Climate & Energy Action Plan (CEAP) Report 2025

ABSTRACT

Ashland's Climate and Energy Action Plan (CEAP) provides a strong foundation for greenhouse gas (GHG) reduction and climate resilience work. While the CEAP's core strategies and actions remain relevant, the use of certain protocols and metrics impede pragmatic action. This report identifies areas for refinement to better align principles with our practice. Additionally, it reports on our status and provides a path forward for locally achievable and measurable progress in reducing emissions.

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CITY OF ASHLAND
Better Together

Executive Summary

We have a good plan in the CEAP. However, it is not perfect and needs to be reviewed and reimagined as we work towards the goal of reducing GHG emissions as close to zero as possible. Previous CEAP reports align with what is presented below, but this report provides a reevaluation of underlying assumptions and reassess indicators. The goal of this report is to redirect the CEAP to better reflect ongoing efforts and provide rationales for this work. The vast majority of the CEAP is still relevant, including all 26 strategies and 65 priority actions. However, it does not always allow for locally achievable and measurable goals and a few changes can make this more accessible.

These changes include:

- Discarding the annual 8% average GHG reduction goal for the Ashland Community (but not the overarching goal of reducing GHG's citywide).
- Removing consumption emission targets from the local inventory.
- Changing the electricity emissions factor to represent local usage due to the unique nature of Ashland's electric supply.
- Move to a new metric for measuring transportation emissions reductions that can be locally measurable on an annual basis.
- Add small engines emissions as a new secondary focus area.

Making these changes helps filter our focus into 3 primary focus areas and 4 secondary focus areas, which closely resemble the sector-based emissions on page 21 of the CEAP.

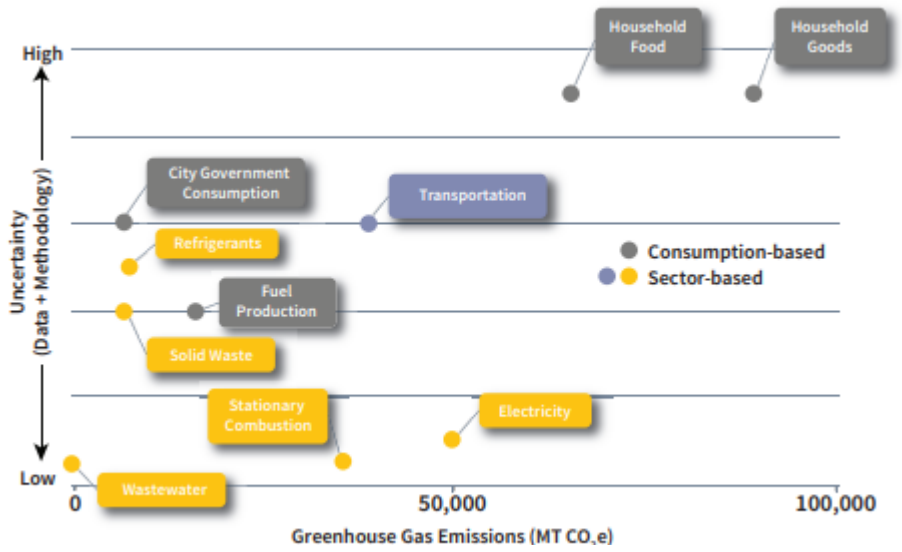


Figure 1 CEAP - Sector & Consumption emissions

Primary Focus Areas:

- The three primary focus areas allow for the greatest local impact. These include Natural Gas, Transportation and Electricity. They also have or could have locally measurable metrics against which to benchmark progress.
- They are the only areas which will be measured in an inventory manner at this point and align with where most city programs are focused.
- Of the three primary areas of focus, Natural Gas and Transportation Emissions reflect our greatest areas to reduce GHG emissions. These decarbonization efforts both have pathways forward, which are becoming more cost competitive every year.

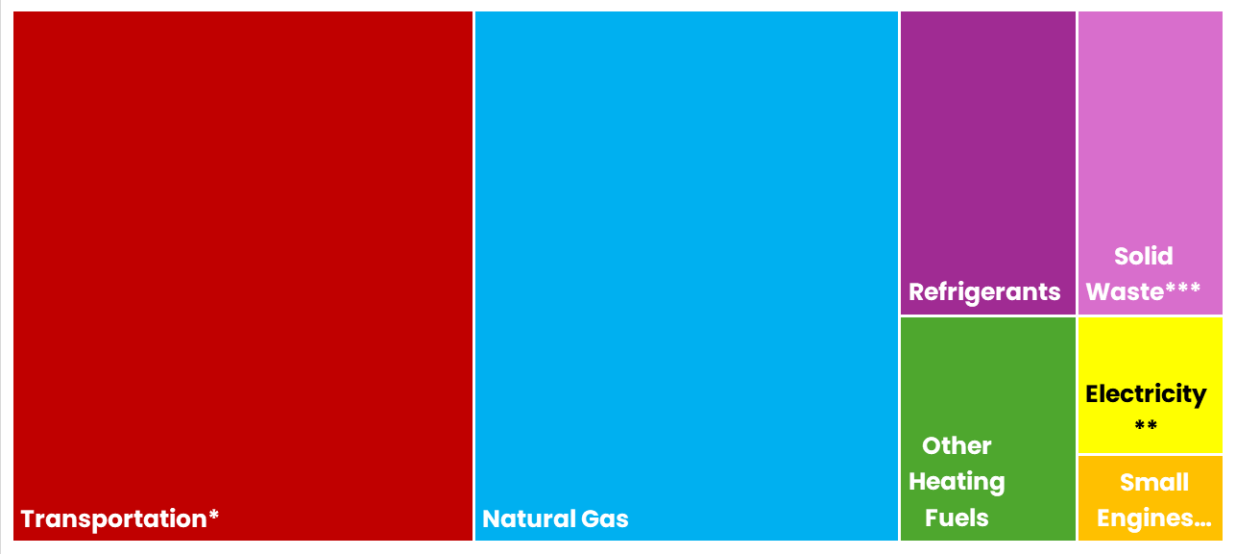


*Figure 2: Primary & Secondary Focus Areas for GHG reductions. Area represents relative emissions quantity. See page 14 for * ** *** definitions.*

Other Focus Areas:

- The secondary focus areas include waste, refrigerants, other heating fuels (primarily heating oil and propane), and small engines.
- These secondary focus area emissions can be worked on locally, but most are not readily measured and do not lend themselves to an annual inventory (waste being the area most likely to be included in the measured inventory next due to the likelihood of locally measurable data – more work must be done on this front).
- The tertiary focus areas, including air transportation and residential food and goods, are difficult to both measure and impact locally. They rely on

extrapolated data and are difficult to impact through city actions because they are largely personal choices and rely on upstream decisions.

- Outreach and education are useful tools for all focus areas and are the only practical tools for some areas, making it integral to all activities.
- City as a leader:
    - As noted above, this report focuses on the community measures because they are a much bigger portion of the citywide emissions pie.
    - A deeper dive into city data in a future update is planned.

Current Status:

- Natural Gas Emissions are possibly going up, but our most recent information is from 2020. Obtaining this information is critical to understand our progress in reducing GHG's. We have successful fuel switching incentives that align well with federal incentives. Additionally, we have a unique loan program that will be launched in 2025 that should greatly help on this front as existing homes and businesses are the major source of natural gas emissions.
- There is progress being made on the transportation front, with Ashland being home to many early adopters of electric vehicles, and this trend should continue to accelerate.
- Electric emissions and consumption are trending downward, while local renewable energy production keeps making gains every year.

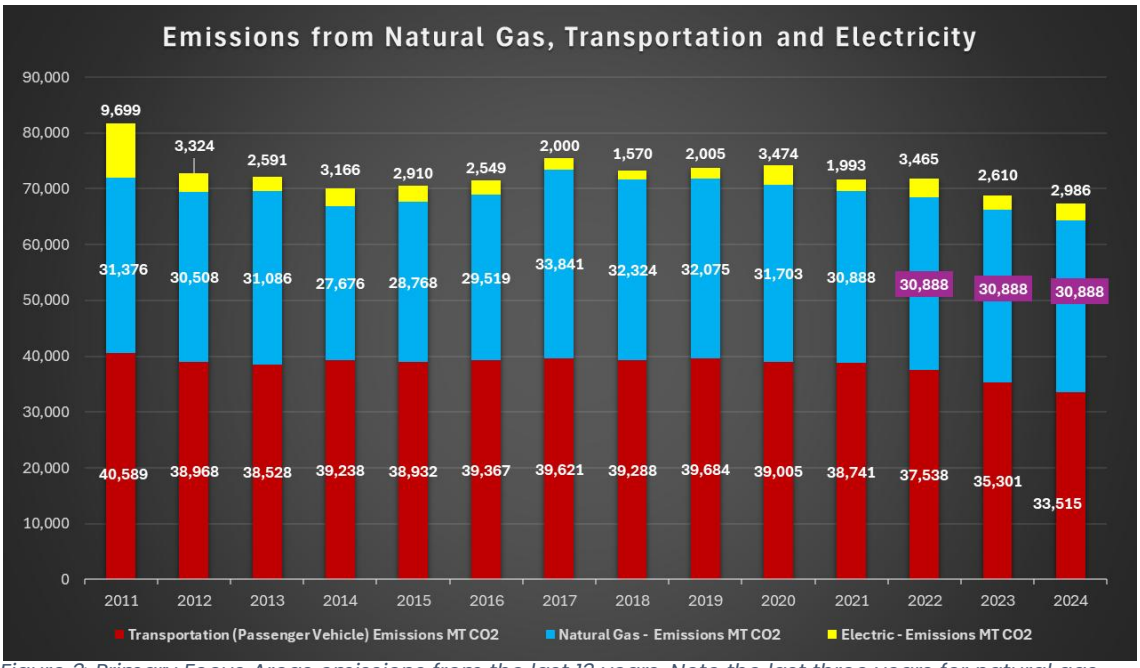


Figure 3: Primary Focus Areas emissions from the last 13 years. Note the last three years for natural gas represent the average over the previous 9 years.

Next Steps

We know what we must do right now, reduce our fossil fuel emissions as quickly as possible and replace that energy with carbon-free energy. The good news is these are the areas that we are focusing on. There is a path to decarbonize our homes and businesses and there is a positive trend in decarbonizing our transportation.

This report contains some benchmarks and projections that seem attainable. We need to work on the programs that we have, expand when we can and ensure that our work continues. We must reassess our plan and progress to account for new ideas, information and technology. If we hope to reach our goals faster or expand our work, it will require more resources.

We are making progress, yet we have much to do.

Introduction

Ashland's Climate and Energy Action Plan (CEAP) is the foundational document for our climate work and has two main goals: reducing greenhouse gases (GHGs) and creating resilience to climate impacts. This report will focus on the former – how we should reduce our GHG emissions.[1] This document is part CEAP analysis, part update on CEAP progress, part implementation plan, and part climate action budgeting tool.

