Community Climate Action Plan

CITY OF BEND

Agenda
Climate Action Steering Committee Meeting
June 26, 2019 3:00 – 6:00 PM
Council Chambers, City Hall
710 NW Wall St

	Time	Topic	Lead	Action Required by CASC
Introduction	3:00	Housekeeping • Minutes	Lindsey	• Approve May CASC meeting minutes
	3:02	Meeting Objectives Overview	Cassie	
	3:05	Updates	Lindsey, Cassie	
Sub Action Review	3:15	Review and approve amended sub actions	Lindsey, Cassie	• DECIDE: Approve sub action list
Strategy Prioritization	3:35	Strategy Prioritization • Results review • Discussion • Approve prioritization	Lindsey, Cassie	• GIVE INPUT: Discuss results • DECIDE: Approve order of prioritized strategies
BREAK 4:25-4:40				
New Strategy Selection	4:40	Review previous runner up strategies and propose new strategies to consider	Lindsey, Cassie	• GIVE INPUT: share ideas for new strategies
	5:00	Round robin discussion of strategies	Cassie	• GIVE INPUT: share opinion on strategies
	5:20	Vote on new strategy additions	Lindsey, Cassie	• DECIDE: vote on 5 additional new strategies
CCAP Governance	5:40	Governance Recommendation Feedback	Lindsey, Cassie	• PROVIDE INPUT: provide feedback for

				governance recommendations
	5:55	Public Comment	Lindsey	
Adjourn	6:00	Adjourn	Lindsey	

Accommodation Information for People with Disabilities
To obtain this information in an alternate format such as Braille, large print, electronic formats, etc. please contact Cassie Lacy at clacy@bendoregon.gov or 541-323-8587; Relay Users Dial 7-1-1, and 541-385-6676.

Community Climate Action Plan

CITY OF BEND

Bend Community Climate Action Strategies Prioritization Order DRAFT for review by CASC on June 26, 2019

Sector	Priority ranking	Strategy	2020-2050 Cumulative Reduction (MT CO2e)	Cost per 1 MT CO2e of Reduction (Savings in parentheses)	Total Co-Benefit Score
Energy in Buildings	1	Improve voluntary uptake of energy efficiency projects in Bend	1,180,000	($50) to 0	4.9
Transportation	2	Increase bicycle and pedestrian trips as transportation mode (assumes 5% mode share)	300,000	$40	4.6
Energy in Buildings	3	Support policies that increase energy efficiency of buildings	1,300,000	Not available	4.0
Transportation	4	Support the transition to electric vehicles with an EV Readiness Plan (assumes 25% VMT are electric)	1,200,000	($200) - $50	3.9
Waste and Materials	5	Promote smaller and denser housing options through incentives	410,000	($700)	3.9
Waste and Materials	6	Implement outreach and education that promote waste prevention	100,000	($270)	3.7
Transportation	7	Increase transit ridership	490,000	$60	3.6
Energy in Buildings	8	Implement benchmarking and disclosure programs for energy performance	1,000,000	($50) - $50	3.5
Energy Supply	9	Expand distributed commercial and residential solar PV	60,000	($75) – ($50)	3.4
Transportation	10	Convert City and other public agency fleets to electric vehicles and alternative fuels	50,000	($200) - $75	3.2
Energy Supply	11	Install solar panels on public buildings like schools, libraries, and public buildings	10,000	($120)	2.7
Energy Supply	12	Build/explore a biodigester at the wastewater treatment facility	140,000	($10)	2.6

Bend Community Climate Action Strategies Prioritization Order DRAFT for review by CASC on June 26, 2019

Energy Supply	13	Provide 100% electricity supply to community	5,300,000	$10 to 35	2.6
Waste & Materials	14	Improve waste recovery	1,230,000	Not available	2.5
Energy Supply	15	Contract for a natural gas offset program for community gas use (25% participation rate assumed)	2,000,000	$20 to $45	2.2

New Strategies to consider for the Bend CCAP

Runner Ups from February Voting

- Promote ride-sharing programs
- Incentivize that C&D waste is sorted for recoverable materials
- Require composting or zero waste at city-permitted events
- Expand recycling and compost infrastructure in public buildings and public schools
- Require or incentivize low carbon concrete in new development
- Utilize low carbon concrete and asphalt in road and infrastructure projects that the City of Bend controls

Additional Ideas from Committee Members and Staff

- Building Electrification
    - Develop program to encourage electric heat pumps in buildings and homes
    - Develop program to encourage electric hot water heaters in buildings and homes (electrification)
- Tree planting activities or other sequestration activities
- Adaptation activities that have mitigation benefits
    - Cool roofs
- Separation of individual sub actions from existing strategies to analyze:
    - Develop program to reduce food waste and wasted food

Review the ideas from the Working Groups. You can find them here.

