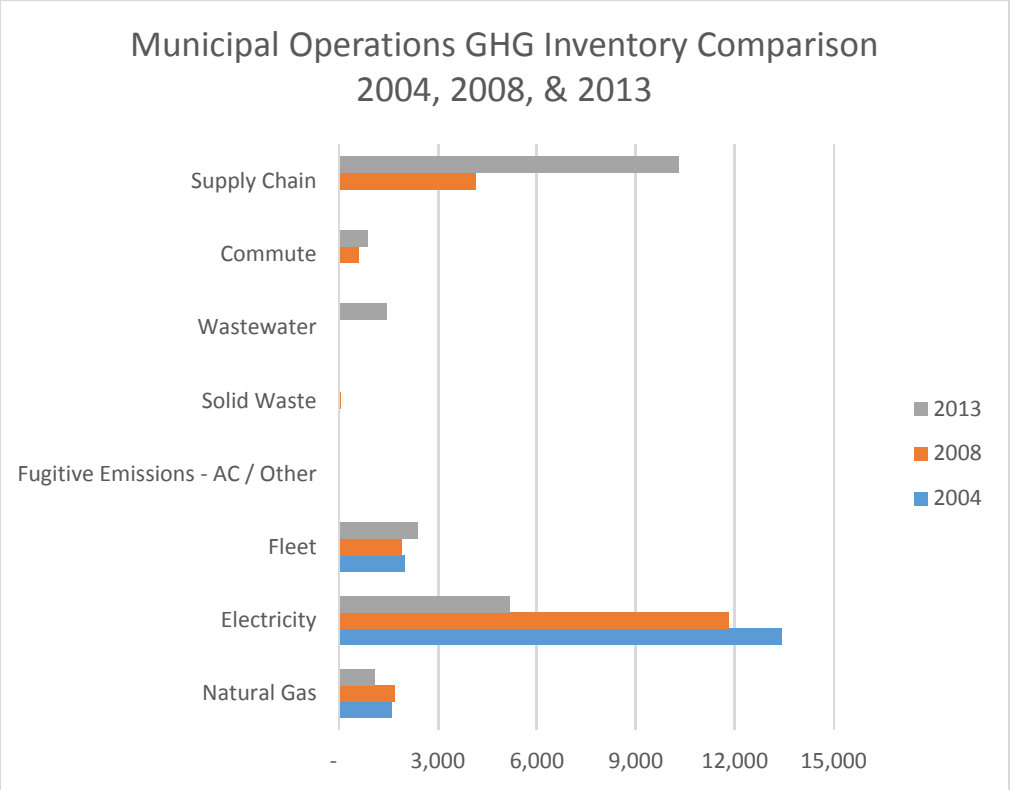


Figure 1. 2004, 2008 and 2013 Greenhouse Gas Emissions from City Operations.

Community Greenhouse Gas Inventory:

As noted above, the City of Corvallis conducted a Community Greenhouse Gas Inventory for Corvallis, Oregon for the 2012 calendar year. The city limits serve as the physical boundaries. The inventory was completed under the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, a methodology developed by ICLEI – Local Governments for Sustainability and released in October, 2012. Emissions sources included in the inventory cover the broad categories of stationary emissions, electricity, transportation, solid waste, and the emissions associated with household and government consumption of food, goods and services.

Total emissions in 2012 for the Corvallis community are estimated at 1,257,115 MT CO_2e. Figure 2 below summarizes the findings based on the five Basic Emissions Generating Activities plus Household and Government Consumption.

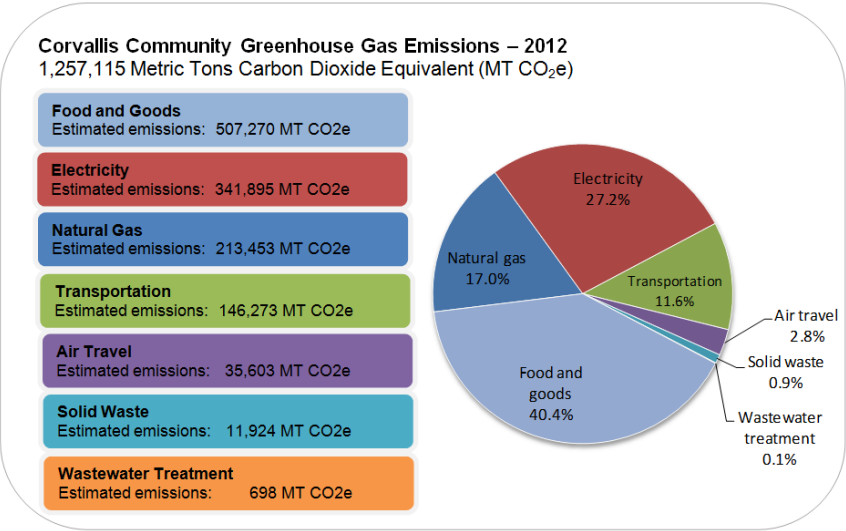


Figure 2. Corvallis Community Greenhouse Gas Emissions--2012

EXISTING PLANS AND POLICIES THAT SUPPORT CLIMATE ACTION:

City of Corvallis:

The City of Corvallis has several adopted long-range plans (or is currently updating existing plans) and/or policies that support actions that already have been implemented to reduce GHG emissions or that will be contemplated in developing the CAP to further mitigate climate change. These plans and policies serve as the existing context for near term actions. And, a review of existing plans and policies relative to newly identified climate change mitigation and adaptation actions will help reveal gaps in agency programs and policies. An implementation and tracking data base tool has been developed that includes relevant policies and plans, and that identifies policy gaps. Once priority actions are determined and added to the implementation tool, areas where additional policies or enabling ordinances are needed can be identified for future development.