The CEAP's GHG inventory is very comprehensive. Probably to be much to use for setting actionable and attainable goals. This report will try to make the Community portion of the CEAP GHG inventory more accessible and create better alignment with how other communities are now focusing their efforts. More important, it will help focus on what is attainable for Ashland. The good news is that our current ongoing work aligns very well with this analysis of the CEAP.

How is Ashland doing in reaching its climate goals?

A recurring experience in the world of climate work is the existence of seemingly opposite statements that are both true. Working in this paradoxical field requires objective analysis of the situation to assess, plan and implement projects.

Our first paradox pits what Ashland is doing versus what citizens think it should be doing. Ashland is viewed as a leader in climate and energy conservation work. It has one of the longest running solar energy and energy efficiency programs, active fuel switching incentives, a generous e-bike incentive program, and the highest paying electric vehicle incentive in the state. When accounting for the size of our city and number of staff it is truly remarkable what we are accomplishing!

On the other hand, there are concerns that we are not doing enough and that we are falling behind in meeting our Climate and Energy Action Plan (CEAP) goals. These concerns are also likely valid, at least in some key areas. Both foregoing statements

[1] The City of Ashland Fire Department has done a tremendous amount of work on climate resilience and preparedness in our fire prone region. In addition, we have a water conservation program that has helped numerous residents increase their efficient use of water and proper disposal of contaminants. Both programs are easily found at our website – www.ashlandoregon.gov.

are likely true, so how do we reconcile this? A good place to start is a better understanding of our situation, and to do so requires a review of the CEAP.

The CEAP

Choices

Can we measure our progress to determine if Ashland is genuinely on track to meet its goals? An initial observation is that in the CEAP, many of the graphs have combined information for simplicity's sake. However, when you consolidate information, you are making choices in what data to combine. Due to this combination of data, figure 3 does not lend itself to measure our progress, and we must step back and look at the background data.

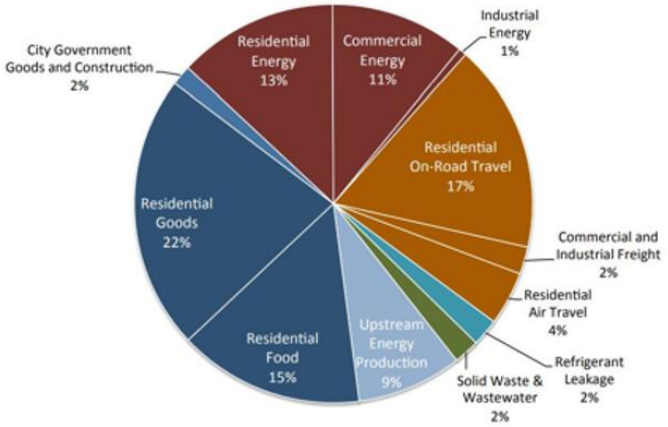


Figure 3: CEAP GHG Inventory.

The 2015 greenhouse gas (GHG) inventory used in the CEAP on pages 8 and 20 is the starting point for measuring our climate progress (8% reductions per year). The pie chart in figure 3 is the grouping of 55 different inventory measurements.[2] Many of which are done using extrapolated national data.

The energy slices of pie combine both electric usage and stationary combustion (natural gas, propane and fuel oil). In other words, combining fossil fuel energy and mostly low emission electricity (more on this later).

Fortunately, the original data is available to better understand how each piece of the pie chart was created. This allows for the reconstruction of a pie chart to help direct our work.[3] We can use the underlying data to make sensible changes where needed. Additionally, the data contains other information such as what "scope" the emissions

[2] https://ashlandor.opengov.com/data/#/27434/query=076C90BDE0EC16B9DB3C85C8644D41F1&embed=n

[3] https://ashlandor.opengov.com/data/#/27434/query=A503AC86D9FE446A366DDC001771C40E&embed=n

are. Scope matters in that it helps you understand what portions of your GHG inventory you impact can most.[4]

The CEAP strategies and actions are sound and most of the document remains sound. After analyzing the data, we need to adjust our metrics to help us track our local emissions and make progress.

Areas to improve.

8%/year

After carefully reading through the CEAP and its appendices it became clear that the goal for the Ashland Community to reduce community greenhouse gas emissions by 8% on average every year to 2050 is impossible as presented. This is largely due to emissions and strategies discussed below that we have little control over. If we were to maintain the 8% then it should only be for those emissions that we can locally impact, regularly measure and track progress against. However, ***it would be better to focus on different benchmarks than the 8% reduction but will still help us reach our goal of reducing our emissions*** to as close to zero as possible as soon as possible.

Additionally, we must acknowledge that we should not expect 8% on average every year until 2050 as it takes time for new technology to become widely implemented. Our task is like pushing an object. We begin to push and create momentum towards the goal, and, over time, we will move more quickly towards our goal. An example of what progress will look like is the transportation graphs below which demonstrate accelerated progress as we move forward.

Consumption Based Emissions

The blue sections of the pie chart in figure 3 above labeled 'Residential Foods' and 'Residential Goods' represent emissions associated with the manufacture and transport of items that almost entirely come from outside Ashland. Similarly, the

[4] https://www.epa.gov/climateleadership/scopes-1-2-and-3-emissions-inventorying-and-guidance Generally speaking, Scope 1 emissions occur locally and are most easily impacted by local decisions (burning natural gas or fueling your car), Scope 2 occur offsite but can be impacted by decisions (utility electric purchases), while Scope 3 emissions are largely outside of local control and difficult to measure locally (the emissions it took to manufacture and deliver your refrigerator).

'Upstream Energy Production' is related to the extraction and production of fuel products. Together these represent around 47% of the pie chart that we have limited ability to directly influence local city actions and an inability to measure change at the local level. Again, the CEAP strategies and actions on these areas are sound and should be pursued, however, to try and measure local GHG reductions on these would be difficult at best. ***Consumption emissions should be omitted when trying to measure progress locally.***

Electricity Emissions Factor

The CEAP chose to use carbon intensity of the Northwest Power Pool (NWPP) because the GHG inventory protocols require our electricity be reported this way unless we also purchase the separately sold environmental benefits of the energy. Therefore, in the CEAP our electric emissions are calculated at 0.288 Metric Tons of co2e (Carbon Dioxide Equivalent)/MWh, compared to the emissions of the energy used by the electricity of 0.018 MT co2e/MWh (16 times cleaner if measured this way).[5]

Figure A3: Comparison of Utility-Specific and Regional Grid emissions factors.

Type of Emissions Factors (MT CO2e / MWh)	2011	2012	2013	2014	2015
Ashland Utility	0.080	0.039	0.044	0.039	0.039*
Regional Grid (NWPP)	0.373	0.304	0.304*	0.304*	0.304*
NWWP Grid (REC adjusted)	0.355	0.288	0.288*	0.288*	0.288*

*Indicates previous year's factor used as proxy. Most recent EPA eGRID factor for NWPP is 2012.
Likewise 2015 data from BPA for Ashland's inventory is not available.

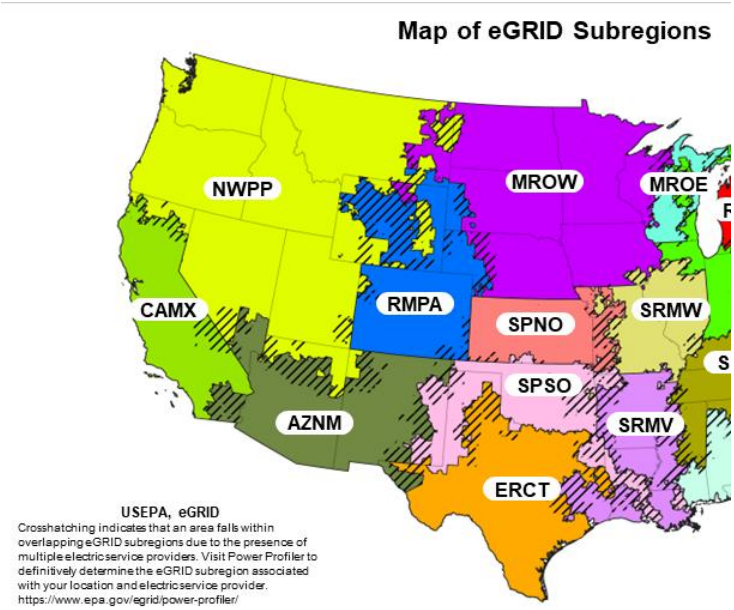
The authors of the GHG inventory (Appendix D of the CEAP) recognized this paradox of buying clean energy and not getting to claim the benefits and advised "…it is not recommended that Ashland continue to conduct this inventory in the future."[6]

This leads to another change from how the CEAP is written now to what should be included. The GHG inventory states this succinctly, while discussing electric supply. The report states that:

> *Focusing on supply is not as appropriate or useful for small, publicly owned utilities served by BPA. For these utilities, it could be argued that the* ***focus***

[5] https://ashlandoregon.gov/DocumentCenter/View/1733/CEAP-With-Appendices- at 400/32. The 0.018 Emissions Factor is the average for the past 14 years.
[6] https://ashlandoregon.gov/DocumentCenter/View/1733/CEAP-With-Appendices- at 401/33.

should be on energy efficiency and conservation, and cost effective, local renewable generation. *In other words - efforts to reduce peak and overall demand by Ashland for grid generated electricity. By reducing demand for grid power, low-carbon BPA electricity can be redirected back to the regional grid to reduce the need for generation from fossil fuels; thereby lowering emissions from the regional electricity grid.*[7] (emphasis added)



The GHG inventory recommends not tracking this data, because it leads to either an unlikely scenario or an impossible task. Using the NWPP carbon intensity to calculate electric emissions, as done in the CEAP, requires that the entire NWPP region is also reducing its emissions on the same timeline as Ashland. If the rest of the NWPP region lags in reducing carbon intensity of the gird, then so does Ashland's progress. Even if our city of 20,000 had zero electric emissions, it would not offset the entire region's emissions, thus making the NWPP emissions an impractical metric.

The Oregon Department of Environmental Quality's (DEQ) Clean Fuels Program calculates Ashland's electric carbon intensity with a much lower number than the NWPP number and was used in the comparison above.[8] Changing how we measure our electricity GHG emissions greatly reduces the emissions associated with electricity and the areas that we should focus our efforts on. Therefore, ***for the purposes of tracking electric consumption we should use the emissions factor calculated by DEQ, which represents the emissions of the electricity purchased.***

While tracking electric energy usage may not show much change in emissions there is value in watching local usage and comparing it to local production. We will want to observe how much our electric consumption goes up as electrification of buildings and transportation increases. Also, it will be beneficial to know how much

[7] https://ashlandoregon.gov/DocumentCenter/View/1733/CEAP-With-Appendices- at 401/33.
[8] https://www.oregon.gov/deq/ghgp/Documents/cfpElectricCIV2023.pdf

energy consumption we are offsetting with local production. Finally, we need to make it easy and affordable to electrify your home.