CITY OF BEND

Community Climate Action Plan

DRAFT Climate Action Strategies and Actions

Energy Supply

1. Expand distributed commercial and residential solar PV
    a. Support community education that increases knowledge of renewable energy, promotes using renewable energy, increases awareness of available incentives for renewable energy.

    b. City-led outreach to increase awareness of existing renewable energy incentives, targeted during the permitting process.

    c. Create new incentives through the building permitting process to expand renewable energy projects on residential and commercial buildings

    d. Create revolving loan funds from the City for financing renewable energy projects, with funds prioritizing low and moderate income residents

    e. Develop community solar projects

    f. Create solar easements to protect access to solar energy

    g. Pilot microgrid and battery storage projects

    h. Support training programs in renewable energy fields to build a skilled workforce in the community, such as a solar installer program

    i. Create C-PACE program

2. Install solar panels on public buildings like schools, libraries, and city buildings

3. Provide 100% renewable electricity to community
    a. Develop a roadmap to achieve 100% renewable electricity supply for community

4. Build/explore a biodigester at the wastewater treatment facility

5. Contract for a natural gas offset program for community gas use

Commented [CL1]: Moved up to energy supply section

Energy in Buildings

1. Improve voluntary uptake of energy efficiency projects in buildings

a. Support community education that promotes the benefits of energy efficient buildings, improves awareness of energy efficiency practices, and improves awareness of existing incentives

b. City-led outreach to increase awareness of existing energy efficiency incentives, targeted during the permitting process.

c. Create new incentives through the building permitting process to expand energy efficiency projects on residential and commercial buildings

d. Create revolving loan funds from the City for financing energy efficiency projects, with funds prioritizing low and moderate income residents

e. Support training programs in energy efficiency skills to build a skilled workforce in the community for energy efficiency

f. Explore demand response programs with utilities

2. Implement benchmarking and disclosure programs for energy performance
   a. Adopt and implement a Home Energy Score program

   b. Develop disclosure and benchmarking programs for commercial buildings, public buildings, and multifamily properties

   c. Create and implement a low cost energy audit program

3. Support policies that increase energy efficiency of buildings, i.e. advocating for higher performing energy efficiency state codes
   a. Actively participate in code update processes and vote for advancing energy efficiency in code

   b. Conduct outreach campaigns to promote building to a net zero building standard faster than the state building code advances

Commented [CL2]: Called out distinct programs that would be considered for different sectors

Commented [CL3]: Need to clarify – does this already exist through Neighbor Impact and we want to scale up? Or would this be an audit program specifically for commercial/multifamily buildings? Is this duplicative with the HES program?

Need to decide if we eliminate because it is redundant.

Commented [CL4]: New addition

Waste and Materials

1. Promote smaller homes and denser housing options (i.e. ADUs) through incentives

Commented [CL5]: Addition to highlight that could apply to more than just single family residential

2. Develop outreach and education materials that promote waste prevention (support repair and reuse, reduce wasted food)
   a. Outreach campaigns that promote reducing consumption and preventing waste, and connecting with resources available

   b. Implement education and training programs in the community that train industry to use less waste

   c. Conduct outreach and education targeting food waste prevention

3. Improve waste recovery
   a. Expand curbside composting program

   b. Expand education for residents of single family homes to promote recovering food waste

   c. Work with regional stakeholders to develop standard multifamily recycling program

   d. Develop a recycling and food waste collection program targeting businesses, hotels and resort communities to reach tourist population

   e. Investigate and invest in facility and infrastructure upgrades to meet long term needs of solid waste system

   f. Expand and develop new programs aimed at increasing recycling of C&D materials

Transportation

1. Increase bicycle and pedestrian trips as transportation mode
   a. Prioritize Bend's Bike/Pedestrian/Complete Streets policies in the Transportation System Plan, prioritizing projects in neighborhoods that have been historically underserved.

2. Support the transition to electric vehicles (EVs) with an EV Readiness Plan

3. Increase transit ridership
   a. Create a Mobility Hub program
   b. Create high capacity transit corridors
   c. Expand transit coverage consistent with the regional transportation master plan

4. Convert City and other public agency fleets to electric vehicles and alternative fuels

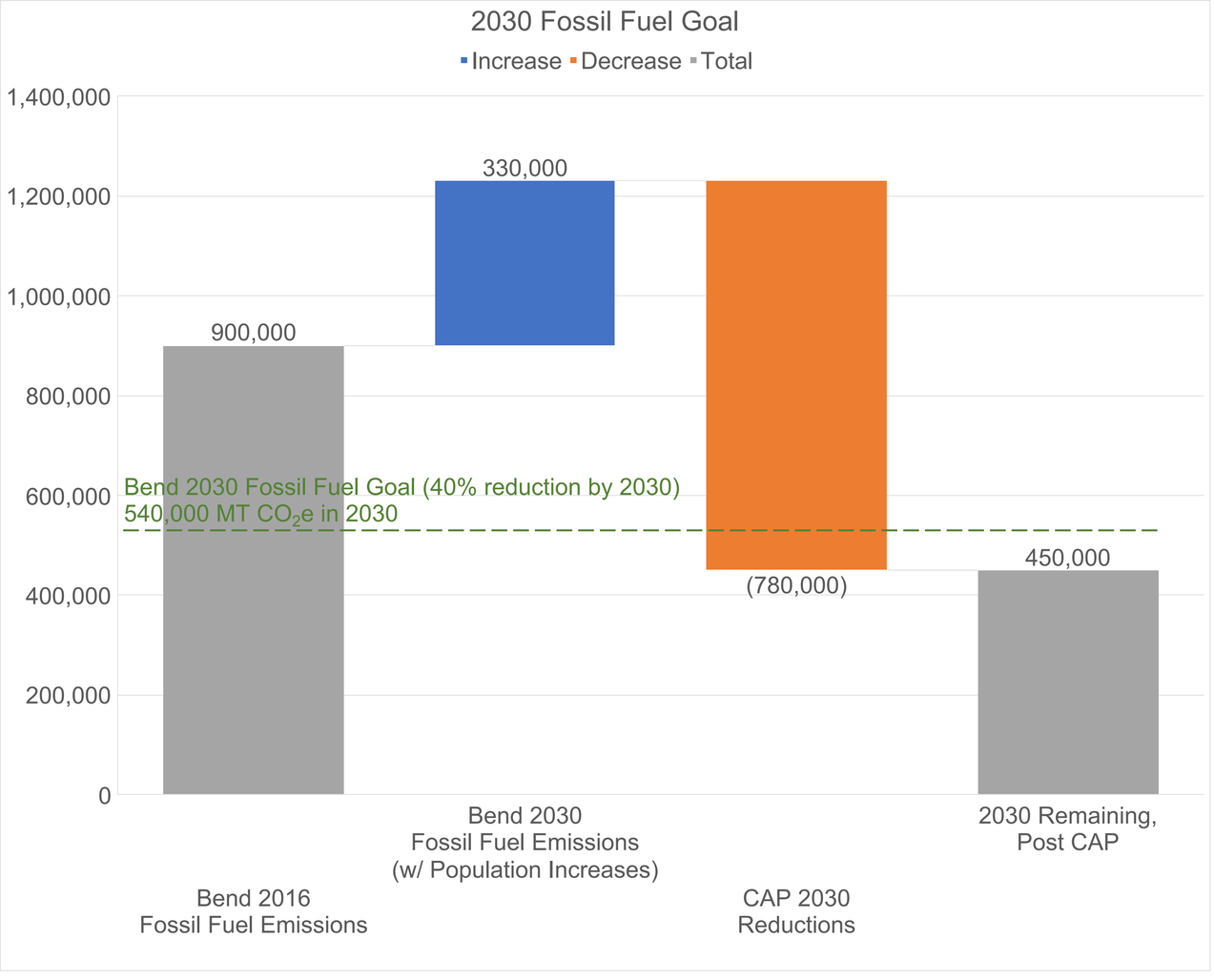
Commented [CL6]: Added specific food waste action