Policies and Plans that are included in the implementation tool to date include:

- Corvallis Comprehensive Plan (1997)
- Energy Conservation Policy
- Organizational Sustainability Policy
- Transportation System Plan (2016)
- Stormwater Master Plan (2002)
- Community Energy Strategy

Plans that have been examined but do not have specific elements to include:

- Water Master Plan (1998)
- Wastewater Master Plan (1998)
- Corvallis 2020 Vision Statement (1998)
- Community Sustainability Policy

These policies and plans touch on both community and operational elements in each of the selected categories except Food and Agriculture.

Benton County:

Benton County's work touches on all categories with a broad web of policies, programs, plans, and practices that work to improve public health. For example, in collaboration with the Oregon Health Authority's Public Health Division, Benton County Health Department worked to develop the Climate and Health Adaptation Plan. Using the Centers for Disease Control's five-step Building Resilience Against Climate Effects (BRACE) framework allowed Benton County to provide an overview of local climate change and health projections, and for the development of possible interventions that would allow communities and identified vulnerable populations to adapt to predicted changes.

Benton County provides a broad array of services to the community, and as such they have a long list of policies, plans, and practices employed to address climate change mitigation and adaptation. A summary of those policies and practices will be identified in the public engagement process where many County employees will be included and asked to identify specific policies, plans, and practices and their link to action items in the CAP.

Corvallis Environmental Center:

The Corvallis Environmental Center (CEC) has been a long-time advocate, sponsor, and host for community energy efficiency programs and campaigns. From 2011-2014, CEC's efforts were integral to the programs funded by the Climate Showcase Community grant from the EPA. The resulting "Energize Corvallis" programs engaged one in ten Corvallis residents and reduced emissions by more than15,000 MT CO_2e. Take Charge Corvallis, Classrooms Take Charge, and Campuses Take Charge are extensions of those programs and have continued to reach more of the community.

Since 2015, the CEC has led the effort behind the Corvallis community competing for the $5 million Georgetown University Energy Prize, continuing to motivate the community to find innovative ways to save energy.

Corvallis Sustainability Coalition:

The Corvallis Sustainability Coalition (Coalition) has been vital in gaining momentum around sustainability issues since its inception in 2007. They have twelve Action Teams working in specific areas of sustainability:

- Community Inclusion
- Economic Vitality
- Education
- Energy
- Food
- Health & Human Services
- Housing
- Land Use
- Natural Areas
- Transportation
- Waste Prevention
- Water

These Action Teams rely on volunteers with interest or expertise in a particular area to advance the community towards the Coalition's goals for that area. Each Action Team is guided by goals documented in the *2013 Framework for Action*, developed through an inclusive, community-wide initiative involving a

broad cross-section of the community. For example, the Coalition has two goals related to water that the Water Action Team pursues. One of those goals seeks, by 2050, to reduce the quantity of water flowing through the Corvallis municipal water systems by 50% compared to 2008 levels. Specific strategies and actions identified in the *Framework for Action* guide the direction of those reduction efforts.

The efforts of the Coalition's Action Teams began in 2008 with the first iteration of the *Framework for Action*, called the *2008 Action Plan*. Insight into the types of programs and their effectiveness will come as the public engagement process proceeds, as many members of the Action Teams have been identified as possible Task Team members or Reviewers. Later that year, the Coalition, in partnership with the Energy Trust of Oregon, provided leadership for the Corvallis Energy Challenge, the first, community-wide, residential energy reduction program.

Climate Action Plan for Corvallis, Oregon 2015 (Developed by a citizen/community task force):

The Climate Action Plan, prepared by a citizen group called the Corvallis Climate Action Plan Task Force (which should not be confused with the City Council-appointed Climate Action Task Force that is overseeing preparation of the City of Corvallis Climate Action Plan), strives to offer direction and focus for the entire community to address climate change and its impacts. The report prepared by community volunteers puts forth a considerable list of existing programs and recommended potential partners and programs, which will be considered by the City in developing the Corvallis organizational and community CAP. The following excerpts from the community CAP include lists of existing and potential programs and partners, organized in the same categories that will be used in the Corvallis CAP.

<u>Buildings and Energy:</u>

Numerous organizations are working to increase energy efficiency and reduce greenhouse gas emissions in Corvallis. Corvallis residents and businesses can also take advantage of efficiency incentives from the City of Corvallis (low flow toilet rebates), the federal government and State of Oregon (tax credits), local utilities, and the Energy Trust of Oregon. Other efforts underway include:

- Corvallis Environmental Center programs: Communities Take Charge, Classrooms Take Charge, Clean Energy Works
- Direct installation of energy saving or renewable energy producing products by local businesses
- Community Services Consortium Home Weatherization Program
- Oregon State University is implementing its Climate Action Plan to reduce GHG emissions from university buildings and operations
- Solar installations: municipal (Blue Sky grants), household (tax credits, ETO incentives, third party financial plans), community (Seeds for the Sol – local investment opportunity)
- Green Street Loans from Umpqua Bank
- Trade Ally contractors working with the Energy Trust of Oregon
- Georgetown University Energy Prize competition 2015-2016

<u>Food and Agriculture:</u>

Many organizations and community groups are working to increase local food production and consumption, support organic gardening and farming, and develop regionally adapted seeds. For example, the Corvallis Sustainability Coalition's Food Action Team organizes an annual Local Eats Week and several edible front-yard garden tours. The Edible Corvallis Initiative also helps local schools source more locally grown fruit and vegetables for students. The City of Corvallis recently lowered the regulatory barriers to urban food production by reforming some of its zoning code. The list of existing efforts is too long to comprehensively describe, but here is a partial list:

- OSU Extension Service provides Master Gardener education, organizes educational gardening events, provides resources for land management of small acreages, and supports local, regional and farm-direct marketing among other efforts.
- Benton County Health Department is partnering with emergency food providers and other community groups to strategically plan for a South Corvallis Food Center.
- Corvallis Sustainability Coalition Food Action Team organizes an annual Local Eats Week and several edible front-yard garden tours, and annually publishes the Corvallis Garden Resource Guide.
- Farm-to-School/Edible Corvallis Initiative introduced tasting tables to Corvallis elementary schools where students get a taste of locally grown fruits and vegetables.
- Farmers' markets
- Local food initiatives at Grocery Stores
- Food pantries, meal sites, and SNAP (Food Stamps)
- Gleaners groups
- Granges
- Slow Food Corvallis
- Small Farms Program
- Southern Willamette Valley Bean & Grain Project is rebuilding the local food system by stimulating the cultivation and local marketing of organically grown staple crops like beans and grains to provide a foundation for year-round food resources in the Willamette Valley.
- Women, Infants and Children (WIC) Office and Clinic

Land Use and Transportation:

A number of government agencies, business, and non-profit organizations are working to reduce the community's dependency on fossil fuels for transportation. For years Corvallis has developed and implemented land use regulations, such as the state required Urban Growth Boundary, which facilitate compact growth and reduce transportation demand. The community has nationally recognized mass transit and bicycle infrastructure systems that decrease dependence on single occupancy vehicles. City staff works with national and local alternate modes advocates to develop more active transportation infrastructure:

- League of American Bicyclists
- Oregon Department of Transportation's Bicycle and Pedestrian Program
- Cascades West RideShare
- Bicycle Transportation Alliance
- Corvallis Bicycle Collective
- Mid-Valley Bike Club

With broad community input, the Corvallis Sustainability Coalition's Land Use Action Team established four goals to support a sustainable, compact city: walkable, mixed-use, diverse neighborhoods; easy access to diverse natural areas; green building practices; and increased access to locally owned and produced foods and goods while protecting resource lands, quality of life, and the environment. The Land Use team worked with local community volunteers to complete a citywide inventory of neighborhood amenities, walkability, and bikability and created a series of maps to help identify current conditions and opportunities to improve non-auto access to common amenities. The team is currently working with partner organizations to conduct a review of local land use codes to identify changes necessary to achieve more walkable, mixed-use neighborhoods, functioning neighborhood centers, and a vibrant downtown.

Consumption and Waste:

The City of Corvallis participates in Benton County's Solid Waste Advisory Council (SWAC), a State mandated board comprised of local officials and citizens who represent various areas throughout Benton County. The SWAC is an advisory committee for the Benton County Board of Commissioners on all solid waste issues for Benton County. The Corvallis Sustainability Coalition's Waste Prevention Action Team also has set goals and accomplished much in the area of waste reduction. The Team works in partnership with Republic Services, Corvallis' provider of garbage, recycling and organics collection and services. The Waste Prevention Action Team has helped to implement the following programs:

- Curbside collection of compost in yard debris bins
- Recycling block captain program
- Reuse directory
- Repair fairs
- Faith Community Education

Oregon State University (OSU) Campus Recycling manages a comprehensive waste management system that focuses on reducing, reusing and recycling with disposal as a last resort. Campus Recycling is also actively engaged in outreach activities. Campus Recycling works with Republic Services to offer Master Recycler classes and has a variety of other programs and challenges, such as Waste Watchers volunteers, Repair Fairs, the Recycle Mania Civil War, the Residence Hall Move-Out Donation Drive, and the Coffee Cup Coup Campaign.

Health and Social Services:

Numerous organizations in Corvallis and Benton County are working to address health and social service needs related to climate change. Following are some of those that have taken the lead in addressing social inequities that may be exacerbated by the effects of climate change:

- Benton County Health Department
- Benton Habitat for Humanity
- Cascades West Rideshare
- City of Corvallis Transportation Options Program
- Community Services Consortium
- Corvallis Environmental Center (Edible Corvallis Initiative and Energize Corvallis)
- Corvallis Sustainability Coalition
- Healthy Aging Coalition
- Housing First (formerly Corvallis Homeless Shelter Coalition)
- Linn-Benton Food Share
- Linn-Benton Health Equity Alliance
- Mid-Valley Health Care Advocates
- South Corvallis Food Bank
- Willamette Neighborhood Housing Services

Urban Natural Resources:

The City of Corvallis collaborates with other public agencies to conserve and responsibly manage the natural resources within its purview, including the Benton Soil and Water Conservation District, OSU-Benton County Extension Service, U.S. Forest Service, U.S. Fish and Wildlife Service, Oregon Department of State Lands, Oregon Department of Fish and Wildlife and Oregon Department of Environmental Quality. The City has completed a number of resource inventories and natural resource plans to preserve the quality of its natural resources:

- Natural Features Inventories throughout the Corvallis Urban Growth Boundary (2003)
- Corvallis Forest Stewardship Plan (2006)
- Urban Forestry Management Plan (2009)
- Understory Vegetation Baseline Monitoring in the City of Corvallis Rock Creek Watershed (2010)
- Corvallis Forest Natural Resources Inventory (2010)
- Parks and Recreation Master Plan (2015)

Non-profit organizations also work to conserve native species and habitats in the Corvallis area through restoration, research and education. These include:

- Greenbelt Land Trust
- Native Plant Society of Oregon
- Institute for Applied Ecology
- Marys River Watershed Council
- Marys Peak Group Sierra Club
- Audubon Society of Corvallis
- Neighborhood Naturalist
- Chintimini Wildlife Center

Task Team Input:

Community stakeholders and City staff combined efforts to develop lists of existing actions currently underway and organized them in the same categories used in the Corvallis CAP. The lists are provided in the following sections at the end of this document.