Separating Energy Types

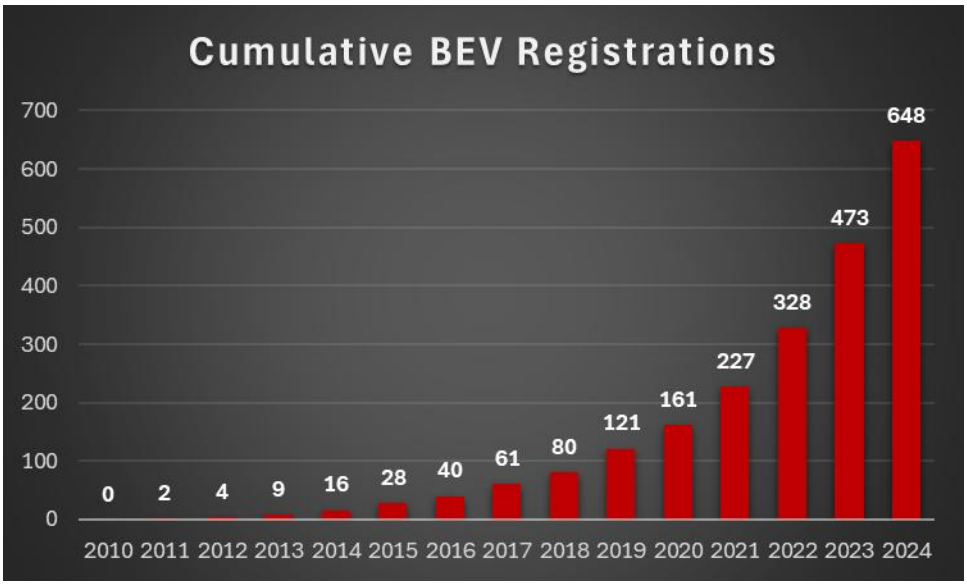
Energy consumption in the CEAP pie chart combines both stationary combustion fuels (natural gas, propane and fuel oil) along with electricity. These are different sources of energy and should be tracked separately. Furthermore, natural gas represents the primary stationary combustion fuel (over 91 %) in our GHG inventory and is also a measurable (or should be measurable) emissions source.[9] The usage of propane and fuel oil is limited in scope and is on its way to obsolescence in most applications and are targeted by the same climate actions as natural gas. Therefore, natural gas should be a primary focus of measuring emissions and tracking progress for stationary combustion fuels and electricity will be the tracked separately.

Transportation

Finally, the last major change identified is transportation emissions. My review identified the need to change how we track these emissions so that we can locally track our reductions and create benchmarks to track progress towards our goals.

In the CEAP, Transportation GHG numbers are based on total vehicle miles traveled (VMTs) in Ashland using a regional model. This data is problematic in a couple of ways. First, the data included several different travel patterns beyond Ashland residents travel patterns, which makes measuring local impacts difficult. Second, the ***CEAP methodology did not account for emissions reductions by using a plug-in hybrid electric vehicle (PHEV) or battery electric vehicle (BEV)***. The adoption of zero and low emission vehicles is where we can make the most emission reduction changes. Previous CEAP reports and the GHG inventory acknowledge that emission reductions from PHEV and BEV would provide a more complete picture.

[9] Until 2020 Avista, our local franchise provider of natural gas, was providing both total therms consumed in the city and the number of meters. This was further broken down by residential and commercial uses. Avista, has never been explicitly obligated to share this information, and has chosen to not share this information any longer, even with repeated requests for this data which is critical in measuring our climate progress.



Shifting to a newer data set that can parse out travel by those within a district boundary solves the first problem above. Using this data would allow for a baseline for local passenger vehicle emissions. From this, we can utilize PHEV and BEV registration data to calculate emissions reductions. This would allow for local measurement of emissions reductions based on the use of PHEVs and BEVs. VMT data is still useful by itself and reducing our VMT's is still a legitimate stand-alone goal, however we can measure progress now in the area where the greatest emission reductions can be made.[10]

How Do We Focus on Our Climate Work

Making the above changes will help to create clearer data to use for stationary combustion of fossil fuel, transportation emissions reductions and electric generation and readiness. A major focus on our climate work is decarbonization as carbon-based pollution is the primary driver of climate change. As such, focusing on the combustion of fossil fuels in both stationary combustion and transportation settings is the clear focus. These two areas we can impact and measure locally and we should be putting a proportionate amount of time, money and effort into getting as close to zero as possible on these two fronts. We should also consider and focus on other areas when we have either a quick and measurable impact, or opportunity warrants our focus.

[10] https://www.transportation.gov/sites/dot.gov/files/2024-01/CuttingCarbonOregonDOT.pdf

Primary Focus

1	Natural Gas
2	Transportation*
3	Electricity**

This leaves us with three areas to primarily focus on –natural gas emissions, transportation emissions and electric emissions. These areas demonstrate where progress can be made and measured in reducing emissions, increasing conservation, increasing local clean energy, reducing costs and decarbonizing our energy source. ***Natural gas and transportation represent our greatest areas to reduce GHG emissions through decarbonization.*** Additionally, conserving local electricity, increasing local production, and ensuring the readiness of our electric system will be essential as demand increases.

Secondary Focus

4	Solid Waste***
5	Refrigerants
6	Other Heating Fuels
7	Small Engines****

There are areas of secondary focus that are not included in the emission reductions calculations at this point. They are important to work on, however there are difficulties or limiting factors with each of these that demote them to the secondary focus status. This focus area includes solid waste, refrigerant leakage, other stationary heating fuels, and small engine emissions.[11] ***The leading candidate of this group for inclusion into the annually measured metrics would be the waste category.*** It has been included in other cities' inventories on their relatively short GHG inventory lists and has data that can be measured.[12]

[11] Small engine emissions were not included in the CEAP but have a sizeable impact and can be readily mitigated in some situations. Meanwhile the waste category is often in the form of methane which presents a different calculus in combating climate change.

[12] See page 10 here: https://www.losaltoshills.ca.gov/DocumentCenter/View/1518/LAH-Green-House-Gas-Emission-Inventory?bidId=; see also https://ftcollinscap.clearpointstrategy.com/#:~:text=Welcome%20to%20the%20Fort%20Collins%20Climate%20Dashboard,%20a%20snapshot%20of

Tertiary Focus

8	**Air Travel**
9	**Household Foods & Goods**

Finally, there are important areas that are difficult to change because they largely depend on personal choices and upstream actions that are beyond our control. These tertiary focus elements include air travel by Ashland residents and consumption behaviors. These areas should be the focus of reductions because the numbers are so large. However, they should not be included in our GHG emission reduction numbers because of the lack of local impact and due to the use of extrapolated national data. ***We can focus on these areas with outreach and education mechanisms, hopefully leading to voluntary reductions, lifestyle changes, upstream changes and offsets.*** Oregon Department Environmental Quality recently created a report on Consumption Based GHG emissions and the need to work on this complex and difficult area. State leadership is welcome on this front.[13]

Special Focus

An area of special focus is the ***City of Ashland leading by example***. While a small percentage of the original CEAP ghg emissions inventory, it is an area where internal policy and choices are within our control and therefore many areas can be targeted including consumption behaviors. A report on City operations will be included in the future.

Not Included

The last area to mention is that of upstream impacts. While it is hard for local changes to impact these items directly (such as electricity line loss), our downstream actions will resonate upstream as implicit benefits. The less electricity used, the less line loss there is. The less natural gas consumed, the reduction on the global scale of GHG emissions is more than doubled due to the upstream impacts of methane leakage (more on this below). ***Upstream impacts matter and are best***

[13] https://www.oregon.gov/deq/mm/Documents/mm-Reporton2021CBEI.pdf#:~:text=%E2%80%A2%20In%201990,%20Oregon%E2%80%99s%20consumption-based%20emissions%20were%20only%20about%205

addressed by focusing on the local impacts that create the upstream demand. This local focus can have both significant local and upstream impacts.

Category	Rank	Priority Level	Focus Area	Scope (1, 2, 3)	Sector or Consumption based emissions	GHG emissions in Metric Tons of CO2E	% of Primary	% of Primary & Secondary
Community	1	Primary	Natural Gas	1	Sector	30,888.00	45.98	35.14
	2	Primary	Transportation*	1 & 3	Sector	33,515.00	49.90	38.12
	3	Primary	Electricity**	2	Sector	2,768.00	4.12	3.15
	4	Secondary	Solid Waste***	3	Sector	6,141.80		6.99
	5	Secondary	Refrigerants	1	Sector	7,389.50		8.41
	6	Secondary	Other Heating Fuels	1	Sector	5,445.90		6.19
	7	Secondary	Small Engines****	1	Sector	1,761.92		2.00
	8	Tertiary	Air Travel	3	Consumption	14,350.00		
	9	Tertiary	Household Foods & Goods	3	Consumption	173,028.70		
City		Special	City as Leader*****	All	Both			
			Primary			67,171.00		
			Primary & Secondary			87,910.12		
			Primary & Secondary & Tertiary			275,288.82		

If not noted elsewhere, numbers are taking from the GHG inventory from 2015

*Calculated using modeled miles by Ashland residents, registration extrapolations, and reductions from PHEV and BEV vehicles

**Calculated using Oregon Dept. of Environmental Quality Direct Emission numbers

***Calculating methane as 28x Global Warming Potential over 100 years - If multiplied by 80 for the shorter time span = 17,547 mt/co2e.

****Data extrapolated from state estimates on a per capita basis

*****City numbers incorporated in other numbers - will be a separate analysis. Originally estimated as 10,716 mt of CO2E in the CEAP.