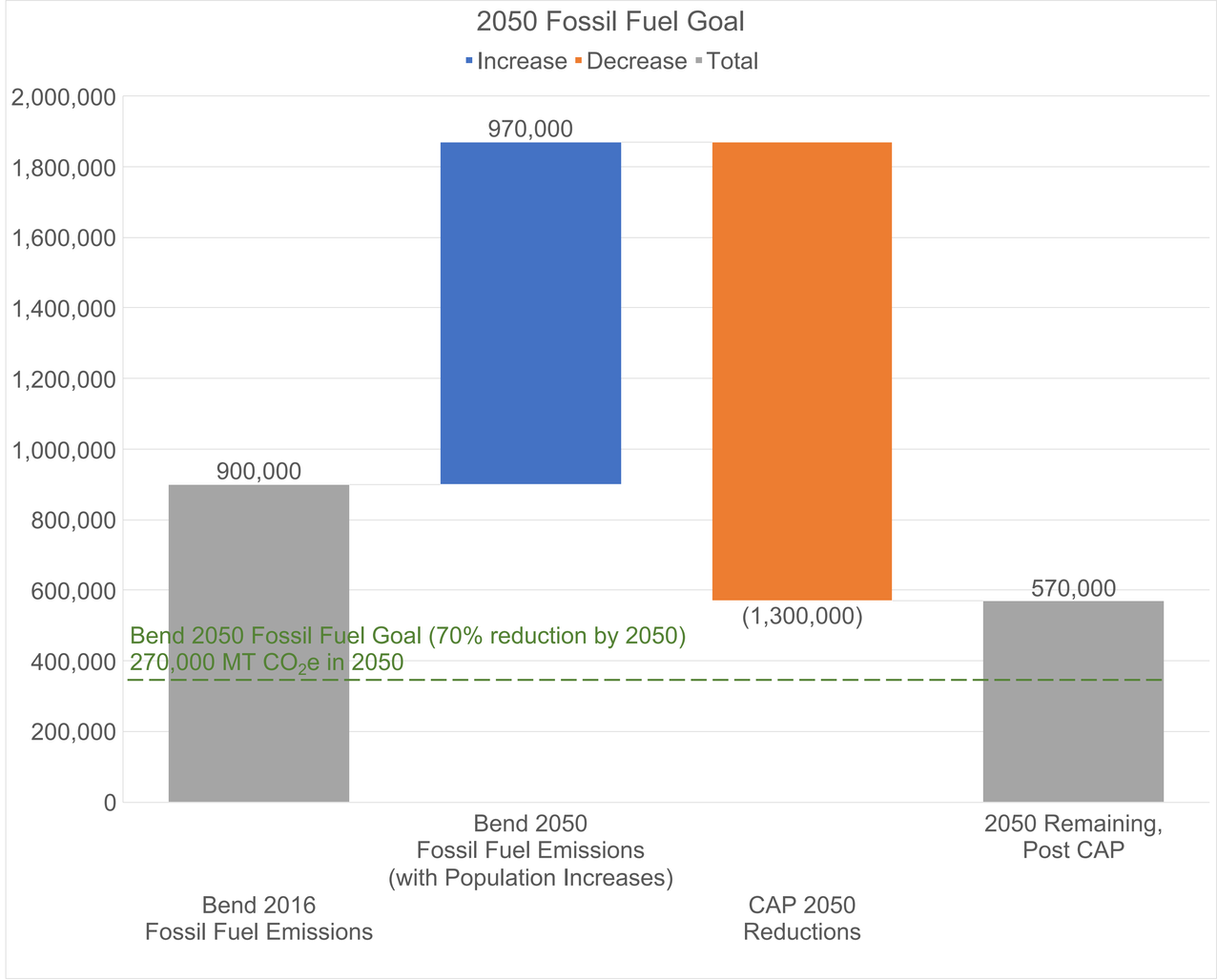
Commented [CL7]: Changed language to make more consistent with regional transportation master plan and to expand scope a bit

Commented [CL8]: Removed specifically calling our CNG, renewable diesel and biodiesel, but left in alternative fuels to hold space for alternative fuels that meet the needs of the goals, i.e. RNG

Changes made to co-benefit scores based on input after May CASC Meeting:

- Changed scores for energy efficiency related actions for economic vitality to reflect that they create permanent jobs. Made equal with strategies related to materials management which also create permanent jobs.
- Changed affordability score on “Implement benchmarking and disclosure programs for energy performance” to be neutral rather than a net cost. Assumes there is a life cycle benefit but recognizes there could potentially be high first costs for building owners if it triggers investment in the building.
- Changed community health and safety score on “Improve voluntary uptake of energy efficiency projects in Bend” from a 5 to a 10 to show consistency with other energy efficiency strategies.
- Improved consistency between adaptation and resilience score on “improve voluntary uptake of energy efficiency projects in Bend,” “Implement benchmarking and disclosure programs for energy performance, and “Support policies that increase energy efficiency of buildings.”
- Changed social equity score of “Implement benchmarking and disclosure programs for energy performance” to reflect positive equity benefits, assuming the transparency that energy performance disclosure brings provides greater benefit to lower income residents.
- Maintained high equity score for bike and pedestrian infrastructure, as the CTAC and TSP staff consider better bike infrastructure to be an equity-forward action.


2030 Fossil Fuel Goal
Increase
Decrease
Total
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
900,000
330,000
(780,000)
450,000
Bend 2030 Fossil Fuel Goal (40% reduction by 2030)
540,000 MT CO2e in 2030
Bend 2016
Fossil Fuel Emissions
Bend 2030
Fossil Fuel Emissions
(w/ Population Increases)
CAP 2030
Reductions
2030 Remaining,
Post CAP


2050 Fossil Fuel Goal
Increase
Decrease
Total
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
900,000
970,000
(1,300,000)
570,000
Bend 2050 Fossil Fuel Goal (70% reduction by 2050)
270,000 MT CO2e in 2050
Bend 2016
Fossil Fuel Emissions
Bend 2050
Fossil Fuel Emissions
(with Population Increases)
CAP 2050
Reductions
2050 Remaining,
Post CAP

CCAP Key Dates and Decisions

CITY OF BEND

JUNE

-*CASC meeting*: final data analysis, decide prioritization, select 4-5 more strategies

- Outreach for public comment period

JULY

- Public comment period (1-31)

- *CASC meeting: No July CASC meeting*

-Council Stewardship Sub Committee meeting: Overview of CCAP

AUGUST

- *CASC meeting:* review public comments, select new strategy based on comments, review strategy analysis, review draft CCAP content

-Report drafting and review

SEPTEMBER

- *CASC Meeting*: review final strategy analysis and final approval

- Report drafting and finalizing. CASC Review of draft

- Council Stewardship Subcommittee Meeting: Policy direction

OCTOBER

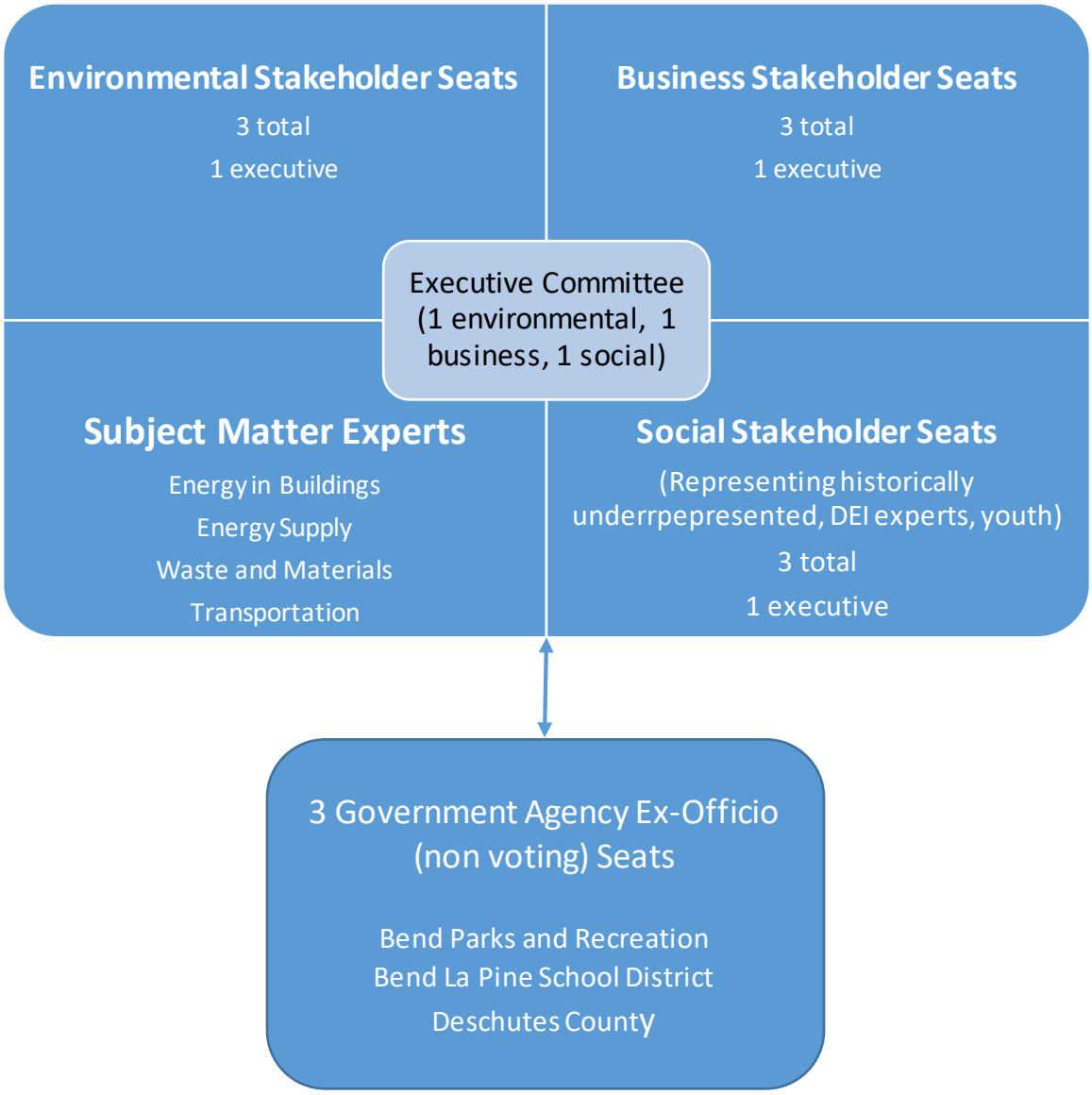
- *CASC Meeting:* Review CCAP drafts and prep for Council decision

-Report finalizing

NOVEMBER

- Council presentation: Wednesday, November 6

Climate Action Committee Structure



Role of Committee

The Climate Action Committee/Board will facilitate community implementation of the CCAP and fill an advisory role to the Council . To facilitate this purpose, they will:

- Develop and implement programs that fulfill the CCAP strategies
- Build partnerships with key implementation stakeholders
- Engage the greater community in the CCAP. Actively involve the community to participate in CCAP strategies

- Advise the City Council on details of new program development that require City action Review progress of the CCAP implementation and report back to the community and to the City
- Provide recommendations for adjustments to the implementation activities
- Update the CCAP every 3-5 years (re do plan the first time after 3 years, and after that every 5 years)
- Assist in identifying and securing funding and resources for CCAP programs

Role of Executive Committee

- Responsibility of being the voice of their respective stakeholder seat
- Responsible for coordinating the other representatives in facilitating involvement from their constituencies in CCAP implementation activities

Sector / Strategies	GHG Methodology and Assumptions	Cost Methodology and Assumptions
Energy Supply		
1. Expand distributed commercial and residential solar PV	Navigant completed an assessment on behalf of Pacific Power titled, *Private Generation Long-Term Resource Assessment (2017-2036)*. This report provides estimates of potential capacity from a variety of distributed electricity generation resources including solar PV for the state of Oregon. The report provides an estimate of market penetration of installed nameplate capacity estimates in megawatts (MW). In the Base Case solar PV capacity in Oregon is estimated at about 330 MW. The Oregon estimate is downscaled, using the ratio of Bend to Oregon population, to estimate Bend's solar potential for the residential and commercial sectors which totals about 10 MW. This generation is used to estimate potential in Central Electric Co-Ops service territory using a ratio of retail electricity sales for CEC and Pacific Power. Emissions savings are calculated using projections of Pacific Power and CEC utility-specific emissions factors between 2020 and 2050.	Residential installation costs, in the Navigant report, are assumed at $3,500 / install kW; and commercial at $2,300 / install kW. Annual fixed O&M Costs assumptions are $25/kW per year for residential and $23/kW for commercial. Systems included in the base case, for all sectors, is assumed to have a 10 year or less simple payback period. Solar PV systems typically have a lifespan of 20 - 35 years. After the payback period, these systems will result in a net savings for the system owner resulting in a negative cost effectiveness, meaning that these systems will reduce emissions and provide a financial savings.
2. Install solar panels on public buildings like schools, libraries, and city buildings	Ameresco performed an initial assessment of a solar PV project for City of Bend and identified 8 potential projects. The assessment estimates electricity generation during the first year of operation (about 1,000 MWh). System generation over the project lifespan is calculated assuming a 30 years lifespan with a 0.5% annual degradation rate. Emissions savings are calculated using projections of Pacific Power utility-specific emissions factors between 2020 and 2050. Similar assessments have not been conducted for other community public buildings.	System costs and revenues are estimated by Ameresco. Initial costs are estimated at $1.3 million with an annual resource savings of $80,000. Simple payback for all projects is between 15 and 22 years.
3. Community purchases all renewable electricity	Between 2019 and 2040, Oregon Senate Bill 1547 requires that Pacific Power provides Oregon customers with coal-free power by 2030 and 50% renewable power by 2040. Emissions savings from SB1547 are calculated and presented as "Existing Oregon Electric Policy" in the table of results. While SB1547 is not an action included in Bend's list of CAP strategies, it is include in the analysis because it will have a significant effect on the community's emissions and determines the quantity of *additional* renewable electricity the community would need to purchase in order to reach a goal of 100% renewable. Emissions reductions from SB1547 are calculated assuming a linear reduction of coal generation in Bend's electricity supply through 2030 and in parallel a linear increase of renewable electricity towards 50% by 2040 versus a business as usual scenario. The non-renewable fraction of Bend electricity in 2040 is assumed to be natural gas generation. No additional reductions are assumed between 2040 and 2050 beyond adjustments for population growth. Emissions reductions for additional community purchase of renewable electricity (i.e., 100% renewable electricity) are calculated as the difference between a BAU scenario and remaining emissions post-implementation of SB1547. Central Electric Co-Op is not considered in this action as its contracts with Bonneville Power Administration are from 95% low-carbon or renewable resources (mostly hydro with some nuclear).	Costs for Pacific Power compliance with SB1547 are not readily available. Costs for additional purchase of renewable electricity credits (RECs) are based on the current range of Pacific Power BlueSky Pricing which is between $7 and $20 per MWh. These values provided an estimate, but future costs are subject to significant change based on a number of factors, such as quantity purchased, year of purchase, generation type and location.
4. Build/explore a biodigester at the wastewater treatment facility	The community's wastewater and brewery waste can be used as the feedstock in an anaerobic digester to generate renewable natural gas. Renewable natural gas provides the same energy as conventional, fossil fuel natural gas with fewer emissions, and once produced and cleaned, can be injected into natural gas pipelines for use in heating equipment or vehicles. Ameresco estimated that Bend could provide about 720,000 therms of renewable natural gas annually. Emissions reductions are calculated for the substitution of renewable for fossil natural gas and adjusted for the energy and emissions generated in the course of producing the renewable natural gas.	System costs include a new anaerobic digester sized for local sources of fats, oils, and greases ($2.5 million); new Deschutes Brewery digester ($5 million); and a gas cleaning system ($5.4 million); along with existing wastewater treatment plan capacity. Revenue from the systems includes sales of the energy (about $900,000 per year, assuming $1.20 / therm) and Federal Renewable Fuel Standard credits at $500,000 annually. Operational costs (labor, energy, and maintenance) for the FOG, brewery, and gas cleaning system are not currently available. Therefore the cost effectiveness value is taken from Center for Climate Solutions report titled *Greenhouse Gas Marginal Abatement Cost Curve Development and Macroeconomic Foundational Modeling for Oregon*.
5. Contract for a natural gas offset program for community gas use (25% participation rate)	Cascade Natural Gas does not currently offer a program for customers to purchase carbon offsets to mitigate the impact of combusting natural gas. Another Oregon natural gas utility, Northwest Natural, does have an ongoing program in partnership with The Climate Trust, called SmartEnergy. To be implemented locally, this strategy would require local parties to staff program development and market research; programmatic implementation; and ongoing administration on monthly billings and annual accounting and administration for carbon credit transactions. Emissions reductions are calculated based on Bend's 2016 consumption of natural gas by the residential and commercial sectors and an assumption that between 2020 and 2030, the community will voluntarily participate in the program reaching a participation rate of 25% for residential and commercial customers by 2030.	Costs for this strategy are based on regulatory-grade carbon offset prices in California's Cap-and-Trade market for the low end. As of May 2019, credits are trading at about $18 per metric ton of reduction. An additional $3 per metric ton is added to account for local administrative program costs (billings; program administration; and accounting). Credit prices on the high end are based on separate Good Company research to develop and administer utility-sponsored, local forestry-related carbon offset projects. Credits for this type of program are estimated at $40 per metric ton. Like the previous $5 per metric ton is added for administrative program costs.
Building Energy Efficiency		
1. Improve voluntary uptake of energy efficiency projects in Bend	Energy Trust of Oregon (on behalf of Pacific Power) and Central Electric Co-Op (on behalf of Bonneville Power Administration) provided energy efficiency programs in Bend. Two sources were considered in estimating energy efficiency resource potential in Bend. The first is annual historic Energy Trust of Oregon energy savings data for project implemented in Bend, which range from annual installed savings of 2,000 MWh to 12,000 MWh and 60,000 to 100,000 therms saved between 2008 and 2018. The second is based on Energy Trust of Oregon's 2014 Energy Efficiency Resource Assessment, which when scaled down for Bend results in an annual average reduction of 6,000 MWh and 125,000 therms. Annual average values from the two sources were very similar and therefore used to project future reductions. Emissions reductions for electricity are calculated using projections of Pacific Power and CEC utility-specific emissions factors between 2020 and 2050.	Energy Trust of Oregon considers three categories of efficiency resources - cost effective, achievable, and technical. Energy Trust of Oregon focuses on developing cost effective resources, or resources that are equal to or less than the cost of wholesale electricity and natural gas in Oregon. A report from Center for Climate Solutions titled *Greenhouse Gas Marginal Abatement Cost Curve Development and Macroeconomic Foundational Modeling for Oregon* considered over 130 individual efficiency measures and found the cost effectiveness for the bulk of the efficiency potential to be between -$50 and $50 per ton reduced. Because ETO programming is focused on cost-effective resources and serves the voluntary market, this strategy is assigned a cost of between -$50 and $0 per ton reduced.
2. Implement benchmarking and disclosure programs for energy performance	Energy benchmarking (e.g., Home Energy Score) measures a building's energy use and motivates the local market to implement voluntary energy efficiency projects. Home Energy Scores are commonly assessed during the home sale process to provide information to potential buyers about the building's energy use and costs. The score can provide a competitive advantage when selling a home as a higher score means more efficiency, fewer costs, and a more comfortable living space. It can be in a seller's best interest to maximize their score to attract buyers and have a competitive advantage over other sellers. Energy Benchmarking provides a motivation to improve voluntary uptake of the cost-effective resources represented in the previous strategy, but may also provide the motivation for owners to go beyond cost-effective resources into more expensive types of projects with longer payback periods in order to achieve a greater score. Emissions reductions for this action are assumed to be equal to the difference between ETO's assessment of cost-effective resources and technical resource potential.	Energy Trust of Oregon considers three categories of efficiency resources - cost effective, achievable, and technical. Energy Trust of Oregon focuses on developing cost effective resources, or resources that are equal to or less than the cost of wholesale electricity and natural gas in Oregon. A report from Center for Climate Solutions titled *Greenhouse Gas Marginal Abatement Cost Curve Development and Macroeconomic Foundational Modeling for Oregon (available for download online)* considered over 130 individual efficiency measures and found the cost effectiveness for the bulk of the efficiency potential to be between -$50 and $50 per ton reduced. Because this strategy might motivate a home owner to participate in ETO programming and may choose higher cost efficiency options to achieve a higher score, this strategy is assigned a cost of between -$50 and $50 per ton reduced.
3. Support policies that increase energy efficiency of buildings, i.e. advocating for stricter energy efficiency state codes	The City of Bend will support the development and implementation of Oregon Zero Energy Ready Building Energy Codes directed by the Oregon Governor Executive Order 17-20. This Executive Order directs appropriate agencies to amend existing code to achieve at least equivalent performance to U.S. Dept. of Energy Zero Ready Standard by 2023. Modeling assumes that code will be in effect for all homes built within Bend between 2025 and 2050. Emissions reductions are calculated assumes DOE Zero Energy Ready Homes are verified by a qualified third-party and are at least 40%-50% more energy efficient than a typical new home. These reductions are applied to current energy use rates for Bend homes and projected forward based on new housing needs detailed in the *Bend Housing Needs Analysis - Bend's Growth to 2028*.	Local costs for this action are not currently available, but are expected to be very low compared to a future business as usual scenario. Technologies and building approaches that are currently expensive will come down in cost by the mid-2020s. In the near-term, costs for this action consist of a fraction of a City FTE to advocate for these policies towards implementation in the mid-2020s. Marginal costs for construction are not considered in this analysis as it is assumed these codes will represent the *minimum* requirements for new construction and therefore comparison with an alternative costs is not applicable.

Waste and Materials		
1. Promote smaller home size with new incentives that encourage building smaller homes.	Choosing smaller housing lowers household carbon footprints from a variety of sources. Smaller houses use less building materials during construction and maintenance. A smaller space also means less heating and cooling requirements over the home's 70+ year lifespan. A smaller space also likely means having to purchase less furniture and other goods to fill the space. Emissions reductions from building materials and energy use are provided by Oregon Department of Environmental Quality's report titled *A Life Cycle Approach to Prioritizing Methods of Preventing Waste from the Residential Construction Sector in the State of Oregon* . This report compares a variety of home square footages, but this strategy assumes that future single family homes in Bend will decrease in size from 2,300 square feet to 1,600. These per unit savings are applied to single family home projections for Bend as reported in *Bend Housing Needs Analysis - Bend's Growth to 2028,* which estimates that about 325 single family homes will be needed annually in Bend. Given Portland State University projections of population growth for Bend, this same rate is assumed through 2050. Emissions reductions are calculated based on the per housing unit reductions detailed in ODEQ's report for building materials and energy use. The same rate of reduction is applied to other consumption-based emissions sources included in *Bend's 2016 Greenhouse Gas Inventory* that will be impacted by a smaller home including furnishings and other goods.	Cost effectiveness for smaller homes is calculated based on cost savings from construction of a smaller space in addition to life-cycle energy use. Building costs are assumed to be $150 per square foot per Homeadvisor.com. Annual energy costs are based on statistics from U.S. Energy Information Administration's, *Residential Energy Consumption Survey,* for appropriately sized homes in Bend's climate zone. Costs for decreased consumption of furniture and other goods are not readily available and therefore are not factored into the estimate, but if they were included would further increase the climate benefit. In other words, this strategy would result in a greater costs savings per unit reduced of climate pollution.
2. Develop outreach and education materials that promote waste prevention (support repair and reuse, reduce wasted food)	In December of 2016, ODEQ released the Strategic Plan for Reuse, Repair, and Extending the Lifespan of Products in Oregon. In the plan, ODEQ cites a 2009 study from the U.K. that found that best practices for "quick wins" for extending the lifespan of products could reduce more than twenty times the greenhouse gas emissions than best practices for commercial and industrial recycling. The study estimates that "product lifespan optimization" could reduce business as usual emissions by 0.7%. To estimate emissions reductions, this value is applied to Bend's 2016 consumption-based emissions for building materials, clothing, furniture, and the other goods categories.	Cost effectiveness for waste prevention, which includes repair and reuse, presented in Center for Climate Strategies report *Greenhouse Gas Marginal Abatement Cost Curve Development and Macroeconomic Foundational Modeling for Oregon* found the cost effectiveness of waste prevention at -$270 / MT CO_2e ($270 is saved for every ton of emissions reduction).
3. Improve waste recovery (assumes food waste to composting and wood waste to energy production)	Between now and 2025, Deschutes County will need to increase the landfill recovery of materials from 33% to 45% of total collected materials. The Deschutes County Solid Waste Mater Plan (DRAFT July 2018) details the materials of focus to meet these recovery goals - which include food waste, construction and demolition waste (e.g. wood waste), and also mentions textiles. There are additional Oregon sub-goals of 25% recovery of food waste by 2020 and 25% of plastics waste by 2025, as well as decreasing total waste generation by 15% by 2025 (compared to 2012) and 40% by 2050. Bend's current SWMP focuses on achieving its County-specific recovery goal and does not offer much planning toward the generation goal. Therefore emissions calculations here focus on recovery goals. Calculations of emissions reductions use EPA's Waste Reduction Model combined with assumptions based on Oregon sub-goals for food waste and plastics recovery using future projected solid waste totals from the County's DRAFT SWMP. Calculations assume 50% of food waste to be composted, 50% of wood waste used for energy production, additional 25% of plastics recycled, as well as additional paper, glass, and metals recycled due to population increases. Reductions towards reducing the total waste generation rate are not considered in this analysis as no detailed planning of towards this goal is included in the County's current draft of the SWMP.	Costs for this action are not readily available.
Transportation		
1. Increase bicycle and pedestrian trips as transportation mode	Substituting a bicycle for a car for trips that are less than 3 miles is one of the most effective climate actions that both saves money and improves health. Currently 23% of Bend's streets are considered "low stress" and 77% are considered "high stress" for biking. The City of Bend has made a commitment to developing a low stress bike network to prevent crashes, increase bike ridership, and facilitate livability. To achieve Oregon's climate goals of Oregon Sustainable Transportation Strategy, 30% of trips need to be by bike by 2050. As of 2016, Bend community bike trips are less than 4% of the total. Whether Oregon reaches this goal is the combination of safe infrastructure and individual transportation choices. The City is doing its part to develop safe and connected bike infrastructure, but the Bend community at large will need to participate in order to realize the emissions reduction potential of the low stress bike network. Emissions reductions for this action are calculated based on fuel savings from vehicles. On a mile for mile basis this calculation is relatively straight-forward. The difficult part in modeling emissions reductions from bike trips is trying to predict the percentage of trips and vehicle miles traveled (VMT) that will be substituted with bikes trips once the infrastructure is developed. This shift depends on many factors that are difficult to quantify; therefore this analysis considers 3 levels of change: 5% of VMT shifts to bike by 2050; 10% of VMT by 2050; and 15% of VMT by 2050, alongside the 30% state goal.	Costs for are assumed to be equal to the revenue available for stand alone bike and ped upgrades reported in 2040 Bend Metropolitan Transportation Plan, Table EX1, as $15,000,000 between now and 2040.
2. Support the transition to EV's with an EV Readiness Plan	Electric vehicle technology is progressing rapidly - increasing battery range and reducing production costs. This will reduce the cost of electric vehicles and increase the number and type of styles available for purchase. It is difficult to predict how rapidly EVs will replace conventional fossil fuel combustion vehicles, so emissions reductions for this strategy are calculated for 3 levels of change; by 2050: 10% of vehicle miles traveled (VMT); 25% of VMT; and 50% of VMT; all alongside the 94% state goal. Current EV and hybrid registrations in Deschutes County are about 4% of total, as reported by Oregon Department of Environmental Quality for Oregon's Clean Fuels Program. Emission reductions are calculated based on levels of change as applied to projected VMT in 2030. The ratio of carbon scores for electricity and gasoline (E10) used to calculate emissions reductions are taken from Oregon Clean Fuels Program reporting.	Costs are based on previous Good Company work for the City of *Eugene's Fleet Division and Fire Department Climate Action Plan (available for download online)* . That plan includes EV technology and market research for a variety of vehicle types as well as a number of scenarios that consider a range of initial vehicle costs combined with various combinations of Federal, State, and local utility financial incentives. This research found a range between -$50 per ton for small passenger vehicles at current market prices for new EVs combined with all currently available incentives up to $75 per ton for larger vehicles without available incentives. These prices include consideration of consider reduced fuel and maintenance costs for EVs compared to internal combustion engines per reporting from Argonne National Laboratory's AFLEET tool as well as charger and infrastructure costs.
3. Increase transit ridership	Between 2020 and 2040 Cascade East Transit plans a 60% increase in the frequency of service for fixed routes within the City of Bend. No additional routes are current planned within the City. In addition, modeling done for Bend's TSP predicts a 1.7% increase in ridership by 2040. Emissions reductions for this strategy are calculated with information provided by Cascade East Transit staff; the 2016 National Transit Database (NTD); and an emissions benefits calculator for transit developed by Transit Cooperative Research Program. The tool was used to calculate the baseline transit benefit in Bend for 2016 as well as the benefit with increased service frequency, ridership, and Bend population in 2050.	Costs for this strategy are based on all current CET operational costs for Bend bus service. These costs were used as a ratio with CET service miles to estimate future costs for additional service miles.
4. Convert City and other public agency fleets to electric vehicles and alternative	This strategy assumes that by 2030, the City's gasoline use (E10) will be 100% substituted with electric vehicles and that 100% of fossil diesel use (B5) is substituted with renewable biodiesel (R99). Fuel use data was provided by the City and Oregon Department of Environmental Quality, and fuel carbon scores from the Clean Fuels Program are used to estimate emissions reductions.	Costs for this strategy are based on previous Good Company research performed in development of City of Eugene's Fleet Division and Fire Department Climate Action Plan. Light-duty electric vehicles and renewable diesel are considered for a variety of cost scenarios for these two fuels. Details of this work are included in the plan, which is available for download at https://www.eugene-or.gov/DocumentCenter/View/38211/Eugene-Fleet-Division-and-Fire-Department-Internal-Climate-Action-Plan (as of 6/2019).