- Section A – Buildings and Energy
- Section B – Food and Agriculture
- Section C – Land Use and Transportation
- Section D – Consumption and Solid Waste
- Section E – Health and Social Services
- Section F – Urban Natural Resources

CONCLUSIONS:

The Corvallis community's achievements in energy efficiency, climate change awareness, and strategies to achieve renewable energy development reflect strategic planning and strong, collaborative efforts of City government, residents, non-profits, businesses, and educational institutions. These serve as a foundation for the City's development of future strategies and actions to mitigate climate change and to prepare the community to adapt and be resilient to changes in the climate and local natural systems and infrastructure.

SECTION A: BUILDINGS AND ENERGY—EXISTING ACTIONS

ACTIONS:	MITIGATES	ADAPTS	COMMUNITY	CITY OPERATIONS
City of Corvallis--Low Income Homeowner housing program provides financial assistance to retrofit existing homes or construct new homes to be more energy efficient.	x		x	x
Benton County—with Energy Trust, completed facility upgrades/retrofits for improved energy efficiency: boilers, chillers, windows, lighting, and installation of variable frequency drives.	x		x	
Benton County--promotes operational energy conservation behaviors, audits energy and water usage, and is working to increase recycling and composting, and to decrease irrigation.	x		x	
Benton County--proposing geothermal heating using domestic sewer system for the BC courthouse.	x		x	
Corvallis Environmental Center—implementing the Residential Take Charge program: door-to-door outreach targeting 15% of Corvallis residents asked to choose 3-5 actions to improve energy efficiency at personal residences with a focus on transportation and purchasing behaviors.	x		x	
Corvallis Environmental Center and City of Corvallis—distributing 35,000 LED light bulbs to Corvallis residents.	x		x	x
Corvallis Environmental Center partners with retrofit organizations to improve energy efficiency across the community.	x		x	
Corvallis Environmental Center—implementing Seeds for the Sol program which provides loans for solar installation on residences (City of Corvallis has provided	x		x	x

$100,000 and Unitarian Church has provided $28,000 in loans).				
Corvallis Environmental Center—implements ongoing volunteer energy efficiency promotion/education programs.	x		x	
City of Corvallis Fire Department—has instituted a "no idle policy" for vehicles.	x			x
City of Corvallis—retrofitting lights at all Parks and Recreation facilities to LEDs.	x		x	x
City of Corvallis—has implemented "smart irrigation systems to reduce irrigation, and is reducing fertilizer application on grass to reduce required mowing.	x	x	x	x
City of Corvallis—has installed variable frequency drives, high efficiency faucets and shower heads at Osborne Aquatic Center.	x		x	x
City of Corvallis—urban forestry and land management practices are increasing tree planting.	x	x	x	x
City of Corvallis—managing 2,500 acres of watershed to optimize growth of trees.	x	x	x	x
City of Corvallis--water treatment and wastewater reclamation plants have implemented upgrades and optimization practices to increase efficiency of pump and lift stations, treatment processes and distribution.	x			x
City of Corvallis—has completed energy efficiency studies and evaluations of numerous facilities, including: wastewater reclamation plant (WWRP), strategic energy management program at Taylor water treatment plant (WTP); micro-hydro at Rock Creek WTP; interior and exterior lighting upgrades; chiller/boiler upgrades, smart lighting systems – daylight systems; evaluating potential uses for WWRP methane.	x			x
City of Corvallis—is completing retrofits of City street lights to LEDs in phases.	x		x	x

City of Corvallis—has installed high efficiency shower heads, solar panels, and increased efficiency HVAC systems at fire stations.	x			x
Energy Trust of Oregon provides cash incentives for energy projects; solar installation – both residential and commercial; stand alone incentives ($550) for gas furnaces – rental properties; residential loan programs to assist lower income homes be more efficient.	x		x	
City of Corvallis--Livability Code in effect in September 2016 will address some energy efficiency upgrades for renters on a complaint basis.	x	x	x	x
Energy Trust of Oregon provides incentives for single family residences for HVAC and weatherization improvements, including the Savings within Reach program which provides incentives to renters.	x	x	x	
City of Corvallis and community members purchase Blue Sky power.	x		x	x
Corvallis Environmental Center--installations of heat pumps and heat pump water heaters are increasing (heat pumps provide air conditioning benefits).		x	x	
Benton County—has implemented a new standard requiring white membranes on most commercial and institutional roof installations.		x	x	
Community—there is a growing network of people engaging in new programs and education for future decisions.		x	x	
Benton County—has developed an adaptation plan for emergency services for continuity of essential services during events.		x	x	
Hewlett Packard has established a goal of 100% renewable energy use by 2040 as part of the Paris Climate agreement.	x		x	

Republic Services converted their entire fleet to Compressed Natural Gas.	x		x	

SECTION B —FOOD AND AGRICULTURE: EXISTING ACTIONS

ACTIONS:	MITIGATES	ADAPTS	COMMUNITY	CITY OPERATIONS
Food Bank and Farmers Market—Provide cooking demonstrations (to adapt the community needs basic cooking skills).		x	x	
Sustainability Coalition Food Action Team--Food preparedness for more than three days and possibly at the neighborhood level.		x	x	
OSU Extension Service Master Food Preservers—Food preservation classes.		x	x	
Sustainability Coalition—Conducting an "eat 40% local challenge" which includes a focus on seasonal food.		x	x	
Farmers Market--takes SNAP for seeds and vegetable starts.		x	x	
Food Bank—has a grant to provide plant starts to grow food.		x	x	
Corvallis Environmental Center—School Gardens Program is teaching kids to grow and appreciate fresh food.		x	x	
Ten Rivers Food Web—Helping transition from retiring farmers to younger generation of new farmers.		x	x	
Statewide land use laws protect local farm and forest lands.		x	x	
City of Corvallis--Has implemented land use code changes to allow for community gardens, chickens, and food stands.		x	x	x
City of Corvallis—Is incorporating xeriscaping practices into public landscapes.		x	x	x
Robust gleaning groups in Corvallis as compared to the rest of Oregon, working to develop a mechanism to distribute information to residents on food sharing.		x	x	
Corvallis Environmental Center, OSU, and 509J—working to implement the Farm to School Program	X	X	X	

OSU Extension Small Farms Program--Growing Resilience: Water Management Workshop Series http://smallfarms.oregonstate.edu/wmws Dry Farming Demonstration http://smallfarms.oregonstate.edu/dry-farming-demonstration Dry Farming Collaborative - Facebook page	X	X	X	

SECTION C—LAND USE AND TRANSPORTATION: EXISTING ACTIONS

ACTIONS:	MITIGATES	ADAPTS	COMMUNITY	CITY OPERATIONS
City of Corvallis—has a bike share program for employees.	x			x
OSU--has a Climate Action Plan and is currently updating it.	x		x	
City of Corvallis—evaluating conversion of transit fleet to Compressed Natural Gas and electric buses.	x			x
City of Corvallis--synchronizes traffic signals to reduce congestion at intersections; additional projects are planned for the future.	x		x	x
City of Corvallis, Land Trust and others--setting aside natural system areas to allow for additional water runoff storage and eliminating urban development in areas that could be impacted by flood.		x	x	x
City of Corvallis—has mapped landslide areas; information can be used to guide future development.		x	x	x
City of Corvallis--has converted all diesel vehicles to renewable diesel (R-99) fuel.	x	x		x
City of Corvallis--uses recycled asphalt during grind/inlay road improvement projects (10-25%) and provides material (asphalt grind and concrete) to Benton County for reuse.	x			x
City of Corvallis—implementing fleet management program with efficiency goals: Vehicle Replacement Policy considers replacement with electric or hybrid;	x			x

evaluates appropriate vehicle for intended use; and evaluates distance/type of travel. Also evaluates usage/needs to "right-size" fleet, extends use of boxes on new chassis, incorporates LED lighting on apparatus, maximizes length of vehicle use before disposal, and maintains a "no-idle" policy.				
City of Corvallis--encourages employees to use fuel efficient pool vehicles whenever appropriate as opposed to assigned vehicles that are less efficient.	x			x
City of Corvallis—has converted all traffic signals to LED lights.	x		x	x
City of Corvallis is converting street lights to LEDs in phases.	x			
City of Corvallis has enacted design standards that require arterial and collector roads to be a minimum of one foot above the 100-year flood plain.		x	x	x
City of Corvallis has restrictive floodplain standards and restricts development in landslide-prone areas.		x	x	x

SECTION D—CONSUMPTION AND WASTE: EXISTING ACTIONS

ACTIONS:	MITIGATES	ADAPTS	COMMUNITY	CITY OPERATIONS
OSU purchasing of goods and services: sustainability built into some contracts; e.g., Office Max has changed packaging and added green purchases; reduction of deliveries by establishing a $ threshold for orders; Athletics contract transitioning to fully compostable products; packing material requirements, e.g., Dell computers are now packaged in cardboard.	x		x	
OSU has an extensive recycling program: use clean waste streams to reduce handling of materials; all Styrofoam is stored and transported	x		x	

to St. Vincent DePaul for recycling; e-recycling; participate in Master Recycler program, and promote recycling among community and student population.				
OSU: promotes re-purposing and extending life of products through purchase deferment, conducting Repair Fairs and participating in surplus resales (in partnership with Corvallis, Albany, etc.).	x		x	x
Benton County: the Materials and Recovery Center takes construction and demolition materials in the sorting area.	x		x	
Benton County: Has reduced waste hauling by purchasing a compactor and consolidating waste from County facilities for one pick up by Republic Services.	x		x	
HP has a landfill reduction program: they provide take back and recycling for electronic products sold by HP; working to identify value in recycle streams; changing from product-based purchases to service-based purchases, e.g. they provide printers as a service for a business instead of selling printers – moving into this for computers, which allows for repurposing of older products that are being replaced.	x		x	
HP: Has included a materials intensity metric in annual sustainability report, i.e., quantity of materials put to market divided by revenue, with the goal to grow business without increasing materials use through practices such as reducing the size of computers.	x		x	
HP: Participating in establishing national sustainable purchasing criteria.	x		x	
Republic Services: Provides public education and outreach – co-facilitation of Master Recycler program; flyers to every address with information on reuse	x		x	

opportunities; four hazardous waste events per year; spring clean-up event – yard debris, wood, metal; curbside recycling, organics, yard debris; working on a material recovery center.				
State Department of Environmental Quality (DEQ): Working to reduce environmental impacts over full product life cycle (i.e., 2050 Vision for Materials Management).	x		x	
DEQ: Legislature has reinstated grants program (this year funding projects as diverse as a tool lending program, furniture salvage program, edible food collection program for food banks, equipment for a Habitat For Humanity store, replacement of disposable silverware with reusable silverware, salvage and rehab bicycle program); focus on food waste and plastics recovery program and multi-tenant recycling; support of a partnership with grocery stores to allow for collection of film plastic; activity on upstream prevention programs – 40% of food produced not eaten – food recycling, composting, edible food salvage, reduction of food waste (Refed report).	x		x	
DEQ: SB 263 (2015) requires DEQ to establish "outcome-based" recovery rates and goals that operate in parallel to weight-based rates for wastesheds (e.g., Benton County). "Outcomes" could include energy, greenhouse gases, or others. DEQ plans to start developing outcome-based measures later in 2016.	x		x	
City of Corvallis: has a sustainability policy for new purchases.	x			x
City of Corvallis: recycles electronics back to manufacturers.	x			x
City of Corvallis: purchases paper that is 30%-100% recycled content.	x			x

City of Corvallis: have reduced paper usage.	x			x
City of Corvallis: Urban Forester is working with local mills and the City of Albany to repurpose or reuse all wood bi-products.	x			x
City of Corvallis: Works to resell or give away used materials.	x			x
Corvallis Sustainability Coalition Waste Prevention Action Team has a network of Recycling Block Captains providing outreach to 4,000 households on a quarterly basis. With support, this program could be expanded to include all households in the community.	x		x	
Republic Services: provides images of recyclables for recycling bins so people have a better understanding of what is recyclable.	x		x	

SECTION E—HEALTH, SOCIAL SERVICES, AND COMMUNITY WELL-BEING: EXISTING ACTIONS

ACTIONS:	MITIGATES	ADAPTS	COMMUNITY	CITY OPERATIONS
Community Services Consortium – Linn Benton Food Share on HWY 34 is isolated during flood events – planning underway for a facility in South Corvallis		x	x	
Benton County--Communication and tracking for viruses affecting the area		x	x	
Corvallis Environmental Center--Farm to School Program is sourcing local foods for schools		x	x	
Samaritan Health Services--addressing addiction health services; reduction in opiate (pain killers) prescriptions		x	x	
City of Corvallis and Benton County have moderate fuel supplies at City and County facilities – both sides of town		x	x	x
Benton County Senior Services has gatekeeper programs to check on seniors living by themselves; Meals-on-Wheels program		x	x	

Jackson Street Youth Shelter – possibly expand these types of services		x	x	
City of Corvallis and Benton County—Natural Hazards Mitigation Plan for Witham Hill landslide area is nearing completion		x	x	x
Heartland Humane Society--works with CARDV to assist in housing pets during emergency situations; allow pets from people staying at a local shelter; BC allows livestock at fairgrounds during severe weather events		x	x	
Vulnerable Population Planning Group provides support – first responder agencies – to elderly, pets		x	x	
Continuity of Operations (COOP) – shelter availability within City, American Red Cross services / education & training		x	x	
Samaritan Health Services (?) – working to establish an emergency water supply		x	x	
City of Corvallis and Benton County—Emergency Operations Plan is being developed; needs to include Emergency Support Functions		x	x	x
City of Corvallis—has snow and ice policies that address tree removal to mitigate hazards and outages and to aid emergency services to respond to icy roads		x	x	x
Benton County Wildfire Protection Plan—Being developed for City interface areas (i.e., watershed and Skyline West)		x	x	
OSU has created improved buffer areas to protect from fire		x	x	
Emergency operations centers have been established		x	x	x
City of Corvallis—water storage reservoirs are equipped with earthquake valves to prevent water losses		x	x	x

City of Corvallis—including mechanisms to get to South Corvallis during flood events		x	x	x

SECTION F—URBAN NATURAL RESOURCES: EXISTING ACTIONS

ACTIONS:	MITIGATES	ADAPTS	COMMUNITY	CITY OPERATIONS
City of Corvallis Parks and Recreation urban forest management actions: changing species list to increase diversity of urban forest to reduce impacts of climate change/pests; reducing impact of service vehicles to water street trees by asking residents to help; investigating electric chain saws; increasing coordination with local groups to plant more trees.	x	x	x	x
City of Corvallis Public Works – maintenance of urban streams, detention ponds – working closely with Parks and Recreation urban forester to maintain habitat when possible; potentially leaving a portion of hazardous trees instead of full removal.		x	x	x
City of Corvallis Parks and Recreation—maintains Parks Master Plan which is the backbone of natural inventory, connection of parks, streams, paths, natural features inventory to improve the ecosystem; update may propose Land Development Code changes to improve vegetation areas; working to improve accuracy of natural features inventory; comprehensive approach.		x	x	x
City of Corvallis Parks and Recreation—landscape maintenance practices are expanding pesticide free/water wise landscaping; identifying 'right' plants (not just native plants) to reduce maintenance required and increased viability under changing climate conditions; working to		x	x	x

improve soil instead of just using pesticides/fertilizers.				
City of Corvallis--Clean Water Act water quality permit compliance (NPDES stormwater discharge permit and Total Maximum Daily Load best management practice implementation) and Endangered Species Act guidelines and/or requirements provide regulatory context for on-going stream temperature monitoring;, riparian planting – plant diversity; rain garden and downspout disconnection program; illicit discharge monitoring; erosion control measures; City evaluation of new development best management practices for water quality; public outreach events – education, planting days, residential property evaluations.		x	x	x
City of Corvallis--sells tree removal waste to a mill to support reuse and reduce waste; developing programs to help identify urban forest issues or concerns using residents for input; program for developers to pay the City to plant trees in new developments to improve survival rate and reduce contractor maintenance.	x	x	x	x
City of Corvallis--maintains a Watershed Stewardship Plan which ensures property is managed for forest health, endangered species protection, plant health, aquatic improvement, meadow restoration, thinning to increase diversity of tree stands, stream/fish monitoring and surveys.		x	x	x
Marys Peak Alliance--bringing attention to public about Marys Peak – promotion of the Peak and water source.		x	x	
Sierra Club--working with School District 509J to plant more trees along riparian buffer near school zones, providing increased street vegetation buffer.		x	x	

Sustainability Coalition Water Action Team--working on streams and low impact development; provides stream tours; education on the importance of urban streams, changing perspective of streams to water retention areas; conducts low impact development demonstrations, examples, and education on guidelines and City requirements.		x	x	
Greenbelt Land Trust – manages 400,000 acres; undertaking a planning process to identify most important investment areas in the Willamette Valley for climate change; developed a map for conservation areas of interest (80,000 acres); permit protection for approximately 3,000 acres within the urban growth boundary; planted approximately 300,000 trees along the Willamette River; installed fish-friendly culverts; manage invasive weeds; remove trees for fire prevention; stream side planting efforts; partnership of non-profit organizations interacting with local government to improve the amount of work that can be completed, sharing of information, data, resources; identifying long term value of actions.		x	x	
Marys Peak Watershed Council--improving local creeks by installing large woody debris and riparian plantings; educating elementary students to create next generation of stewards; completes restoration activities outside of urban area that have a big impact within urban areas.		x	x	
City of Corvallis Parks and Recreation—currently implementing four restoration projects.		x	x	x
City of Corvallis Parks and Recreation—maintains policies/plans that support adaptation/resiliency: Urban Forest		x	x	x

Management Plan to manage trees in the right of way; Integrated pest management program; cooperative agreement with Benton County on shared borders; Willamette Valley Planning Atlas; working with Planning on low impact development; use of "City Green" to evaluate water quality and stormwater runoff from new developments.				
Visit Corvallis: Encourages the use of local natural areas for stay-cations (offsetting climate impact of travel).	x		x	
City of Corvallis Public Works Utilities - incentivizes water conservation activities that increase water efficiency in industry and residential areas (high-efficiency toilet rebates).		x		x
City of Corvallis Public Works Utilities - has evaluated the number and impact of direct storm drain outfalls on local waterways.		x		x
City of Corvallis Parks and Recreation - Maintains carbon in wood by using wood from urban forest management for products with long lives.	x			x

CORVALLIS CLIMATE ACTION PLAN

APPENDIX 4

Lower-Priority Strategies and Actions

The tables below contain the lower-priority actions for each category. The strategies and actions in the tables are in an order that reflects input from Task Teams, Reviewers, and the public based on greenhouse gas reduction potential and the approved evaluation criteria. Actions that have been more thoroughly vetted and scaled for greenhouse gas reduction potential, are located in Chapters 2-7 of the main document.

STRATEGIES AND ACTIONS
BUILDINGS & ENERGY
COMMUNITY
MITIGATION

STRATEGY	ACTION
Energy Supply Efficiency	Improve energy efficiency in existing commercial building mechanical systems.
Conservation and Efficiency	Support development and expansion of low-carbon district heating and cooling systems.
Shift to Renewable Energy	Focus economic development efforts on residential, commercial and industrial local renewable energy installations (based on economic benefits of import substitution).
Federal/State Policy Advocacy	Legislation to reduce greenhouse gas emissions.
Shift to Renewable Energy	Develop local smart grid technology and storage capacity of electricity (especially locally generated renewables) and natural gas.
Research	City-wide energy use study of residential and commercial structures.
New Technology	Capture heat from sanitary sewer for community use.
Energy Conservation and Efficiency	Utility rate structures, requirements and practices intended to reduce consumption and maximize efficiency.
Promote Lower Carbon Fuels	Conversion to electric leaf blowers, lawnmowers, string trimmers, etc.

STRATEGIES AND ACTIONS
BUILDINGS & ENERGY
COMMUNITY
ADAPTATION

STRATEGY	ACTION
Fire Prevention Efficiencies, Building Codes	Deploy residential sprinklers to reduce catastrophic fire risk, and reduce water and fuel used in firefighting.

STRATEGY	ACTION
Resilience Planning/ Implementation	Water treatment process requirements to treat for new organisms and anticipated temperature changes.
Resiliency Planning/Implementation	Decrease power outages.
Landscaping Codes	Increase vegetation and shading.
Green Buildings	Increased use of basements in buildings for storing water, air cooling for heat pumps, thermoregulating, etc.
Alternative Technology	Enable composting toilets in residences.

STRATEGIES AND ACTIONS
BUILDINGS & ENERGY
MUNICIPAL OPERATIONS
MITIGATION

STRATEGY	ACTION
Fugitive Emissions	As refrigerants are replaced, use lower greenhouse gas intense chemicals.
	Identify fugitive emission sources in the Wastewater Treatment Collection System at points of storage, uphill pumping or vents.

STRATEGIES AND ACTIONS
BUILDINGS & ENERGY
MUNICIPAL OPERATIONS
ADAPTATION

STRATEGY	ACTION
Conservation and Efficiency	Study City buildings to improve readiness for increased temperatures and to reduce the need for air conditioning.

STRATEGIES AND ACTIONS
LAND USE & TRANSPORTATION
COMMUNITY
MITIGATION

STRATEGY	ACTION
Freight	Reduce GHG emissions related to freight movement.
Land Use / Development	Increase development of accessory dwellings (increase urban density).
Transit	Increase transit system efficiency.
Land Use and Transportation System Planning to reduce car dependency	Establish motor vehicle-free streets with exceptions for dedicated transit deliveries (possibly with time-of-day limitations), emergency vehicles and disability access).
Transportation Accessibility	Address Alternative travel needs of people with disabilities.
Technology Improvements	Increase accessibility to high-performance broadband connectivity to business and residences for e-commerce, telecommuting and improved emergency response.

STRATEGY	ACTION
Land Use/Development	Increase housing opportunities in commercial centers.

STRATEGIES AND ACTIONS
LAND USE & TRANSPORTATION
COMMUNITY
ADAPTATION

STRATEGY	ACTION
Land Use / Development	Increase connectivity of natural areas, residential areas and core commercial districts via paths / trails.
Infrastructure Planning and Management	Mitigate drought impacts in areas served by wells.
Land Use / Development	Discourage development on lands where it would endanger life, property or infrastructure, or where important ecological functions ore environmental quality would be adversely affected.
Land Use / Development	Protect watersheds, water ways and floodplains.
Land Use / Development	Reduce impervious surface areas and replace them with pervious areas (such as urban forest, native prairie, xeriscaping or pervious alternatives to pavement).

STRATEGIES AND ACTIONS
LAND USE & TRANSPORTATION
MUNICIPAL OPERATIONS
MITIGATION

STRATEGY	ACTION
Conservation and Efficiency	Implement vehicle tracking system to monitor excessive traveling, idling and vehicle performance to reduce fuel consumption and extend life of City's fleet.

STRATEGIES AND ACTIONS
LAND USE & TRANSPORTATION
MUNICIPAL OPERATIONS
ADAPTATION

STRATEGY	ACTION
Infrastructure Management	Plan for increased impacts of waterline breaks

STRATEGIES AND ACTIONS
CONSUMPTION & WASTE
COMMUNITY
ADAPTATION

STRATEGY	ACTION
Materials Management	Reduce / minimize dangerous disposal practices
Waste Recovery	Increase recovery of recyclable materials.
Product Reuse / Repair	Increase sharing of tools and materials.

STRATEGIES AND ACTIONS
CONSUMPTION & WASTE
MUNICIPAL OPERATIONS
MITIGATION

STRATEGY	ACTION
Waste Reduction	Track common waste materials to determine if more is being purchased than is needed and whether they can be diverted from the waste stream.
Recycling and Composting	Review recycling stations in all buildings for proper signage and convenience.
	Evaluate alternate handling of snails from Wastewater Reclamation Plant.

STRATEGIES AND ACTIONS
FOOD & AGRICULTURE
COMMUNITY
MITIGATION

STRATEGY	ACTION
Shift to Renewable Energy	Increase onsite production of renewable energy / biofuels for farm machinery.

STRATEGIES AND ACTIONS
URBAN NATURAL RESOURCES
COMMUNITY
ADAPTATION

STRATEGY	ACTION
Educate Youth	Increase knowledge and awareness of future community members.
Stormwater Management	Reduce or eliminate piped stormwater from draining directly into streams to reduce stormwater peaks and improve water quality.

STRATEGIES AND ACTIONS
URBAN NATURAL RESOURCES
MUNICIPAL OPERATIONS
MITIGATION

STRATEGY	ACTION
Integrated Pest Management	Improve Landscaping Manual and Integrated Pest Management Policy and Plan for all city facilities and train staff. Consider need for inputs such as water and manage towards zero.
Equipment and Fuels	Create policy for electric lawn mowers, chain saws, leaf blowers and weed eaters.
Forest Management	Ensure that the City's watershed forest is managed for carbon storage over time, consistent with water quality and other ecosystem values.
	Expand opportunities to maintain carbon in wood by using wood from urban forest management for products with long lives.

STRATEGIES AND ACTIONS
URBAN NATURAL RESOURCES
MUNICIPAL OPERATIONS
ADAPTATION

STRATEGY	ACTION
Urban Forest Management / Resiliency	Maintain Urban Forest Plan implementation and funding to monitor and improve the health and resilience of street trees, including species selection, planning for mitigating urban heat areas and by increasing pruning cycle to industry-standard of 5 to 7 years, and increasing tree/shade coverage on public properties.
Education and Outreach	Expand educational outreach and public stewardship programs regarding natural resources restoration / management, tree stewardship, on-site vegetation and stormwater management for resiliency, etc.
	Convene Community Involvement and Diversity Advisory Board (CIDAB) twice a year for listening sessions with City on UNR issues
Funding	Development fee directed to protecting natural areas.

STRATEGIES AND ACTIONS
HEALTH, SOCIAL SERVICES & COMMUNITY WELL-BEING
COMMUNITY
ADAPTATION

STRATEGY	ACTION
Population Forecasting	Develop and understanding of likely population impacts related to climate refugees.
Community Economic Well-Being	Address financial implications from climate change impacts.

STRATEGIES AND ACTIONS
HEALTH, SOCIAL SERVICES & COMMUNITY WELL-BEING
MUNICIPAL OPERATIONS
ADAPTATION

STRATEGY	ACTION
Health Care	Emphasize preventive health care in City's health and wellness programs and insurance programs.
Risk Management	Develop fuel allocation systems to ensure availability for Police, Fire, wastewater collection / treatment, water treatment, and emergency medical response.