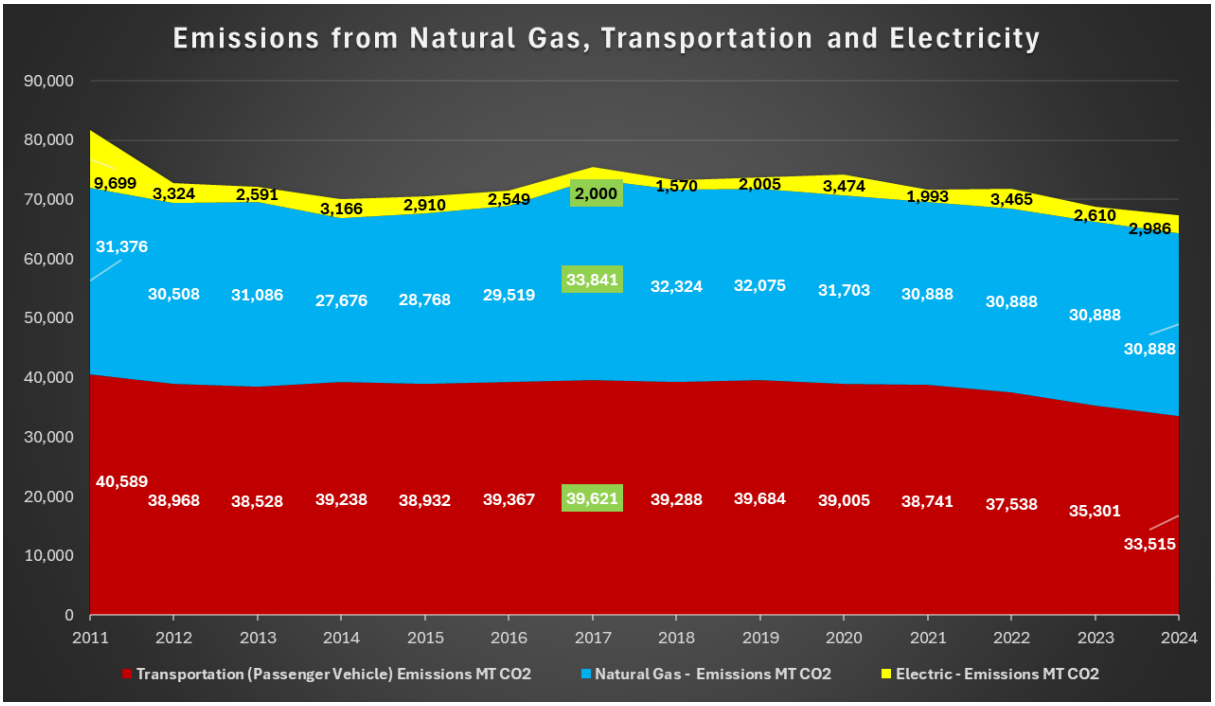
Non-focus categories: Off road vehicles, upstream power and transportation, NWPP energy difference (42,000) = 72,856 mt/co2e.

No upstream numbers for stationary combustion (methane leakage for NG) included in the original GHG inventory

Climate Progress

There is progress being made, but it does not reflect the 8% change the CEAP calls for. As noted above, this may not be the best way to measure progress and instead we need to create a pathway forward and use projections to determine if more effort will be needed to meet our goals. How fast we can move forward will depend on funding, staffing, technological advancements and public input.

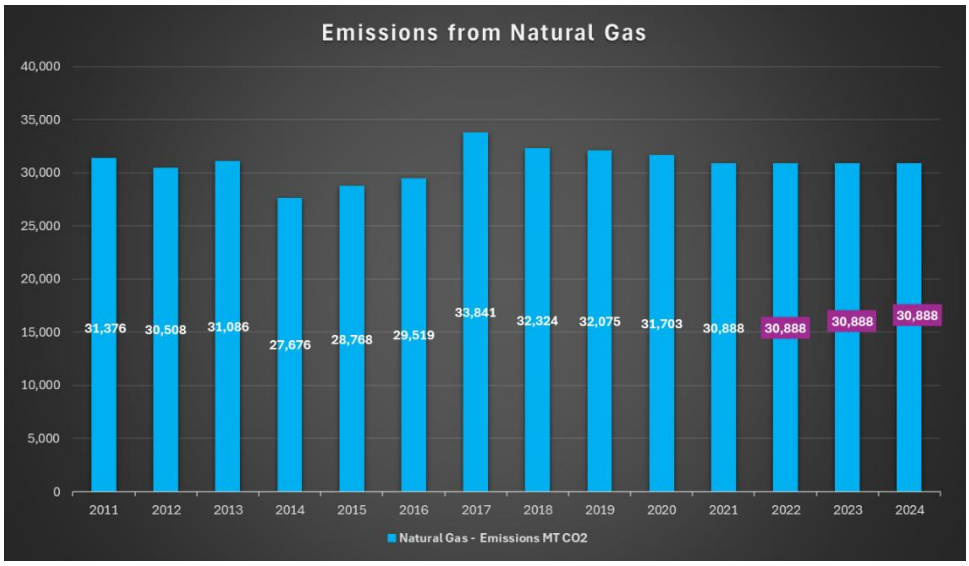
Regarding our primary focus areas, we are making inroads on transportation goals, and it seems likely we will be able to meet or get close to our 2050 goals. Natural gas consumption, the single largest source of stationary combustion fuel, is both an area of concern and difficult to measure. Our electric consumption and local production are both areas to be proud of as we have a low carbon source of energy and local production has shown incredible growth.



Natural Gas

We don't know exactly what our citywide consumption of natural gas is because these numbers have not been shared for the past three plus years. As noted earlier, Avista has decided not to voluntarily share this information even though it has been requested multiple times. Previously, Avista, our natural gas franchise provider, had shared the total therms of natural gas used and total meters installed. Each data point was further broken down by commercial and residential use. This data was helpful to determine trends regarding usage and carbon emissions related to our GHG inventory. The last data was provided in 2020; in the future this data should be required as part of any agreement so that we can better track natural gas (carbon) reductions. Therefore, the most recent years are represented by the average consumption from 2011-2020 and highlighted in purple.

The best information available since 2020 is data modeling based on heating degree days, Avista rates and franchise fee payments. This modeled data shows a trendline with a slow increase in natural gas usage. This is exactly what we don't want to see as we are trying to reduce carbon emissions. ***We may be going the wrong direction on this key emission since the implementation of the CEAP in 2017.***

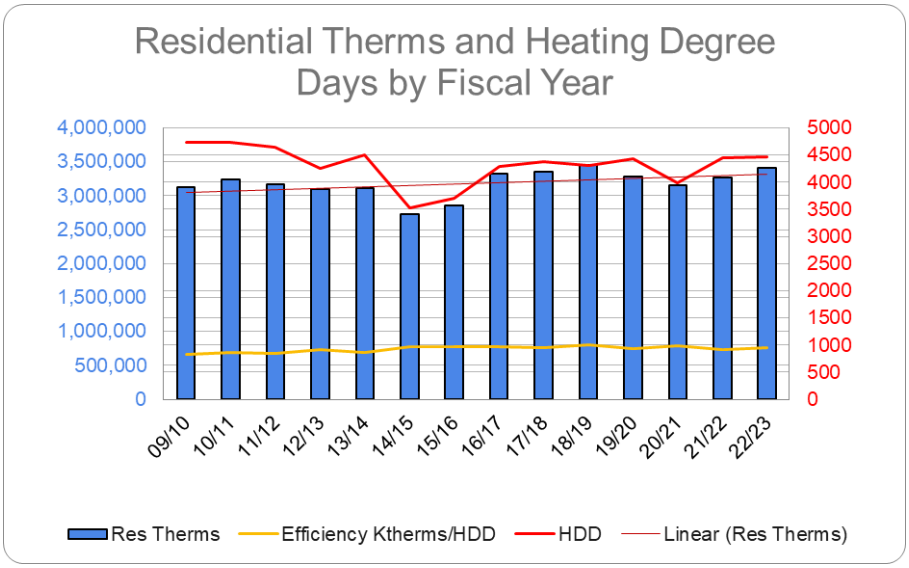


While discussing natural gas it is important to remember a couple of points. Natural gas is primarily composed of methane. In our original GHG inventory, the upstream impacts of natural gas were not calculated. Even at the EPA's more modest estimations of leakage of methane at wellheads and through distribution, the emissions of leakage (calculated as methane for unburned natural gas) over the short term are greater than emission of all the burned natural gas (emitted as carbon emissions) due to the much higher global warming potential of methane.[14] We are not targeting upstream energy emissions, however if calculated, this would have further changed the pie graph in our original GHG inventory and our current metrics to focus on natural gas.

Related to this, is the incidental upstream benefits of reducing our carbon emissions from natural gas. There is a strong argument that focus should be placed more heavily on methane related emissions because methane is a short lived GHG which,

[14]https://pubs.acs.org/doi/10.1021/acs.est.0c00437#:~:text=We%20estimate%20methane%20emissions%20from%20U.S.%20local%20distribution%20natural%20gas; 1.4% leakage x 80 = 112 co2e vs 98.6% x 1 = 98.6 co2e.

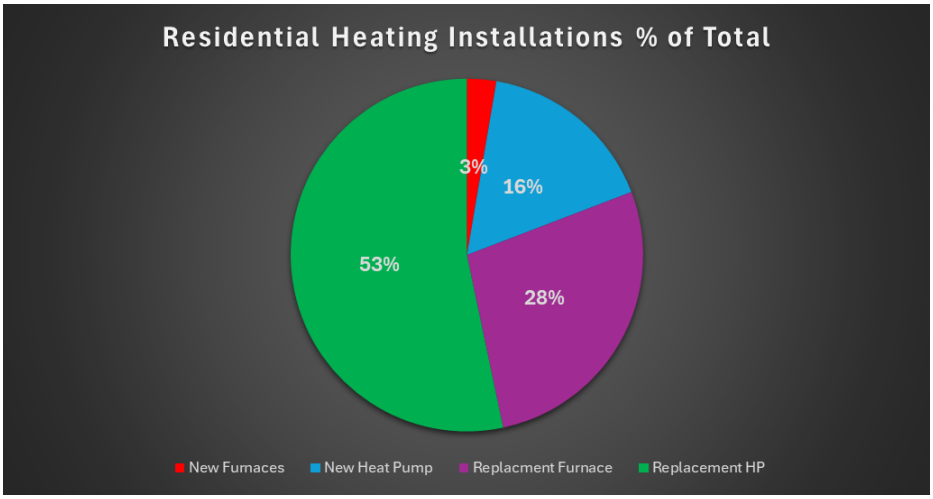
if reduced quickly could yield benefits in helping mitigate short term warming.[15] Stanford professor Rob Jackson, states that "we can restore the atmosphere to preindustrial levels for gasses like methane. Doing so would save half a degree Celsius of warming and could happen in our lifetimes."[16] Both of these points emphasize that ***decarbonizing our buildings from stationary fossil fuel combustion is a primary focus and the number one target overall.***



This fact is only further emphasized when you change the timing of measuring GHGs. If looked at a 20-year period of emissions (rather than a 100-year period), methane emissions have an even higher carbon dioxide equivalent (co2e, aka global warming potential). This presents another paradox of weighing long lasting carbon emissions against short lived, more potent methane emissions related to the production and distribution of natural gas. When considering these methane emissions, it can help tilt the scales of where to focus. In our situation, working on both the carbon emissions of burning natural gas and the upstream methane emissions are in alignment and further help us prioritize natural gas emissions as the primary target.

[15] https://woods.stanford.edu/news/methane-removal-stanford-led-research-reveals-potential-overlooked-climate-change-solution#:~:text=Two%20new%20Stanford-led%20studies%20could%20help%20pave%20the%20way%20by

[16] https://woods.stanford.edu/news/clear-blue-sky-moving-climate-despair-climate-repair#:~:text=The%20Last%20Judgment,%20Michelangelo%E2%80%99s%20Sistine%20Chapel%20masterpiece,%20provides%20a%20powerful



While this information might seem dire, remember that we are discussing long-term trends and a quickly changing world in terms of technology and policy. My belief is that we are just seeing the shift away from natural gas for thermal purposes. New technology and awareness are helping people move to fuel switching which is largely to electricity. Additionally, state policy aims to green our grid energy.[17] It is an exciting time, and we are seeing substantial movement in Ashland on this front. Nearly 70% of heating installations in Ashland are heat pumps over the past five plus years. This is progress and we can expect the percentage of heat pump installs to increase as awareness increases and new programs become available.

Ashland has been incentivizing residents to decarbonize their homes for years; however, the federal government has recently begun working on this through the Inflation Reduction Act tax credits and state pass through incentives. Perhaps more exciting though is the city's upcoming on-bill financing loans for energy efficiency measures. All this is to say that ***we have some great tools at our disposal to meet the goal of reducing an average of 1,200 mt co2e emission from natural gas combustion every year.***

We are not alone in this effort. There are state goals for reducing natural gas consumption across the state to help achieve statewide goals. Southern Oregon University also has ambitious goals that will help the entire city meet its goals.

We still need to continue making inroads to increase the percentage of residential heating installation to heat pumps. Additionally, adding and expanding opportunities for businesses to electrify will be essential.

[17] https://www.oregon.gov/deq/ghgp/Pages/Clean-Energy-Targets.aspx

Transportation

Measuring Progress

As introduced above, the CEAP transportation GHG numbers did not account for emissions reductions from using plug-in hybrid electric vehicles (PHEV) or battery electric vehicles (BEV). ***Adjusting our emissions data to accounts for these reductions will allow us to make and track progress.*** There have been discussions with the Oregon Department of Energy and the Oregon Department of Transportation about how to account for these reductions. These agencies share our interest in creating better local data to track transportation emissions. However, there is not a settled protocol on how to account for emissions reductions from BEVs and PHEVs.

Since there was no established protocol, I used existing BEV and PHEV registration data to calculate emission reductions from these vehicles (spreadsheet located on last page of this report). The transportation numbers used in the graph below are uniquely created for this report. The data here was created with the best numbers available and could change in the future as better data becomes available. ***By using the available data, we can demonstrate emission reductions from Ashland's residents adopting PHEV's and BEV's and project what we need to do to meet our goal and when we can meet it by.***

To address the concern that the CEAP included non-resident vehicle miles traveled I used a more recent model that can separate trips made by those living within the model boundary. Therefore, only the VMT's from Ashland residents are accounted for.[18]

The next step was to calculate and apportion total passenger vehicle registrations for Ashland from county wide data.[19] This number was then multiplied by average miles driven per vehicle and the average emissions per mile to create a baseline emissions number.

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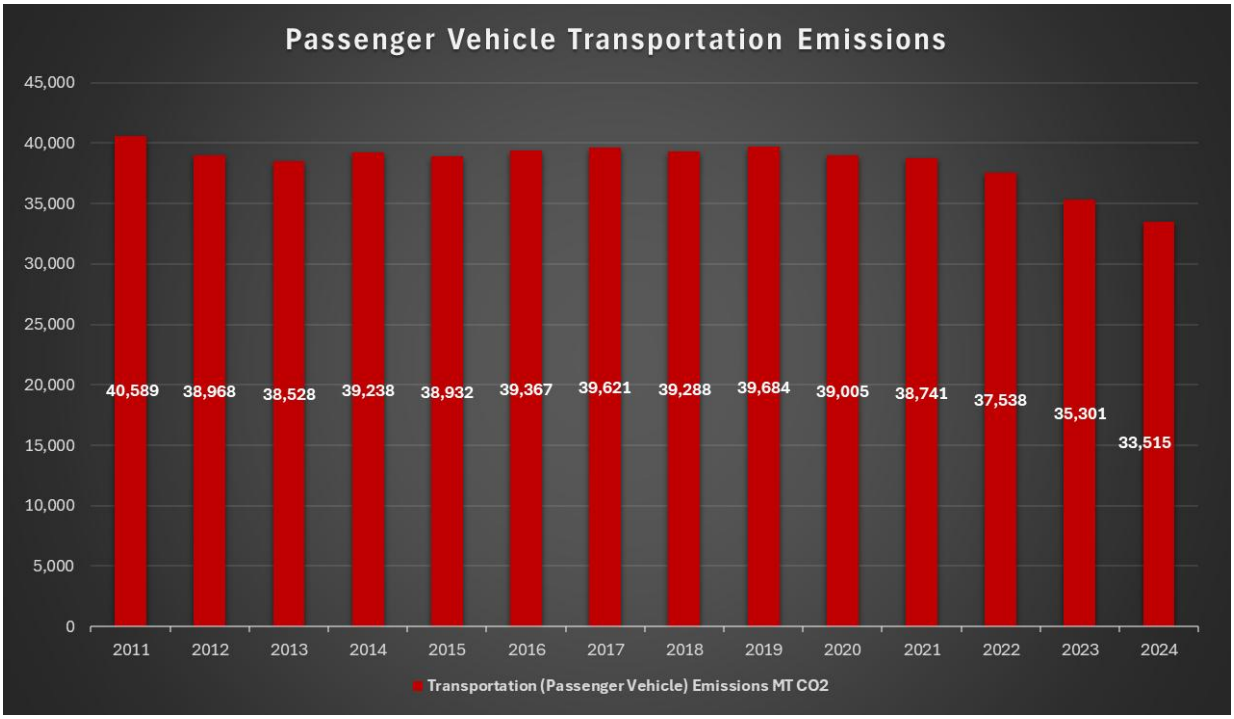
[18] The model is Southern Oregon Activity Based Model use by the Oregon Department of Transportation. The modeling was done about Ashland VMTs in 2021.

[19] Passenger vehicle registration is utilized as it has more readily available data and accounts for about 85% of the local VMTs. This chart and metric are not intended to provide proof of an accomplishment but are a proxy for our relative improvement in transportation emissions reductions.

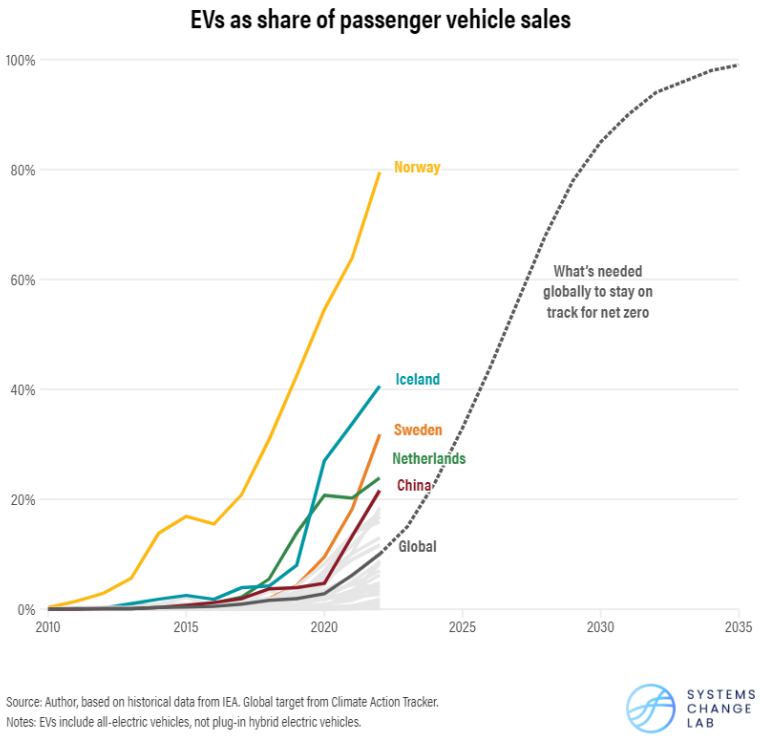


We then use Department of Motor Vehicles data for electric vehicle registrations in Ashland (available on the Oregon EV Dashboard) to estimate average tailpipe emission reductions .[20] We used emissions for a common PHEV (a Rav4 Prime for this exercise) and zero emissions for a BEV and then multiplied the emissions reduction per mile by the average Ashland resident VMT's.[21] We then subtract these expected emission reductions from the baseline to estimate current passenger vehicle emissions. The result is captured in the chart above. Ashland has had many early adopters of EV's and this factor is the major reason emissions for local passenger vehicles are already going down even though annual VMT's and population have gone up.

[20] https://www.oregon.gov/energy/Data-and-Reports/Pages/Oregon-Electric-Vehicle-Dashboard.aspx#:~:text=The%20dashboard%20displays%20Oregon%E2%80%99s%20total%20number%20of%20electric%20vehicles%20by

[21] https://www.fueleconomy.gov/feg/Find.do?year=2021&vehicleId=42793&zipCode=97520&action=bt3

One thing to note about the registration and emissions chart is the shape of the curve. It takes a while to move downward and then it begins to turn sharply downward, and the shift happens dramatically. This isn't unique and aligns well with what is known as the s-curve that appears for "value-creating" technologies, including EVs.[22] The charts below show that EVs are on the precipice of an automotive revolution.[23] If you need further proof of how quickly things can change, look no further than Norway who went from 1% of new car sales being EV's to 80% in just 12 years.



This vehicle sales study correlates with the emission reductions portion of the chart and demonstrates how quickly change could happen in Ashland.

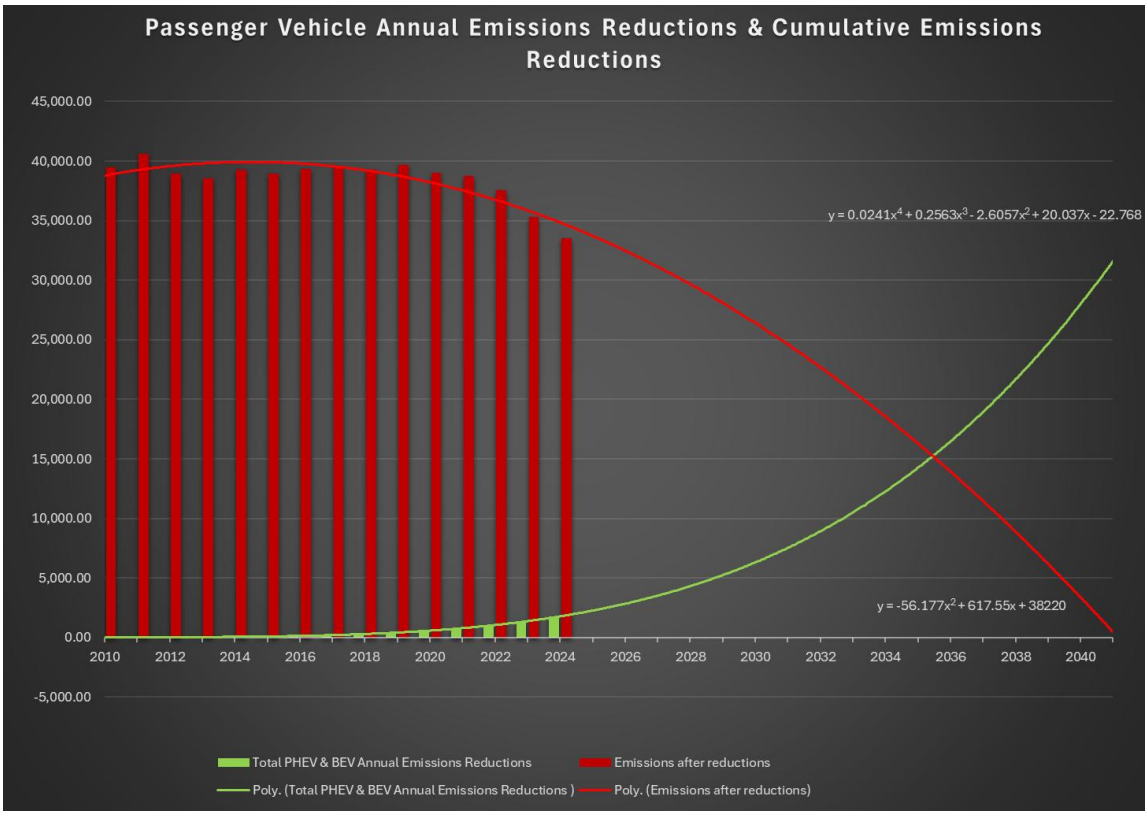
Norway made policy decisions that helped accelerate EV adoption. California has similarly implemented a policy called the Advanced Clean Cars II rule, which establishes that ***by 2035 100% of new cars and light trucks sold in California will be zero emission.[24] Oregon, along with California and ten other states have now***

[22] https://www.wri.org/insights/what-projected-growth-electric-vehicles-adoption#:~:text=Global%20sales%20of%20electric%20vehicles%20are%20exceeding%20expectations,%20but%20the#:~:text=Global%20sales%20of%20electric%20vehicles%20are%20exceeding%20expectations,%20but%20the

[23] https://www.wri.org/insights/countries-adopting-electric-vehicles-fastest#:~:text=Our%20analysis%20of%20the%20International%20Energy%20Agency%E2%80%99s%20EV%20Data%20Explorer

[24] https://ww2.arb.ca.gov/news/california-moves-accelerate-100-new-zero-emission-vehicle-sales-

adopted this standard, which will have a large impact on this s-curve timing above for the U.S.[25] Currently the U.S. sits just below the global mark, so this type of policy can jumpstart the trajectory on the s-curve and get us where we need to be in 2035.



When estimating our annual emissions reductions and our cumulative emissions reductions we can see the promise of change over the next 10-15 years.[26] An important note, when looking back at the original CEAP actions there were two EV related actions (EV land use codes for charging infrastructure and direction to provide EV and hybrid vehicle information on the website). Since the CEAP, we now have an EV incentive, free public EV charging and a commercial charger installation incentive. In many ways these actions went well beyond what the CEAP provided. EV adoption has taken off and is now clearly a primary tool in combating climate

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2035#:~:text=The%20new%20regulation%20accelerates%20requirements%20that%20automakers%20deliver%20an%20increasing

[25]https://www.oregon.gov/deq/aq/programs/Pages/ORLEV.aspx#:~:text=DEQ%20recently%20adopted%20the%20Advanced%20Clean%20Cars%20II%20regulation.%20This

[26] The annual and cumulative emissions reductions chart above is not meant to be an official projection but illustrative. It uses the columns of existing data and polynomial trendlines in excel to match the pattern of the current data trends.

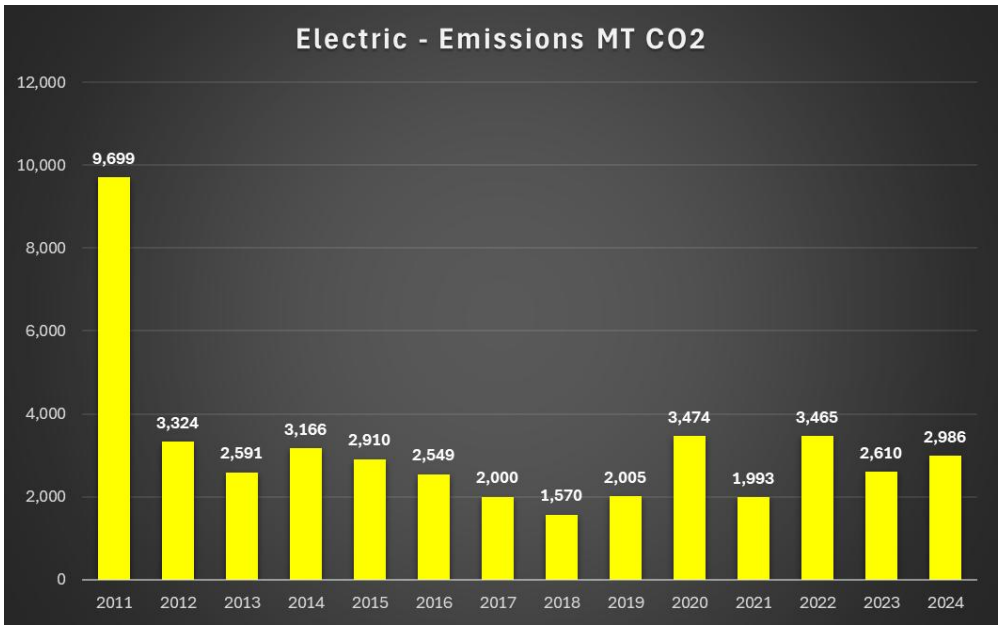
emissions. It is important to understand how this change is impacting our emissions and this metric attempt to provide such a mechanism, even if imperfect. This metric doesn't account for non-resident travel or commercial travel. Regarding commercial VMT's, there is certainly going to be a delay in widespread low emission vehicle adoption as many of the hesitations someone has in purchasing an EV are magnified in the commercial setting. This metric is an improvement over simply measuring VMT's and instead provides and lens to understand our progress in reducing overall transportation emissions. In short, ***we have a good chance to meet our long-term 2050 goals with our current trajectory due to local efforts, state policy and overall market transition.***

VMTs, Ebikes and Bike Lanes

Reducing our actual vehicle miles traveled is an important transportation goal and one that can be worked on. We already have a robust ebike incentive program, goals to ***increase protected bike lanes, and regional efforts at making mass transit more appealing.*** All of these can result in reducing the energy needed to get us around to our jobs, schools and appointments, whether that energy be fossil fuel or zero emissions electricity. It will be important to reduce energy needs so that energy can be used in other sectors. This work should be maintained, and perhaps a useful metric beyond VMT to locally and easily measure the impact can be developed in the future.

Electricity

The biggest news about electricity isn't new at all. As mentioned above, there is no practical reason to measure our electric consumption using the NWPP emissions



factor. Doing so simply misdirects where our efforts should be focused. It is useful to understand the underlying premise of GHG protocols that suggest the NWPP emissions should be used and allow that to inform decisions on local production though.

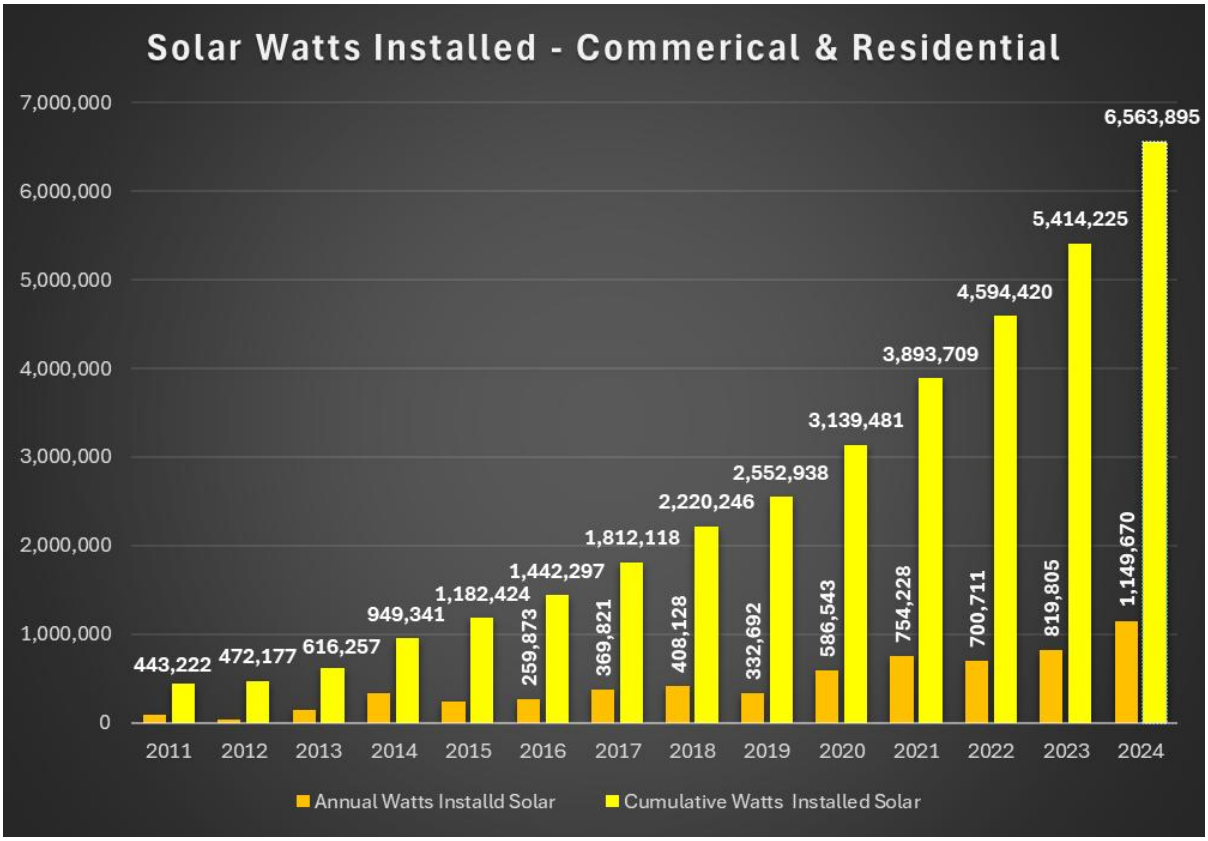
By shifting from the NWPP emissions to the DEQ emissions factor changes our electricity related emissions enormously. ***With the NWPP our emissions in 2015 were 50,135 mt co2e. Using the DEQ numbers reduces this to 2,910 mt co2e.*** As noted above, in order reduce emissions in the NWPP scenario requires the entire NWPP area to reduce at the same rate. There is no way a small city like Ashland can pull the entire NWPP area to greener pastures. The unique nature of Bonneville Power Authority (BPA) electricity informs us to focus on other areas, however the more local production and energy conservation we create locally, can lessen the amount of clean BPA energy we need that can be used elsewhere. Furthermore, as the use of EV's rises, it is helpful to know that the energy powering them is coming from a clean source when charged locally.

We have numerous energy efficiency programs in place, that should only be bolstered by our on-bill financing program noted above. These programs should continue, as it is often and accurately stated that conservation is the most cost-effective way to reduce energy use!

While our electric emission numbers are quite low when using the DEQ numbers, there are other reasons to focus on electricity and efficiency. One key reason is that of reducing cost in heating and cooling our homes and water. ***Some of the lowest income homes have less efficient appliances – we still have homes using electric resistance heat that could be done 200% more efficiently by installing a heat pump*** and thereby reducing energy costs and energy needs. We need our homes to be ready to move to low carbon electricity to solve this climate crisis, so we must focus on having homes ready for electrification without it being an undue burden. Related to both is the remaining duration of the Inflation Reduction Act, which allows the city and residents to reduce the costs of transition to a low carbon electric future.

In addition to conservation, Ashlanders have embraced solar energy and continue to install solar power. The chart below of installed watts is only for half of 2024 and it is already our largest single year of solar installations! We have currently over 6.5 megawatts (MW) of total installed solar in Ashland. ***A realistic goal for our community, especially when including Southern Oregon University's efforts, is to***

install an average of 1 MW of new solar per year for the next ten years.[27] Additionally, the on-bill financing program can be available for solar installations and necessary panel upgrades. Not to mention the Inflation Reduction Act tax benefits that help reduce overall costs.



Moving Forward

Our implementation has naturally followed the primary focus areas and to a lesser extent the secondary focus pathways. This connection is easy to understand when you look at actions to decarbonize and reduce CO2. Our work on these primary areas must continue and receive the greatest focus because they provide the greatest local reductions. ***When looking at expanding work into secondary, tertiary and special focus areas we must think carefully about where to spend our time and money.*** There are many factors that can guide these decisions. What can we impact

[27] https://news.sou.edu/2024/09/sou-receives-third-1-million-state-grant-for-solar-arrays/#:~:text=%E2%80%94%20The%20solar%20energy%20aspirations%20at%20Southern%20Oregon%20University%20have

locally? What can we measure locally? What has the greatest impact? What other factors should be considered (equity, return on investment)? Is it realistic? These questions need to be asked when implementing and budgeting for our climate work. We work within the constraints of a city budget and ingenuity.

Secondary Focus Areas: Waste, Refrigerants, Other Heating Fuels, Small Engines

When and how we expand work on the secondary areas of focus will be explored moving forward. There are possibilities to address these areas, however they must be balanced against our current work and each other.

Waste is the area that is most easily calculated of this group. We have data we could work from to measure our status and set goals. ***Waste emissions are especially important when looking at the short-term increased potency of methane emissions*** (see above on page 17 of natural gas discussion). The goal is to incorporate annual measurements of this in the near term with locally available and calculated data.

Refrigerants are important because of the enormous global warming potential they have compared to CO2; they are multiple orders of magnitude higher.[28] Refrigerants are another data point that comes from extrapolated data and is hard to pin down locally. To date, the city has required refrigerant recapture as part of incentives that deal with these GHG's. This in turn does provide some education to installers and help create awareness. This category could be used for further development.

Small engines do have extrapolated data available, that we can apportion on per capita basis. The emissions from these devices are surprisingly high, especially when you compare it to our electricity source emissions. One study has state level information that can be apportioned in Ashland on a per capita basis.[29] It is a unique opportunity to reduce emissions and one that shouldn't be difficult to meet as each year there are better electric alternatives and presumably the cost will come down as the power output of the tools goes up in the next two and a half decades.

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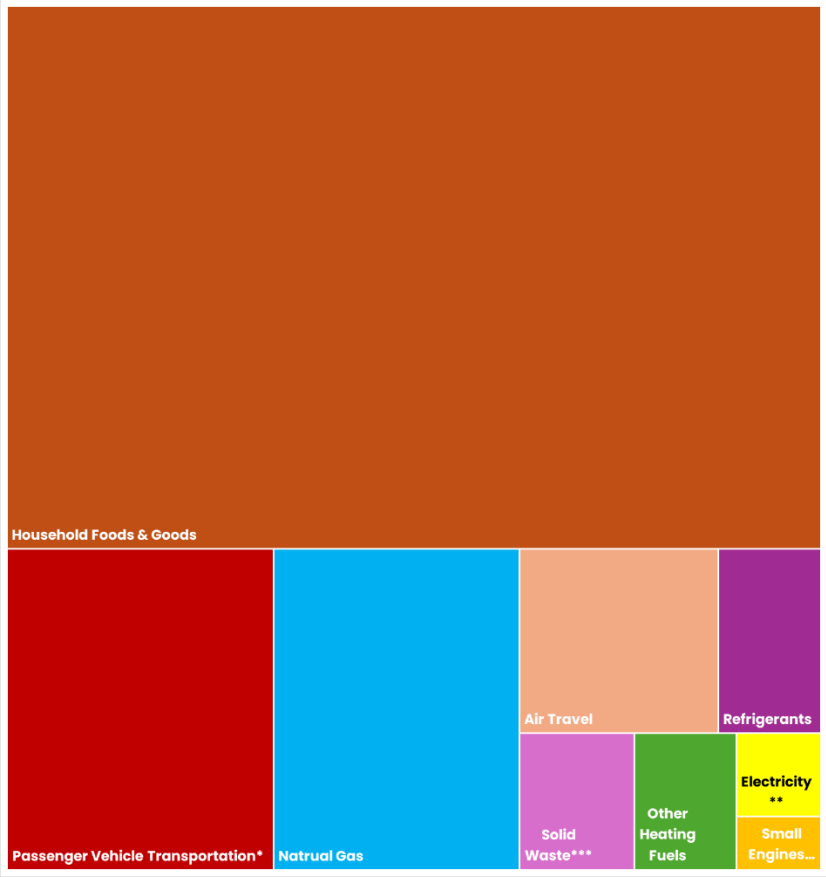
[28] https://ghgprotocol.org/sites/default/files/2024-08/Global-Warming-Potential-Values%20%28August%202024%29.pdf#:~:text=This%20document%20provides%20100-year%20time%20horizon%20global%20warming%20potential%20(GWP)

[29] https://publicinterestnetwork.org/wp-content/uploads/2023/10/Lawn_Care_Goes_Electric_Oct23.pdf

Other heating fuels (propane and heating oil) will likely continue to be replaced by more efficient options. However, the concern is that it may be easier for homes and businesses to transition to carbon emitting natural gas and lock in that emission source for 15 or more years, rather than switch to electric options. The work on natural gas electrification can cross over into this realm as the solutions to switch from natural gas to electricity are similarly applicable to other heating fuels.

Tertiary Focus Areas: Household Food & Goods, Air Travel



This area is too large to ignore and too difficult to directly work on with so many outside factors involved. These include manufacturing and the transportation for these goods or services. When combined, the categories of household foods and goods consumption is the single largest emission type in the CEAP. These areas are much more difficult to directly impact at the city level and do not lend themselves to local measurement or programs. When you add in air travel, another personal choice consumption factor, this focus area dwarfs the primary and secondary areas emissions. ***The best mechanism to help effectuate change for this area is the tool that should be used for all our climate work – outreach and education.*** We should increase the use of this tool for both our existing programs and the areas we want to address in some capacity.

City As Leader

The city has access to data that provides valuable insights for analysis and planning. This data includes:

- Electricity and natural gas usage
- Fuel consumption
- Vehicle and equipment inventory
- Building equipment inventory
- Solar installations

By prioritizing decarbonization in its own operations, the city can demonstrate its commitment to sustainability and inspire others to follow suit. As a leader, the city can play a pivotal role in driving emissions reductions by setting a strong example.

Immediate actions within city operations can align with the same principles outlined for community efforts. Over time, the city can consolidate data, track progress, and provide updates to showcase achievements and identify opportunities for improvement.

The broader community remains the largest source of emissions, but using the data collected by the city will allow us to demonstrate that it is possible to effectively reduce the overall GHG emissions. With appropriate funding and staff time to commit to this, we can combine the original numbers used to create the GHG inventory and provide a more nuanced understanding of the progress to date and in the future.

By embracing its role as a sustainability leader, the city can pave the way for a more sustainable and decarbonized future for everyone.

Conclusion

This report is intended to orient our climate work moving forward by explicitly stating how we can better focus our efforts by slightly tweaking how we look at the CEAP. We cannot work on everything and we need to focus on those areas where we have the greatest impact to reduce emissions. The focus areas presented above attempt to triage our climate work and maximize our emissions reductions. There is still room to look at our actions through an equity lens to ensure that we are inclusive in moving our community forward.

The next two pages examine the focus areas discussed above and provide a pathway forward. The city has spent most of its time working in the primary focus areas and the pathway is more fully developed. The final page has the newly developed metric for passenger vehicle emission reductions.

Category	Focus Area	Goal	Objective	Key Performance Indicators	Strategy	Tactics/Actions	Metrics	Timeline	Planned Result
Community	#1 Primary Focus - **Natural Gas**	**Zero Natural Gas Emissions**	**Reduce emissions by an average of 1,200 metric tons/year = 29,330 MT over 25 years**	**Metric Tons of CO2 Emissions** (based on annual therms used)	**Fuel Switching**	**Fuel Switching Incentives - Federal, State, Local** (Local = heat pumps - 4 types, induction cooking, heat pump water heaters)	**Assist up to 300 homes per year transition to electric power from NG for 25 years**	**25 years**	**17,500 MT CO2 from NG removed**
							Assist 30 businesses per year transition to electric power from NG for 25 years	**25 years**	**11,250 MT CO2 from NG removed**
						Fuel Switching Loans (USDA RESP - on bill financing)	**Assist up to 1,000 homes & businesses fuel switch in the next 10 years**	**10+ years**	**2.5 MT CO2/house 15 MT CO2/business**
Community	#2 Primary Focus - **Trans. Emissions**	**Zero Tailpipe Emissions from Passenger Vehicle Transportation**	**Accelerate trajectory of zero tailpipe emissions from passenger vehicles**	**Metric Tons of CO2 Emissions** (reductions calcuated using BEV and PHEV registration data)	**Support and promote the adoption of zero tailpipe emission passenger vehicles**	***State Actions***	***No new internal combustion engine car sales in 2035 (Clean Cars 2)***	***10 years***	***100% of newly purchased daily use vehicles have zero tailpipe emissions by 2035***
						EV Incentives - *Federal* , *State* , Local ($1000 local incentive)	**Increase low emission registrations to 22% by 2035 and 100% zero tailpipe emissions by 2050**	**25 years**	**100% of passenger vehicles have zero tailpipe emissions by 2050**
						EV Chargers (free EV charging, commercial charger incentive)	**Maintain Free EV Chargers**	**25 years**	**Incentivizes EV purchases**
							Strategically deploy new chargers	**10 years**	**Easy and affordable charging creates a desire to adopt EV's**
							Workplace Chargers	**10 years**	**Encourage employees and patrons to drive EV's**
							Create a City EV Charger plan	**2026**	**Strategic plan for infrastructure changes to accommodate citywide needs**
		Increase usage of zero & ultra low emission mobility options	**Improve access to non-personal automobile transportation options**	**Reduction in VMT** (a better local indicator may be needed)	**Expand mileage of low emissions infrastructure, increase percent of walkable areas, and enable access to these options**	**Bike Path & Pedestrian Infrastructure Development**	**Increase mileage of bike paths & sidewalks/pedestrian infrastructure**	**25+ years**	**Lower emissions and more affordable transit**
						Climate Friendly Communities (Community Development Dept.)	**Walkable Communities Development**	**25+ years**	**Reduced need for transportation**
						E-bike Incentive	**Number of Incentives & Estimated Emissions Reductions**	**25+ years**	**Affordable, useful micromobility!**
						EV Carshare	**Miles Used & Emissions Reduction**	**2 years (pilot)**	**Allow for trial of EV's and reduce need for personal auto use and cost**
Community	#3 Primary Focus - **Carbon Free Electricity & Efficiency**	**100% Carbon Free Electricity**	**1) Continue to increase efficiency, 2) Increase local production of electricity, 3) Provide 100% carbon free electricity**	**Metric Tons of CO2 Emissions** (Based on annual GHG Report submitted to DEQ for KWH used) **& Renewable Watts Installed**	**Increased Energy Efficiency**	**Energy Efficiency Loans (USDA RESP - on bill financing)**	**Reduction in electricity used**	**10 + years**	**Reduction in kilowatt hours used**
						Home Energy Review (City Staff, and pending Home Energy Score Incentive)	**Total number of Reviews**	**10+ years**	**Allow for easy access to energy efficiency and cost savings programs**
						BPA Incentives (weatherization, windows, doors, duct sealing, lighting, refrigeration, heating and cooling)	**Reduction in electricity used**	**25 years**	**Reduction in kilowatt hours used**
					Local Renewable Energy Production	**Solar Expansion** (via city and federal incentives & possible state grants)	**Increase generation by 1 MW/year for 10 years**	**10 years**	**10 new megawatts of local production - increases total to over 16 MW of local solar**
					Low Carbon Electricity Requirements	***State/Federal Actions***	***Lower carbon grid electricity***	***25+ years***	***Carbon free electric grid***

Category	Focus Area	Goal	Objective	Key Performance Indicators	Strategy	Tactics/Actions	Metrics	Timeline	Planned Result
Community	Secondary Focus - **Waste**	**Solid Waste Emissions Reductions**	**Solid Waste Reductions**	**Metric Tons of CO2 Emissions (caculated using avoided waste in pounds)**	**Maintain & expand recycling & waste diversion efforts**	**Outreach & Education**			
					Reduce emissions from food waste in the landfill	**Composting of Food Scraps**			
	Secondary Focus - **Refrigerant**	**Refrigerant Leakage Emissions Reductions**	**Maximize recycling and proper disposal**	**Data from Incentives and Loans if possible**	**Support and promote best practices for storage and disposal**	**Require Recapture for other incentives (PTHP/HVAC)**			
						State and Federal action for lower emissions factor regfrigerants			
						Outreach & Education			
	Secondary Focus - **Other Fossil Heating**	**Zero Emissions from Other Heating Fuels (Propane & Fuel Oil)**	**Reduce emission by 500 tons/year for 10 years**	**Data from Incentives and/or Loans if possible**	**Electrification**	**Existing City Incentives for Heat Pumps**		**10+ Years**	**Assist homes and businesses using loan and incentive programs to fuel switch**
						RESP loan		**10+ Years**	
	Secondary Focus - **Small Engines**	**Small Engines**	**Reduce Emissions by 100 tons/year for 20 years**	**Incentive Data if/when implemented**	**Electrification**	**Outreach & Education**			
						Incentives or Policy			
Community	Tertiary Focus - **Air Travel, Goods & Food**	**Air Trans. Emissions Reductions**	**Reduce impact of emissions from air miles**	**Air Miles Traveled**	**Reduce Net Emissions from Air Miles Traveled**	**Carbon Offsets**			
						Outreach & Education			
		Residential Food and Goods Emissions Reductions	**Reduce Emissions Associated with Food Consumption**	**Extrapolated Data**	**Reduce pre-consumption food waste**	**Outreach & Education**			
			Reduce Emissions Associated with Goods Consumption	**Extrapolated Data**	**Reduce, Reuse, By Used**	**Outreach & Education**			

			Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
Steps	**Source**	**Data Type**	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1. Annual Ashland Resident based VMT	ODOT SOABM Modeling 9-2-2021	Daily - Ashland Population only VMT	274,442	278,733	283,091	287,516	292,012	296,577	301,214	305,923	307,459	309,004	310,555	312,115	313,683	315,258	316,841
		Days	365	365	365	365	365	365	365	365	365	365	365	365	365	365	365
		Annual - Ashland Population only VMT	**100,171,330**	**101,737,440**	**103,328,035**	**104,943,498**	**106,584,217**	**108,250,588**	**109,943,012**	**111,661,895**	**112,222,682**	**112,786,285**	**113,352,719**	**113,921,998**	**114,494,136**	**115,069,147**	**115,647,046**
	Ashland, OR Population by \	Ashland Population	20,092	20,296	20,386	20,374	20,607	20,714	20,939	21,117	21,297	21,126	21,405	21,639	21,295	21,061	**21,161**
		Ashland VMT per capita	4,986	5,013	5,069	5,151	5,172	5,226	5,251	5,288	5,269	5,339	5,296	5,265	5,377	5,464	5,465
2. Converting VMT from per capita to per passenger vehicle registration	Oregon Department of Trans	Jackon County Passenger Car Registrations	176,311	178,932	179,423	181,736	181,507	183,446	186,058	188,165	190,407	191,447	193,879	187,553	191,397	189,881	194,293
	Jackson County, OR Popula	Jackson County Population	203,357	204,798	205,939	207,313	209,351	211,587	214,600	217,030	219,616	220,815	223,620	224,353	221,669	220,768	221,061
		Ashland population as percent of Jackson County	9.88%	9.91%	9.90%	9.83%	9.84%	9.79%	9.76%	9.73%	9.70%	9.57%	9.57%	9.65%	9.61%	9.54%	9.57%
		Ashland Passenger Vehicle Registrations	**17,420**	**17,733**	**17,761**	**17,860**	**17,866**	**17,959**	**18,154**	**18,308**	**18,464**	**18,316**	**18,558**	**18,090**	**18,387**	**18,114**	**18,599**
		Ashalnd VMT Per Registration	**5,750**	**5,737**	**5,818**	**5,876**	**5,966**	**6,028**	**6,056**	**6,099**	**6,078**	**6,158**	**6,108**	**6,298**	**6,227**	**6,352**	**6,218**
3. Calculating Annual Baseline Vehicle Emissions	50 Years of EPA's Automotiv	***Average Vehicles Tailpipe Emissions Rate (g/mile)****	393.70	399.00	377.30	367.50	368.70	360.50	359.30	356.70	352.70	355.70	348.80	346.90	337.10	319.00	305.00
		Converting grams to Metric tons per mile	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001	0.000001
		MT CO_2 per mile	0.00039370	0.00039900	0.00037730	0.00036750	0.00036870	0.00036050	0.00035930	0.00035670	0.00035270	0.00035570	0.00034880	0.00034690	0.00033710	0.00031900	0.00030500
		Emission per registered vehicle based on 100% average vehicle	2.26	2.29	2.19	2.16	2.20	2.17	2.18	2.18	2.14	2.19	2.13	2.18	2.10	2.03	1.90
		Total Emissions based on 100% average vehicles	39,437.45	40,593.24	38,985.67	38,566.74	39,297.60	39,024.34	39,502.52	39,829.80	39,580.94	40,118.08	39,537.43	39,519.54	38,595.97	36,707.06	35,272.35
4. Calculating Emissions Reductions from BEV and PHEV	State of Oregon: DATA & REP	Ashland PHEV Registrations	0	0	5	6	3	4	10	16	27	26	15	51	61	61	80
	State of Oregon: DATA & REP	Cumulative PHEV Registrations	0	0	5	11	14	18	28	44	71	97	112	163	224	285	365
	Beyond Tailpipe Emissions:	Average Annual PHEV Tailpipe Emissions (72 g/mile) in MT CO_2	0.41403177	0.41308606	0.41886988	0.42305546	0.42952805	0.43398997	0.43603876	0.43912299	0.43759829	0.44335582	0.43977457	0.45343054	0.44834046	0.45736930	0.44769869
		Ashland PHEV Emissions Reductions per vehicle	1.85	1.88	1.78	1.74	1.77	1.74	1.74	1.74	1.71	1.75	1.69	1.73	1.65	1.57	1.45
		Total PHEV Emissiosns Reductions	0.00	0.00	8.88	19.10	24.78	31.30	48.72	76.40	121.13	169.45	189.36	282.19	369.77	447.17	528.81
	State of Oregon: DATA & REP	Ashland BEV Registrations	0	2	2	5	7	12	12	21	19	41	40	66	101	145	175
	State of Oregon: DATA & REP	Cumulative BEV Registrations	0	2	4	9	16	28	40	61	80	121	161	227	328	473	648
		Ashland BEV Emissions Reductions per vehicle	2.26	2.29	2.19	2.16	2.20	2.17	2.18	2.18	2.14	2.19	2.13	2.18	2.10	2.03	1.90
		Total BEV Emissions Reductions	0.00	4.58	8.78	19.43	35.19	60.84	87.04	132.70	171.49	265.03	343.00	495.92	688.51	958.49	1,228.93
		Total PHEV & BEV Annual Emissions Reductions	0.00	4.58	17.66	38.53	59.97	92.14	135.76	209.10	292.62	434.48	532.36	778.11	1,058.28	1,405.66	1,757.75
																	1,757.75
5. Ashland Passenger Vehicle Emission Reductions		**Emissions after reductions**	**39,437**	**40,589**	**38,968**	**38,528**	**39,238**	**38,932**	**39,367**	**39,621**	**39,288**	**39,684**	**39,005**	**38,741**	**37,538**	**35,301**	**33,515**

Notes: