

Grants Pass

Sustainability and Energy

Action Plan



MAY 2023

Acknowledgements

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2023 City Council

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A short, four-page overview of the Plan's contents including its goals, projects, and significance.



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"IT'S THE CLIMATE"

Some background on the current state of things in Grants Pass.



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VISION FOR THE FUTURE

Painting a picture of Grants Pass in the year 2045 and how it might come to pass. Introduces the Plan's five goals.

PROJECTS AND STEPS BY FOCUS AREA

This Plan's recommendations are divided into four focus areas, listed below. Each focus area's section of the Plan includes background information and context, basic information on how focusing on this area will contribute to the Plan's overall goals, and metrics for determining achievements. This section overview is followed by an in-depth explanation of the projects recommended for that area and the steps that each of those projects entail.



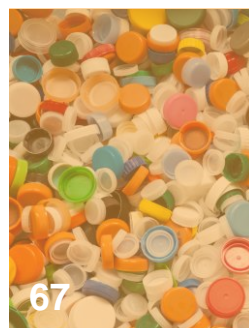
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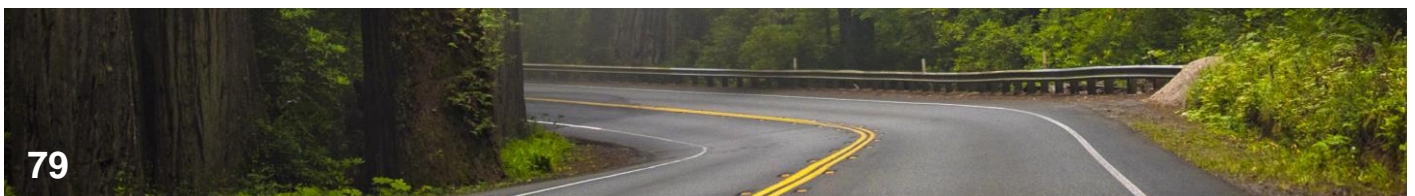
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EXECUTIVE SUMMARY

Executive Summary

WHY THIS PLAN?

This Sustainability and Energy Action Plan (**SEAP**) is the product of more than a year's worth of work by the Sustainability and Energy Action Taskforce (**SEAT**) established by the Grants Pass City Council on November 17, 2021¹. The Taskforce analyzed City facilities and current operations for potential sustainability concerns and researched potential solutions in order to develop the Plan. The Plan offers five goals for council approval. It also provides 14 project recommendations for achieving these goals.

What informed the Plan?

The Grants Pass Sustainability and Energy Action Plan was informed by:

- The expertise of the [12 members of the Sustainability and Energy Action Taskforce](#)
- Online survey responses from more than 125 employees
- Review of similar plans made by other cities in earlier years
- Review of City of Grants Pass reports containing relevant information ([2022 MENG Facility Condition Assessment](#), [2022 Safe Routes to School Report](#), and [2022 Josephine County Hazard Mitigation Plan Addendum](#))
- [Analysis of the City of Grants Pass' current energy usage, spending, and emissions data](#)
- Discussion with energy and transportation sector experts
- Research on [available funding resources](#) relating to energy and sustainability (including consultations with experts at different levels of government and implementation)
- Initial information on processes and feedback on potential recommendations from staff in various departments

BY THE 2040s,
GRANTS PASS
COULD FACE...



A \$1.5 million increase
in Energy Costs²



More Days of Extreme
Heat Annually³



Cascadia Subduction
Zone Earthquake⁴



Elevated Rates of
Wildfire⁵



Windstorms⁶

Grants Pass' climate vision for 2045 is one of resilient City operations that best serve the people through cost-efficient achievement of net-zero emissions

GOALS AND TARGETS

This Sustainability and Energy Action Plan has five overall goals. Through adoption of this Plan, the Council is establishing these goals as new City policy.

GOAL 1: Manage energy costs, allowing for better allocation of limited City funds.

GOAL 2: Improve energy resilience to allow Grants Pass to continue to provide essential services in the event of a grid failure or catastrophic natural disaster.

GOAL 3: Reduce greenhouse gas emissions incrementally over the next 20 years, reaching net-zero by 2045.

GOAL 4: Integrate sustainability into all City decision-making and consider sustainability measures whenever a project is undertaken.

GOAL 5: Establish a standing Sustainability and Energy Advisory Committee to monitor progress, advise on new technologies, and engage in citizen outreach.

These goals are in line with every one of Council's strategic goals.⁷ While the Plan's ability to **facilitate sustainable, manageable** growth, and to **maintain, operate, and expand our infrastructure to meet community** needs are fairly evident, it also works to **enhance community safety** through resilience and funding preservation, to **provide cooperative shared leadership** through standing committee creation, and to **encourage economic opportunities** by safeguarding the long-term economic health of the City and community, and stimulating new industry growth in renewables.

HOW CAN WE GET THERE?

The Taskforce identified a variety of options for the City to be able to reach these goals – a total of 14 projects, which have been divided into four major thematic sections. Each project consists of two to ten steps towards the project’s completion, making for a total of 59 overall steps (33 for Buildings and Energy, 12 for Transportation, 8 for Consumption and Materials, and 6 for Natural Systems).



BUILDINGS AND ENERGY

- Project BE-1. Address Energy Inefficiencies within Existing Buildings and Operations
- Project BE-2. Develop Microgrid Systems (to support essential services)
- Project BE-3. Improve Efficiency of Pumping Systems
- Project BE-4. Reduce Energy Footprint of Parks Operations
- Project BE-5. Implement Sustainability and Energy Standards for all new projects
- Project BE-6. Develop Dedicated Renewable Energy Generation Sites

TRANSPORTATION

- Project T-1. Transition Rolling Stock to Zero Emission Vehicles (ZEVs)
- Project T-2. Install Charging Stations to support a Zero Emission Fleet
- Project T-3. Reduce Employee Commute Emissions

CONSUMPTION AND MATERIALS

- Project CM-1. Reduce Consumption by Introducing Environmentally Preferable Purchasing (EPP) Guidelines
- Project CM-2. Identify Opportunities for Material Reuse and Improved Materials Selection
- Project CM-3. Pursue Improvements in Waste Disposal

NATURAL SYSTEMS

- Project NS-1. Enhance the Urban Forest
- Project NS-2. Prioritize Disposal Methods with the Greatest Retention of Sequestered Carbon

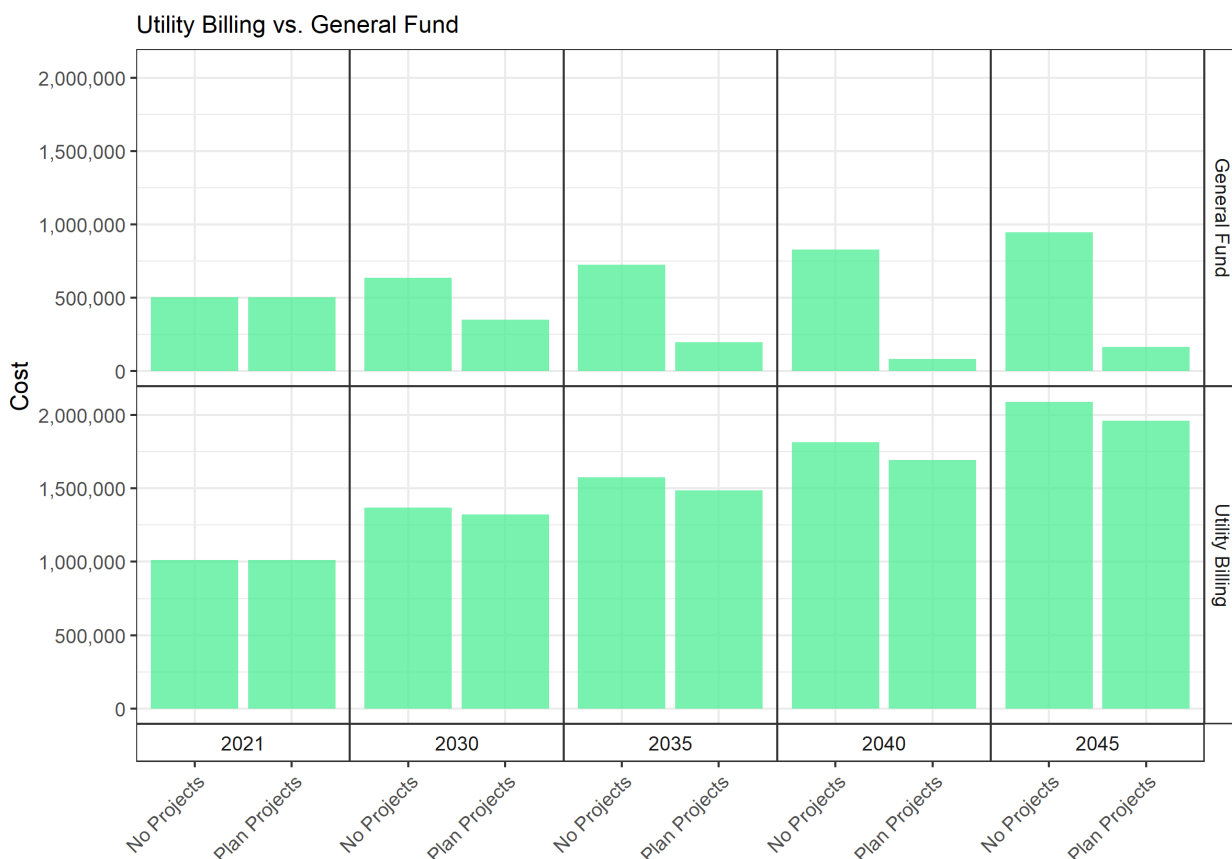
NEXT STEPS

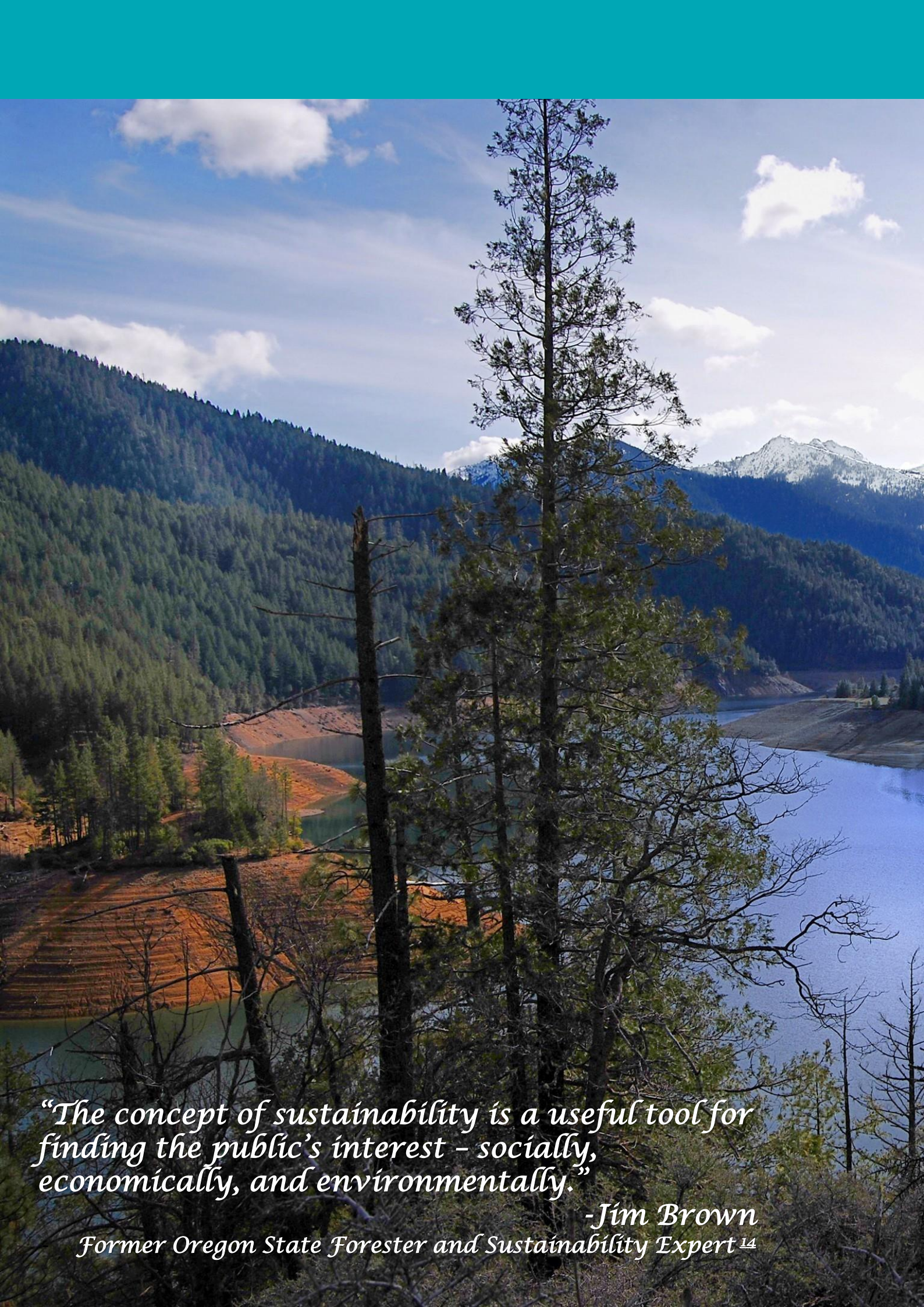
The adoption of this Plan begins an on-going process of implementing changes to City facilities and operations over the next 22 years in order to develop a more sustainable system of City operations. The *Implementation* section of this Plan outlines what this process could look like and how the City might want to begin it.

These timeline recommendations were generated by weighing each project’s contributions toward goal achievement, its feasibility, and relative urgency. Urgency played a large role because, although all the projects are feasible (or in some cases involve exploration of future feasibility), some are much more cost-effective when factoring in grant funding, which will likely be abundant only for the next few years⁸. For an overview of the available relevant funding examined by the Taskforce, see Appendix III.

Due to its rurality and designation as an area of economic hardship, Grants Pass is also currently more eligible for funding opportunities than other municipalities.⁹ These funding resources’ availability, coupled with energy savings projections, are key to project feasibility and impact. Right now, the savings in energy usage due to Plan projects using the most modest scenario is estimated to be at least \$900,000 annually by 2045,¹⁰ and incorporating some more intensive projects is estimated to produce annual savings reaching up to \$1,904,582.¹¹ The majority of this change would result in reduced pressure on the general fund, but some would also result in managing increases in utility billing rates over the years.¹²

ENERGY SAVINGS IMPACT ON CITY FUNDING ¹³





“The concept of sustainability is a useful tool for finding the public’s interest – socially, economically, and environmentally.”

-Jim Brown

Former Oregon State Forester and Sustainability Expert ¹⁴



INTRODUCTION

Introduction

The formation of the Sustainability and Energy Action Taskforce (**SEAT**) was first considered during the Grants Pass City Council's 2021 annual Strategic Planning process during a discussion of a new objective that would create "A Climate Advisory Committee."¹⁵ The proposal received three stars from members of the Council, which made the new objective a high priority for the coming year, under the goal of Leadership, and the objective to ensure effectiveness in City operations.

The three-star item was operationalized by Public Works Director Jason Canady, who took responsibility for the realization of the Council's new objective.

Working with members of the community and the Council, the **SEAT** emerged as a short-term single-focused planning group. The Taskforce was charged with the responsibility of developing a Sustainability Plan for Council consideration, and with considering recommending the creation of an Advisory Committee to support ongoing sustainability.

The Council Action to establish the Taskforce was adopted on November 17, 2021.¹⁶

The formation of the Taskforce followed quickly after the adoption of the November 17 resolution. Applications for membership were sought from specific groups identified to include widespread public involvement and related expertise:

- Energy Efficiency Engineer
- Solar Professional
- Contractor/Developer
- Grants Pass High School Student
- Rogue Community College Student
- Agriculture/Horticulture/Arborist/Landscape Architect
- Forestry Experience
- (3) Members at Large

The 12 Taskforce members include 10 full-voting members and 2 non-voting ex-officio members – one representing [Southern Oregon Climate Action Now \(SOCAN\)](#) and one representing [Energy Trust of Oregon \(Energy Trust\)](#).¹⁷

The Council selected the founding members of the Taskforce in December 2021. Current membership can be found on [page 14](#).

In order to have adequate staffing to support the work of this newly formed Taskforce, the City of Grants Pass applied for an AmeriCorps member through the [Resource Assistance for Rural Environments \(RARE\) program](#) administered through the University of Oregon.¹⁸

Upon arrival in mid-September 2022, this **RARE** member began serving as the City's Sustainability Planner, coordinating the Taskforce and managing the development of the Sustainability and Energy Action Plan they were to develop, and putting into motion a workplan for the next year of work.

The Taskforce then developed a Plan to be presented to Council for approval in May 2023.



The Team



Jan O'Hara
Committee Chair

Jan is an engineer with 30 years of experience in air quality, landfills, hazardous waste site cleanup, stormwater, sea-level rise, and water policy development. She contributed primarily to the *Buildings and Energy* and *Natural Systems* sections of the Plan.



Tom Bradbeer
Vice-Chair, Team Lead for Transportation

Tom is a retired economist turned engaged community advocate, also serving on the Budget Committee, as a member of SOCAN's City/County Project, and is on the board of The Siskiyou Field Institute. He contributed primarily to the *Buildings and Energy* and *Transportation* sections of the Plan.



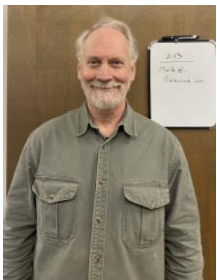
Matthew Rosen
Team Lead for Data Collection

Matt has 42 years of experience in information technology. He contributed primarily to background Information by crunching all the City's energy usage and emissions data, and to the *Implementation* section through modeling and the development of the systems to monitor and report emissions progress.



Catherine Vawter
Rogue Community College Student

Catherine is a science student at Rogue Community College pursuing her bachelor's degree. She contributed primarily to the *Natural Systems* and *Implementation* sections of the Plan.



David Bartlett
Team Lead for Natural Systems

David is retired from the U.S. Army and has a Master's degree in Strategic Studies and History. He contributed primarily to the *Natural Systems* and *Buildings and Energy* sections of the Plan.



Robert Allen
Local Energy Efficiency Engineer

Robert is the President of Microgrid Design and Engineering Services, LLC. He has 20+ years in the energy sector and brought technical analytical skills to the Taskforce. He contributed primarily to the *Buildings and Energy* section of the Plan, providing expert data on potential energy installation projects.



Clair Highfield
Forestry Experience

Clair is a former employee of True South Solar and has held a number of educator/leadership roles in the forestry/natural systems spheres. She contributed primarily to the *Natural Systems* section of the Plan.



Kayle Palmore
Grants Pass High School Student

Kayle is the team's Grants Pass High School representative and is especially interested in transportation issues. She was primarily tasked with work for the *Transportation* and *Future Visioning* sections of the Plan.



Emily Berlant
Solar Professional

Emily has more than 10 years of experience working in climate/sustainability work. As a member of the Talent, OR, city council, Emily played an instrumental role in developing Talent's Clean Energy Action Plan, allowing her to provide the Taskforce with insight from her experience.



Amie Siedlecki
Member at Large

Amie is the Natural Resources Coordinator for the Rogue Valley Council of Governments. She has extensive volunteer experience working with local non-profits and government bodies. She was primarily tasked with work for the *Buildings and Energy* and *Natural Systems* sections of the Plan.

Ex-Officio Members



Dorothy Swain

SOCAN

Dorothy is a member of the science faculty at Rogue Community College, a founding member of Sustainable Rogue Valley, and a representative of Southern Oregon Climate Action Now (SOCAN). She contributed mainly to the *Glossary* and *Implementation* sections of the Plan.



Karen Chase

Energy Trust of Oregon

Karen lives in Josephine County and is the Southern Oregon representative of Energy Trust. She contributed primarily to the provision of contextual information for the Taskforce, as well as being a resource for exploring funding options.



Josh Berger

Energy Trust of Oregon

Josh is an alternate Energy Trust representative specializing in industrial processes. He provided information on available Energy Trust incentives and new project recommendations.

Council Liaison



Vanessa Ogier

Council Liaison

Councilor Ogier has been a member of the Grants Pass City Council since 2021 and was instrumental in the formation of the Taskforce.

City Staff



Jason Canady

Staff Liaison, Director of Public Works

Jason has been the Director of Public Works since 2015 and has worked for the City for more than 27 years. He provided insight into operations and recommendation feasibility.



Kyrriha Sevco

Public Works Business Operations Supervisor

Kyrriha has been working for the City since 2019 and has 30+ years of prior experience in energy efficiency and environmental work. She was the Taskforce's go-to resource for knowledge of City operations.



Wendy Higgins

Public Works Support Technician

Wendy has been in administrative services for more than 30 years, with prior municipal experience. Her organizational skills and attention to detail made her an excellent administrator for this Taskforce and an invaluable resource in the gathering of data.



Allegra Starr

Sustainability Planner

Allegra is an AmeriCorps RARE member with a background in Economics, Policy, Public Health, and Sustainability. She was responsible for the management of the Taskforce and the construction of the Plan itself.

The Process

To develop this Plan, Taskforce members first toured City facilities and received presentations from City employees from different departments.

After several months of preliminary information gathering, the Taskforce organized into small workgroups in order to focus on collecting and analyzing baseline data, municipal operations, accountability methods, and natural systems. These workgroups then researched their topic, investigated available resources, reviewed the relevant work done in other plans, and consulted City staff. The research generated by these workgroups informed the development of recommendations that were then put into a draft Plan that was released for internal committee review in February.

Ensuring this Plan was tailor-made for Grants Pass was of utmost importance, and the specific temporal, economic, geographical, demographic, and meteorologic context under which this Plan would be implemented were all given careful consideration as project recommendations were developed. The context to the Plan was so important that an entire section of the Plan, [*"It's the Climate,"*](#) is dedicated to it.

Engaging with City staff and other affected groups to ensure they felt confident in the final Plan recommendations was another important step in the development process. Staff from Fire, Police, Parks, and Facilities were all consulted as Plan recommendations were being developed and workshopped.

As recommendations were reviewed, their feasibility and contributions to Plan goals were weighed allowing them to be prioritized.

After several rounds of revisions, the Taskforce voted on April 12 to present the Plan to City Council on May 1. [19](#)



Plan Organization

This Plan's recommendations (a total of 59 steps towards 14 separate projects) ²⁰ are organized into four focus areas:



Buildings and Energy

A total of 33 recommended steps for making energy efficiency improvements and incorporating renewable energy generation into City buildings and facilities through 6 key projects.



Transportation

3 projects involving a total of 12 steps for reducing dependence on liquid fuel reserves for transportation purposes within City operations and employee commuting.



Consumption and Materials

8 steps toward the completion of 3 projects relating to reducing consumption, selecting materials to better facilitate reuse, and improvements to recycling and other waste disposal methods.



Natural Systems

6 steps for accomplishing 2 projects to maintain and improve the sequestration impact of the City's urban forest.

For each focus area, there are cost-effective, feasible projects recommended to help achieve the Plan's five overall goals.

Projects are broad approaches that give direction for the determination of specific actions that contribute to the achievement of larger goals. Because these broader approaches are based on knowledge of where the most substantial chances at having an impact might lie, these projects serve as a guide when generating potential step recommendations. If a recommended step contributes to one of these projects, then it can be determined to be a step worth exploring.

Steps are specific actions recommended for the achievement of each project identified. They provide actionable recommendations to staff and illustrate project feasibility.



"IT'S THE CLIMATE"

GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN



"IT'S THE
CLIMATE"

It's The Climate

Grants Pass is a special place. It has historically enjoyed, and economically benefitted from, its mild climate and natural beauty. Without question, both are worth protecting. An appreciation of the uniqueness of the City, as well as an understanding of the threats to the local and larger climate, drove the creation of this Plan, informed its recommendations, and underscores the importance of its adoption.

Significant hazards in Grants Pass are: [21](#)

Electrical Grid Flux refers to ongoing changes in the electrical grid due to changing demand, weather, and other factors.



Extreme Heat*



Wildfires*



Winter Storms*



Windstorms*

The Cascadia Subduction Zone is a 9.0+ magnitude earthquake predicted to hit this region within the next 50 years.



Earthquakes
(especially the **Cascadia Subduction Event**)



Volatile Fuel Prices



Electrical Grid Flux*

*projected to increase in frequency and/or severity

The risks presented by these hazards is intensified by several noteworthy vulnerabilities of the City of Grants Pass:

- Economic status – chronic poverty and unemployment in the area results in a population that pays an outsized proportion of their limited income for energy.
- Physical location – Grants Pass' more rural location within a mountain pass makes it more prone to isolation in the event of natural disaster than its less rural counterparts.

What will this mean for Grants Pass' future?

The potential consequences of these hazards include:

- **Challenges providing essential services** such as wastewater, water, 911 call center operations, police and fire service due to electrical grid shortages and isolation, or market-driven liquid fuel shortages
- **Loss of efficiency and efficacy** of less-essential government operations due to both short- and long-term power outages
- **Increased pressure on the City's general fund** from rising energy expenses due to higher electricity costs and volatile liquid fuel costs and/or shortages, and potential damage to City property from natural hazards
- **Sizeable increases in utility billing rates** from rising energy expenses due to higher electricity costs and volatile liquid fuel costs and/or shortages, and potential damage to City property from natural hazards
- Increased medical spending due to elevated rates of heat-related and respiratory illnesses, which is more likely to lead to **medical debt** due to the relatively high rates of poverty in this region
- **Increased financial stress on the Grants Pass population** due to high energy prices, increased medical expenses/debt, and natural disaster property damage, which, especially in cases of severe property damage, can result in homelessness
- **Elevated rates of heat-related illness** due to extreme heat, loss of power for air conditioning, and the particular vulnerabilities of this community
- **Elevated rates of respiratory illness** due to poor air quality from fires and the particular vulnerabilities of this community
- **Declining worker productivity due** to increases in extreme heat event severity and frequency

Inaction could result in economic distress for the City and its citizens as well as a decline in livability. However, there are actions the City can take to minimize these hazards.

What can be done?

Actions the City can take to minimize these hazards include:

- **Developing energy independence** through off-grid power sourcing (especially to essential City services) to allow for continued services without reliance on grid functionality and/or during short-term power outages.
- **Utilizing regenerative local energy sources** as opposed to other off-grid options for both vehicles and facilities operations to avoid supply issues arising from physical isolation or shortages.
- **Mitigating natural hazard increases** to decrease the severity of impacts.
- **Increasing independence from fuels** with volatile/increasing markets.
- **Reducing City operations' negative impacts on livability** in Grants Pass.
- **Investing in long-term energy savings.**



To develop this Sustainability Energy Action Plan, the Taskforce has reviewed these climate risks along with City operations, the current availability of funding, and City energy expenditures to determine where the most productive and financially savvy changes can be made. The results of this process are the five goals of the Plan which are discussed in the following section.

\$1.9 million

In potential annual energy cost savings by
2045 through Plan recommendations ²²







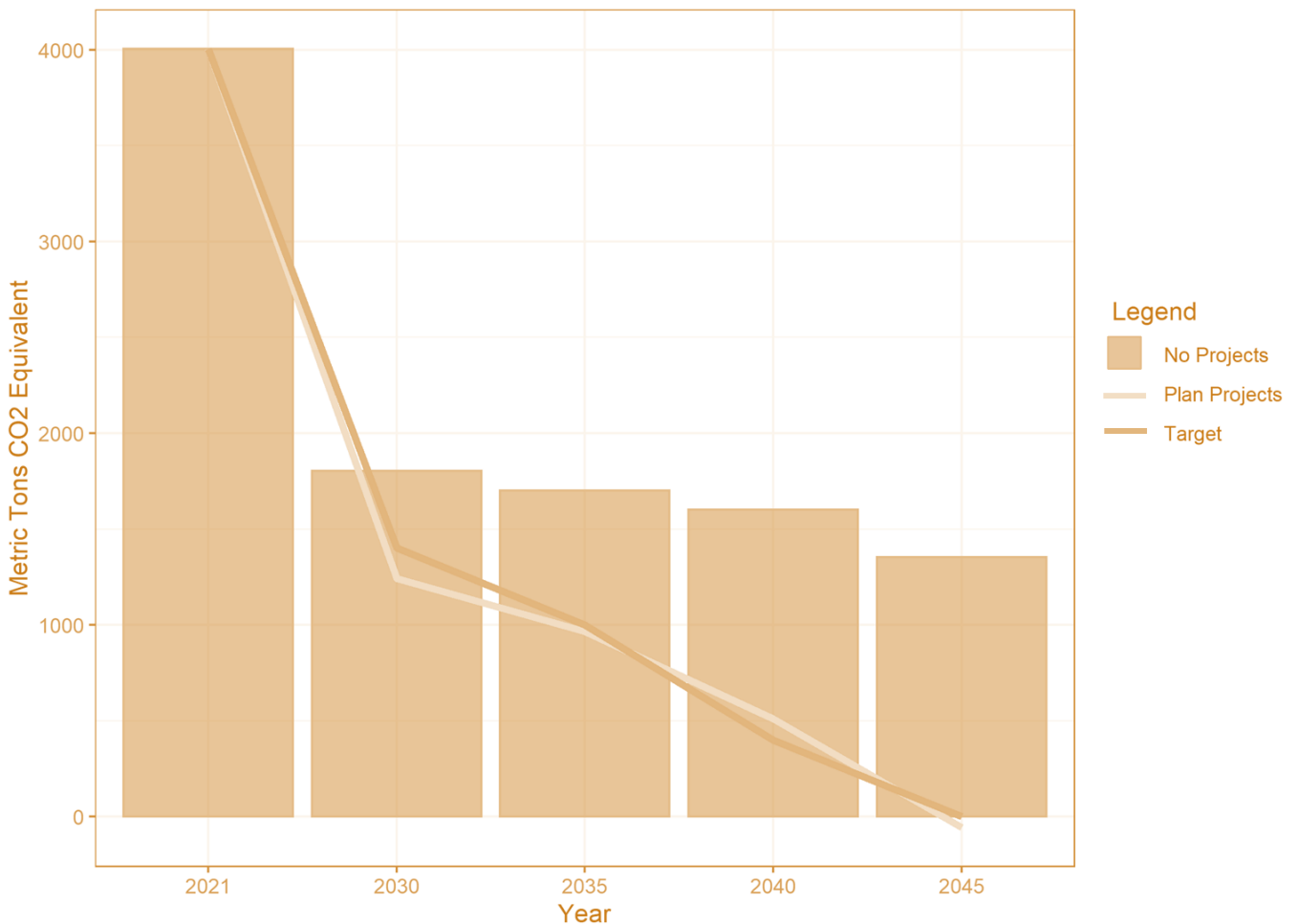
VISION FOR THE FUTURE

Vision for the Future

The Feasibility of Success

The vision of Grants Pass the Taskforce wishes to put forward is one in which the hazards present in the “*It’s the Climate*” section are no longer such serious threats. This is not a pipe dream, as it may have seemed 20 years ago, but a very achievable reality. In fact, in 2021, the organization Carbon Tracker published a report that showed “current technology could produce 100 times as much electricity from solar and wind than current global demand.” ²³

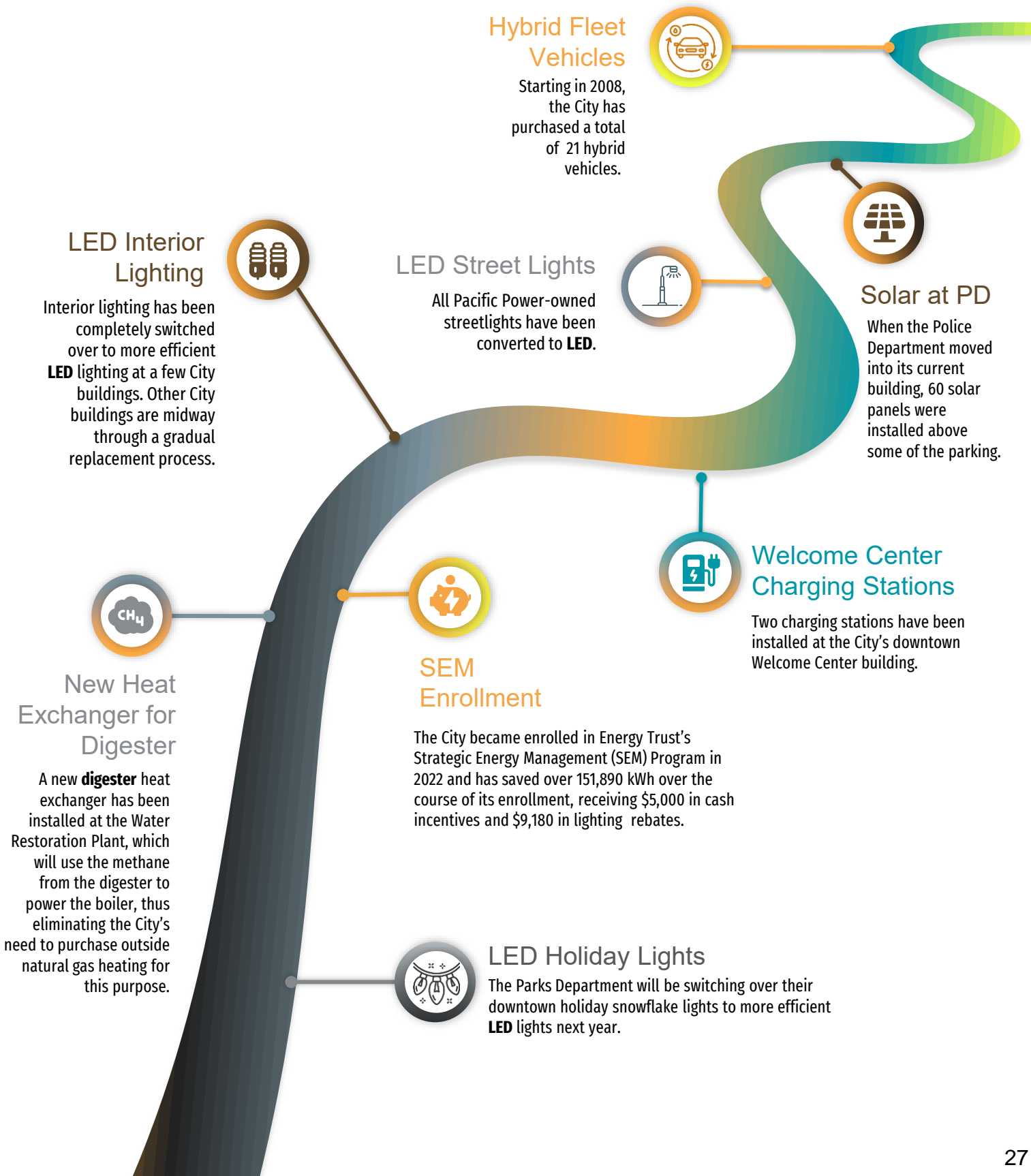
GRANTS PASS’ GHG EMISSIONS PROJECTIONS V. GOALS



Annual estimated greenhouse gas emissions per milestone year. Emissions projected without impact of Plan projects are shown as bars. Emissions expected after reductions from Plan projects are shown as a line graph. Target emissions levels are shown as an additional line for comparison.²⁴

Grants Pass' Prior Sustainability Work

Not only are sustainability improvements theoretically possible, but Grants Pass has been making efforts to improve its energy usage and be more sustainable for some time now. This timeline shows some highlights over the years. Efforts to date saved nearly \$50,000 in electrical costs alone in 2022 compared to 2020. [25](#)



Hybrid Fleet Vehicles

Starting in 2008, the City has purchased a total of 21 hybrid vehicles.



LED Interior Lighting

Interior lighting has been completely switched over to more efficient LED lighting at a few City buildings. Other City buildings are midway through a gradual replacement process.



LED Street Lights

All Pacific Power-owned streetlights have been converted to LED.



Solar at PD

When the Police Department moved into its current building, 60 solar panels were installed above some of the parking.



Welcome Center Charging Stations

Two charging stations have been installed at the City's downtown Welcome Center building.



SEM Enrollment

The City became enrolled in Energy Trust's Strategic Energy Management (SEM) Program in 2022 and has saved over 151,890 kWh over the course of its enrollment, receiving \$5,000 in cash incentives and \$9,180 in lighting rebates.



LED Holiday Lights

The Parks Department will be switching over their downtown holiday snowflake lights to more efficient LED lights next year.



New Heat Exchanger for Digester

A new digester heat exchanger has been installed at the Water Restoration Plant, which will use the methane from the digester to power the boiler, thus eliminating the City's need to purchase outside natural gas heating for this purpose.



WHAT ARE WE DOING NOW AND WHAT WILL WE ADD FOR THE FUTURE?

The recommendations within this Plan have been chosen in alignment with current City practices, as shown below. Current practices are shown in black while recommendations are shown in gray.

PLANS

- Josephine County Hazard Mitigation Plan
- Forest Management Plan with a goal of a 5% increase in urban forest sequestration by 2045
- Sustainability and Energy Action Plan

PROGRAMS


- Energy Trust’s SEM Program for all City properties
- Energy Trust’s New Buildings Program for all new projects
- Employee Wellness Program
- Alternative Commute Incentivization Program

POLICIES

- Pesticide Selection Policy
- Environmentally Preferable Purchasing Policy

STUDIES

- Safe Routes to School
- 2022 MENG Facility Condition Assessment
- Building Energy Usage Evaluations
- Energy Generation Potentials Study
- Safe Routes to Work



Grants Pass' climate vision for 2045 is one of resilient City operations that best serve the people through cost-efficient achievement of net-zero emissions



“The warm breeze draws you to tilt your face up to the clear blue sky and take a deep breath of the fresh air...”



A Day in 2045

By Kayle Palmore

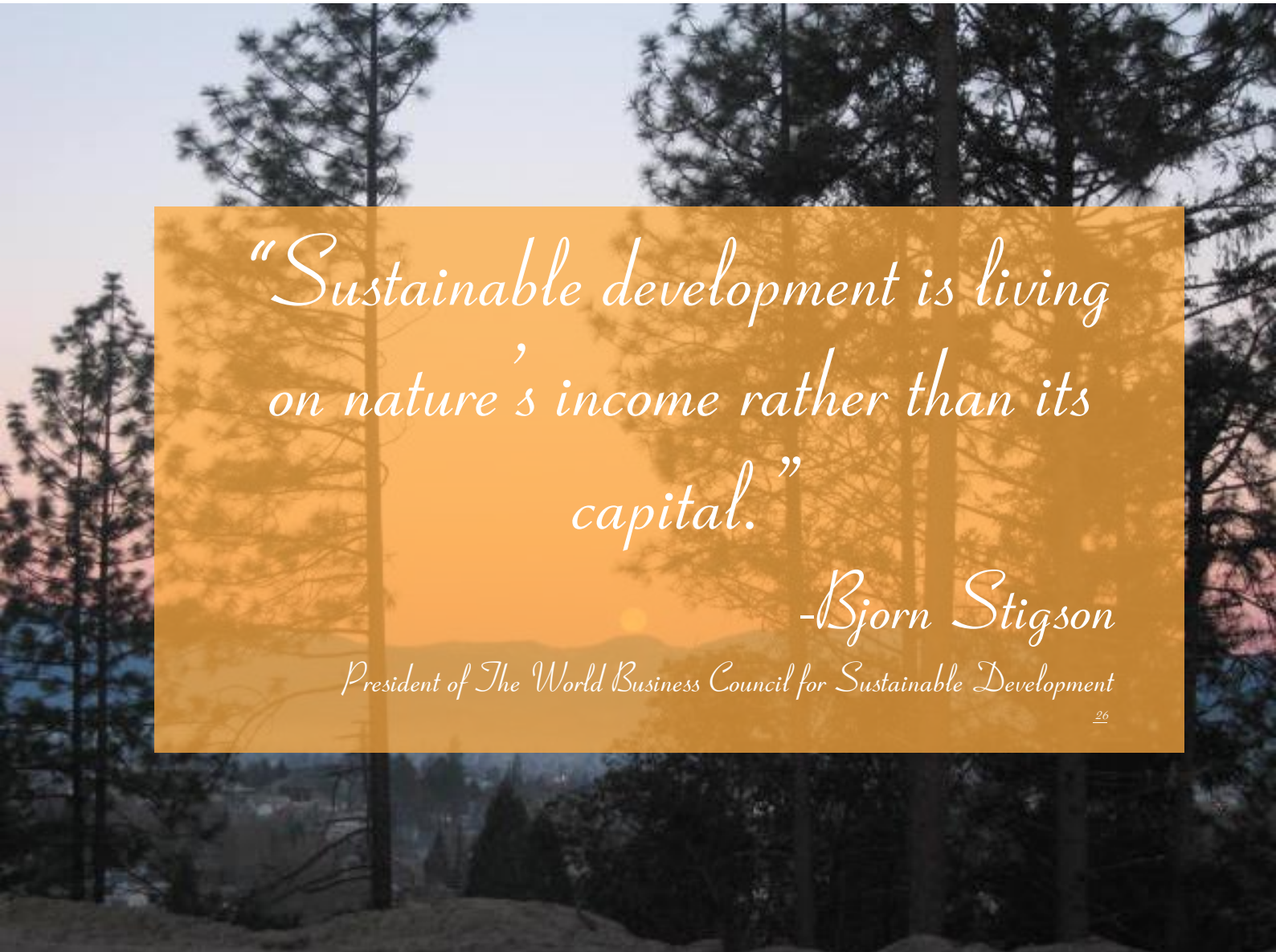
Grants Pass High School Class of 2025 and Sustainability and Energy Action Taskforce member (2022-2023)

As you walk the streets of downtown Grants Pass in the summertime, you marvel at all the beauty surrounding you, from the hanging flower baskets hooked on LED streetlights to the smiling faces of all the people strolling about and entering the small shops with their families. Much of what was once extra parking spaces have been turned into spaces for bikers and pedestrians to navigate this city more safely. In remaining parking lots, many of the spots now host electric vehicle charging stations charging a wide array of electric vehicles. As you turn one of the corners, you see a young girl and her brother riding their bikes side by side in the large bike lane. They pass in front of you and your family's favorite restaurant, one of the oldest in the city and you admire the way the sunlight dances across its rooftop solar panels which have enabled it to reduce its energy costs enough to stay in business all these years. The sounds of birds and laughing children permeate the air in the absence of the vehicle noises that once drowned them out, even as an electric city vehicle drives past with its brightly colored logo so beautifully plastered on the side. The warm breeze draws you to tilt your face up to the clear blue sky and take a deep breath of the fresh air. A bumblebee flies past you and into the foliage of the small grove of trees planted on a designated urban forest expansion area where once there'd been nothing more than an empty lot and abandoned building. A smile spreads across your face as you think of how much you love this beautiful city.

The Future Grants Pass Deserves

Grants Pass is a community that values and wants to preserve its natural environment – it deserves to be the community in Kayle’s story. A community with a thriving economy and robust public health, with a City government that operates in ways that facilitate those interests. Hopefully, by 2045, Grants Pass will be well on its way to making that dream a reality.

The Taskforce developed the following goals as measures to safeguard Grants Pass’ economic health and livability.



*“Sustainable development is living
on nature’s income rather than its
capital.”*

-Bjorn Stigson

President of The World Business Council for Sustainable Development

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Overarching Goals

This Sustainability and Energy Action Plan has five overall goals. Through adoption of this Plan, the Council is establishing these goals as new City policy.

GOAL 1: Manage energy costs, allowing for better allocation of limited City funds.

GOAL 2: Improve energy resilience to allow Grants Pass to continue to provide essential services in the event of a grid failure or catastrophic natural disaster.

GOAL 3: Reduce greenhouse gas emissions incrementally over the next 20 years, reaching net-zero by 2045.

GOAL 4: Integrate sustainability into all City decision-making and consider sustainability measures whenever a project is undertaken.

GOAL 5: Establish a standing Sustainability and Energy Advisory Committee to monitor progress, advise on new technologies, and engage in citizen outreach.

Goal 1: Manage Energy Costs

Without action, energy costs are projected to increase more than 100% from 2021 to 2045. [27](#) This Plan sets the goal of maintaining energy expenditures within 30% of the 2021 baseline. The projects within this Plan are projected to make this feasible. This Plan seeks to avoid the financial pressures on both the City budget and its citizens that are discussed in “*It’s the Climate*” by investing in projects to manage long-term energy costs.

To pursue this goal, the Plan includes:

- energy-efficiency improvements;
- investment in sustainability improvements that produce long-term savings;
- pursuit of available (grant) funding opportunities; and
- efforts to become less dependent on expensive energy sources with volatile and/or rising costs

Goal 2: Improve Energy Resilience

Improving energy resilience will help Grants Pass maintain essential government services in the event traditional energy resources become unavailable.

To pursue this goal, the Plan recommends:

- closed-loop, self-contained electrical systems that provide resilience in the provision of essential public services;
- independence from diesel for backup power and essential services-related transportation;
- minimized reliance on outside fueling sources for essential transportation or power needs; and
- diverse fueling sources.

This goal also provides support for existing recommendations within the most recent Josephine County Natural Hazard Mitigation Plan.

Goal 3: Reduce Greenhouse Gas Emissions

Reducing **GHGs** will positively affect the livability and economic health of Grants Pass, as shown in the “*It’s the Climate*” section. Reduction goals start with an initial 65% reduction by 2030, reaching 75% of 2021 emissions by 2035, and 90% by 2040 before reaching net-zero by 2045.

To pursue this goal, the Plan includes:

- transitioning to cleaner energy sources (which are also more resilient and affordable);
- bolstering carbon sequestration efforts; and
- tracking factors that contribute to these emissions and planning accordingly.

Goal 4: Integrate Sustainability into all City Decision-making

Making sustainability (i.e. economic, social, and environmental stewardship) considerations a part of all City decision-making will provide for continual progress towards energy-efficient and resilient City operations.

Achieving this goal will require that sustainability measures be considered for every project, and that City staff engage in some mix of the following:

- adding sustainability to job descriptions as appropriate;
- giving preference to those with experience in sustainable practices in hiring when appropriate;
- assigning the role of Sustainability Coordinator to one or more current staff members, perhaps one per department; and
- reporting on sustainability considerations for future capital projects or programs.

Goal 5: Establish a Standing Sustainability and Energy Advisory Committee

A standing Sustainability and Energy Advisory Committee would ensure an ongoing commitment to sustainability progress and provide a resource to advise City staff in Plan implementation and to assist in monitoring efforts.

Such a committee would meet at least quarterly to:

- monitor progress towards achieving Plan goals and benchmarks;
- advise on new practices, regulations, and emerging technologies through research and outreach;
- promote education within the community;
- engage in ongoing deliberations and recommendations regarding further actions; and
- seek input and share findings with the citizens of Grants Pass.

These goals are in line with every one of Council's strategic goals.²⁸ While the Plan's ability to **facilitate sustainable, manageable** growth, and to **maintain, operate, and expand our infrastructure to meet community** needs are fairly evident, it also works to **enhance community safety** through resilience and funding preservation, to **provide cooperative shared leadership** through standing committee creation, and to **encourage economic opportunities** by safeguarding the long-term economic health of the City and community, and stimulating new industry growth in renewables.







BUILDINGS AND ENERGY

Buildings and Energy

The ways in which the City of Grants Pass designs its buildings, sources its energy, and operates all its infrastructure are crucial components to the sustainability of municipal operations.

Buildings and Energy related uses account for 64% of municipal spending on energy,²⁹ and 85% of municipal **GHG** emissions.³⁰ Dependable and dynamic energy sourcing is an integral part of resilience.

For this reason, sustainability improvements in this area can result not only in substantial savings and reductions in greenhouse gas emissions/livability improvements but can also be the difference between functionality and failure in the event of a natural disaster.

In order to meet overall Plan goals, the goals for the Buildings and Energy section of the Plan are to 1) reduce the energy usage of operations (and in turn, energy spending and emissions volume); 2) convert critical infrastructure (Police, Fire, Wastewater, and Water) to be able to run off-grid without depending on external fuel sources; 3) consider sustainability in all new constructions and remodels; and 4) have a standing committee advise on sustainability of any major new projects.

Projects in this section target reductions in electrical and natural gas consumption, as well as improvements in the sourcing of electrical power to reduce its direct cost and public health impacts.



Progress to Date

Grants Pass’ municipal electrical energy usage declined 3.4% from 2020 to 2022 and overall energy usage declined 0.5% for the same period (electricity and natural gas). Energy expenditures for electricity and natural gas declined by nearly \$12,000 during this period.³¹ This was largely due to a few key improvements:



Going Forward

Goals	Potential Indicators
<ul style="list-style-type: none"> • Reduce the energy usage of operations (and in turn, energy spending and emissions volume) • Convert critical infrastructure (Police, Fire, Wastewater, and Water) to be able to run off-grid without depending on external fuel sources • Consider sustainability in all new constructions and remodels • Have a standing committee advise on sustainability of any major new projects 	<p>The following measures could be used to indicate successful improvement in sustainability in the Buildings and Energy sector of Grants Pass’ operations over time:</p> <ul style="list-style-type: none"> • Energy spending reduced by 40% (inflation and population adjusted) • 60% locally sourced (off-grid) energy • 100% electric systems by 2045 • Emissions reduced to net-zero by 2045

Projects and Steps

Project BE-1. Address Energy Inefficiencies within Existing Buildings and Operations

Energy-efficiency upgrades are the critical first steps towards improved buildings and energy systems. The City has already saved nearly \$50,000 in electricity billing alone,³² largely through energy efficiency improvements. Making buildings more energy-efficient will reduce City energy spending and emissions, as well as make it more feasible to power facilities through more resilient, independent sourcing.

BE-1-1. Improve Weatherization of City Buildings

Loss of heated/cooled air is costly, increases energy demand, and is a major factor in the **EUI** of older structures. Weatherization also contributes to resiliency by addressing poor seasonal air quality from fires in this region, something which is only projected to worsen.

Weatherization efforts can include a wide range of potential improvements, as shown in the U.S. Department of Energy’s Weatherization Assistance Program model for “whole house weatherization.”³³ Which weatherization techniques make sense for each building can be evaluated for impact v. cost of implementation on a building-by-building basis.

BE-1-2. Convert to Energy Efficient Lighting

Grants Pass has saved thousands of dollars already through a variety of **LED** lighting conversions across the City. Completing this transition to **LEDs** for all City lighting, both interior and exterior, and maintaining this standard for energy efficient lighting, is one of the most cost-effective actions that can be taken to improve the energy efficiency of City buildings.

EUI stands for Energy Use Intensity and is a way of measuring the energy efficiency of a building using the amount of energy it uses relative to its size.



BE-1-3. Electrify Heating Systems

As solar infrastructure is rolled out, both local and otherwise, the City should consider the cost-effectiveness and public health benefit of transitioning to electric systems for both building and water heating.

HVAC is shorthand for heating, ventilation, and cooling systems.

BE-1-4. Automate Systems

Automating the times that lights and **HVAC** systems are in operation can prevent energy waste. Grants Pass has already saved \$9,000 annually in part through automation of lights and thermostat controls at City Hall.³⁴ More City buildings could benefit from these same automation efforts.

BE-1-5. Utilize Most Up-to-Date Facility Condition Assessment Findings

Prioritize addressing Facility Condition Assessment deficiencies relating to energy-efficiency from the most recent Facility Condition Assessment. To jumpstart this effort, a list of specific energy-related deficiencies that were identified in the current 2022 Facility Condition Assessment prepared by MENG Analysis, is attached to this Plan (Appendix VII).

BE-1-6. Investigate Opportunities to Improve Energy Efficiency Further

This Plan addresses the energy inefficiencies that were known to its authors. However, a systematic evaluation of City facilities for energy inefficiencies is key to long-term energy and cost savings. The methods and scopes for such evaluations can vary. For example, energy walk-throughs can be conducted at no cost through **Energy Trust of Oregon (Energy Trust)**,³⁵ pre-assessments of buildings could be made at no cost, or a full energy audit can be conducted to obtain the best possible information. Some method of energy evaluation should be conducted on a 3- to 5-year cycle.



Project BE-2. Develop Microgrid Energy Systems (to support essential services)

Microgrids offer resiliency, positive economics, and sustainability. A microgrid system reduces reliance on traditional energy sources, and thereby increases resiliency while reducing emissions and energy costs. The Water Restoration Plant and the Police Station are recommended as priorities for microgrids because of 1) the irreplaceable and vital services they provide which will be important in the event of an emergency, 2) their high energy usage, and 3) the feasibility of being able to generate substantial amounts of energy at these sites shown in preliminary evaluations.

Microgrids are customized, small-scale, localized energy systems composed of an energy generation system and the facilities using the electricity for operations.

BE-2-1. Install a Dual-Source Microgrid at the Water Restoration Plant

The new **digester** heat exchanger project completed in spring of 2023 at the Water Restoration Plant allows for the methane produced by the digester to be used to power the boiler in place of purchased natural gas. This step forward in sustainability will result in reduced energy costs at this site. However, by expanding on this concept, further savings may be possible. By developing a microgrid system that incorporates on-site solar generation (likely rooftop and raised solar over existing infrastructure due to land requirements) as well as any additional methane emissions from the digester, emissions could decrease even further, and the additional power generated could cover more of this facility's sizeable energy usage. Not only would this save money, but this would also mean that in the event of any grid failings, the plant would still be able to operate at a reduced capacity without relying on external fuel sources.

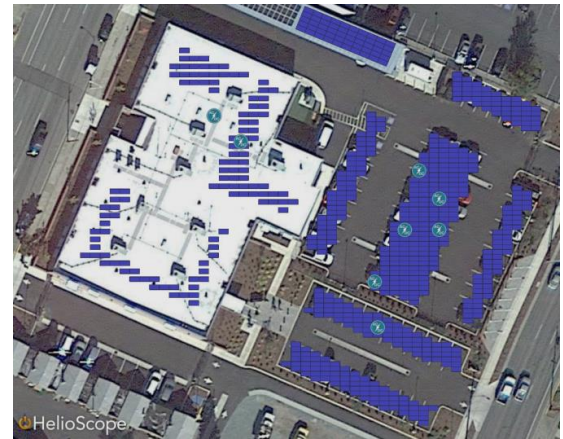


BE-2-2. Monitor Feasibility of Micro Hydropower Generators in the Water Restoration Plant Infrastructure

Micro hydroelectric power has great potential for future installation at the Water Restoration Plant given the high volumes and consistent rates of water flowing through the plant. As micro hydropower generation technologies improve, the feasibility and pay-off of such an installation may increase.

Micro hydroelectric power refers to small-scale hydroelectric systems. These can, for example, capture the energy of water flowing through a pipe.

To provide further energy savings and resilience in the event of a natural disaster, this Plan recommends expanding the solar array into a microgrid system. This process would include the installation of battery storage (for which space could be found outside somewhere on the current lot or on the property next door which is being demolished), and installation of additional solar panels, not just on the remainder of the existing shade structure, but also potentially on the roof of the building (pending structural feasibility), and over the remainder of the parking lot.

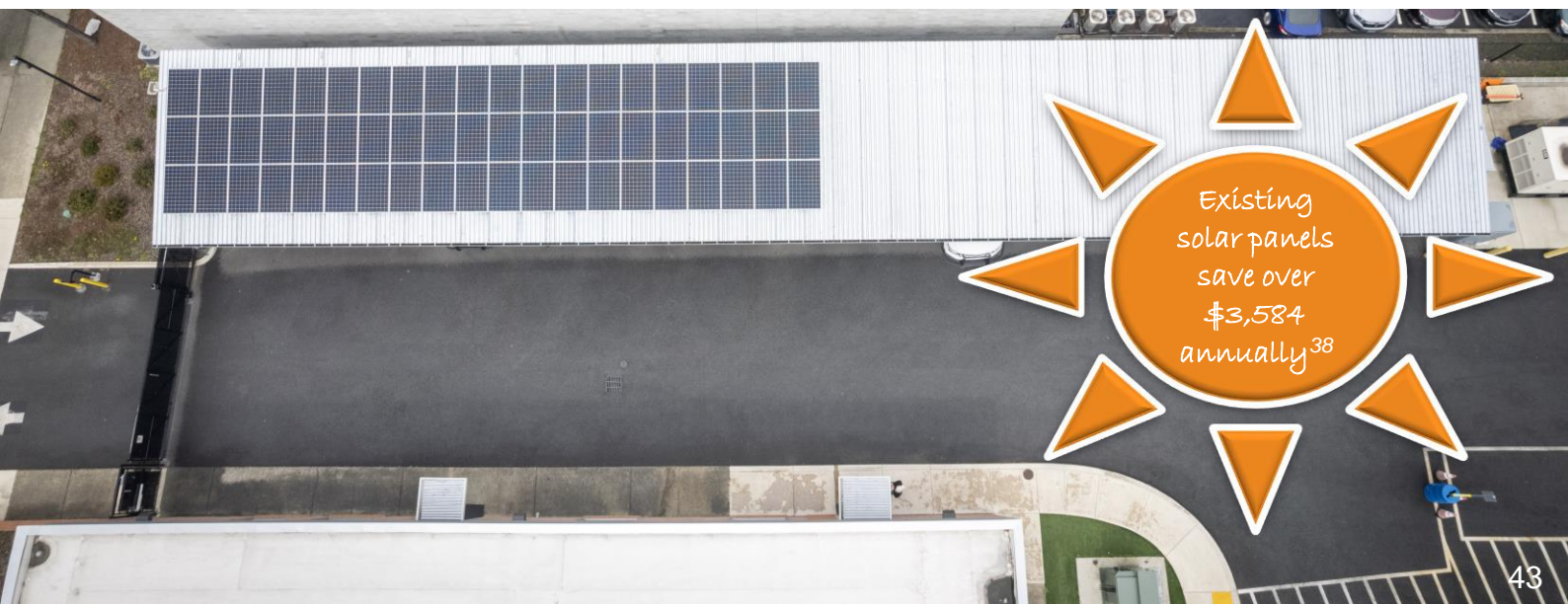


BE-2-4. Explore Feasibility of Expanding a PD microgrid by Incorporating Nearby Property

The central location of the Police Department building opens possibilities for the expansion of a PD microgrid. Nearby

BE-2-3. Install a Microgrid System at PD

The Police Department building provides crucial emergency services 24 hours/day, seven days/week, and is one of the City’s most energy intensive buildings.³⁶ A 60-panel solar array was installed over a parking shade structure when the building was renovated to accommodate the Police Department in late 2019 - an initial step toward developing a microgrid. These existing panels are producing 2,715 kWh of electricity a month on average (32,578 kWh a year), equivalent to an annual savings of about \$3,584.³⁷ The Police Department is eager to expand on this investment and further reduce its energy costs.



Existing solar panels save over \$3,584 annually³⁸

pieces of City property should be assessed for their energy generation potential and considered for incorporation into the microgrid system at the Police Department building. Such properties include the abutting former rental property, the empty lot across the street to the west of the building, the parking lot right next to the empty lot, and the City Hall campus right across the street to the south of the empty lot and parking lot. In the future, consideration could be given to setting up an arrangement with the county to loop the county buildings adjacent to the City Hall campus into this microgrid system as well. As the City's property holdings may change over the years, plans for fully developing the Police Department microgrid system should evolve as well. An

envisioning of what such a system might look like can be found in Appendix VIII.

Project BE-3. Improve Efficiency of Pumping Systems

The most energy intensive processes within City operations all involve water: treatment of river water to make it drinkable, treatment of wastewater, and distribution and collection of drinking water and sewage/greywater.³⁹ All these processes require the pumping of massive quantities of water, which uses a great deal of energy.



Therefore, one of the most effective methods for reducing energy usage and costs is to reduce the energy used in pumping through technological improvements and improved management tools.



according to U.S. Department of Energy guidelines for energy efficiency, which are cited as producing savings of 10-25 percent.⁴⁰ To facilitate this process, a regular review of the energy usage of pumps and of the available technology in pumping should be conducted, perhaps on a 5-year basis. This an area to pay attention to and in which to continue to prioritize improvements due to the aforementioned high energy consumption of these systems.

Project BE-4. Reduce Energy Footprint of Parks Operations

BE-3-1. Coordinate Pumping to Optimize Energy Usage

Pumping efficiency can be improved by better utilizing flow data from existing monitoring systems to coordinate pumping efforts and improve efficiency. As improvements to smart management technology develop, maintaining the best available version of this technology, dependent on its cost-effectiveness, is recommended.

Parks operations are considered separately in this section because their energy usage is different from other departments in large part.

BE-3-2. Install Flow Meters at Reservoirs Currently Without Them

Currently, there are flow meters on only some of the eight reservoirs in the City. By installing flow meters at reservoirs that do not have them, more data would be available for making smart pumping calculations, thereby increasing the impact of that technology.

BE-4-1. Use Energy Efficient Street Lighting in Parks

The streetlights within the City’s parks are owned by the City and not Pacific Power and were therefore not converted to **LED** along with the rest of the streetlights in the City. Pacific Power’s streetlight conversion project was highly successful, providing an annual savings of \$78,000 (a 28% reduction in energy costs).⁴¹ Due to the cost-efficiencies, conversion of this remaining street lighting to **LEDs** should be a high priority.

BE-3-3. Replace Pumps That are More Than 20 Years Old

Energy efficiency improvement opportunities for aging pumps should be pursued



BE-4-2. Upgrade Sports Fields Lighting

Sports field lighting comprises the largest percentage of Parks' electricity usage.⁴² Only one of the sports fields has energy-efficient lighting. The lights at the remaining fields are quite energy intensive, resulting in such high energy usage by the department. Not only is the lighting inefficient, but human error in turning the lights on and off improperly can result in extended usage and wasted energy usage. Switching over the current lighting systems at sports fields to automated ones with energy-efficient lights would reduce energy consumption significantly.



BE-4-3. Explore Solar Potential at Parks

Given high energy demand at some parks ⁴³ and the current grant funding opportunities,⁴⁴ it is a good time to evaluate installing solar panels on park structure roofs, over parking lots, or at other locations in parks to power lighting and other electricity needs. These comparably much smaller solar installation projects could have similarly lower capital costs associated with them, and relatively short payback periods.

BE-4-4. Electrification of Parks Equipment

Some Parks Department outdoor power tools have been converted to electric versions, and the transitioning of Parks tools and equipment to more energy-efficient options should continue with the goal of electrification when feasible. This transition would be subject to the limitations of available technology, and its ability to perform the tasks required.



Project BE-5. Implement Sustainability and Energy Standards for All New Projects

While making changes to existing infrastructure and operations is important to the development of City sustainability, changes to how all new projects are developed will be equally important to ensure long-lasting changes that prioritize sustainability values.

This is why it is a goal of this Plan that the City consider sustainability in all new projects it takes on. When beginning a new project, energy efficiency, emissions impact, resiliency, and other impacts relating to the sustainable maintenance of this City should be considerations. Some specific parameters for new projects are given below, but this overarching requirement should apply to all projects.

BE-5-1. Enroll All New Construction Projects in Energy Trust of Oregon's New Construction Program

New projects should be designed in line with the City's sustainability efforts. **Energy Trust** of Oregon's New Construction Program offers guidance through every step of design and construction to help reach energy-efficiency goals.⁴⁵ **Energy Trust's** outreach manager helps determine which incentives and resources the project may be eligible for. This **Energy Trust** program could provide consistency moving forward and help maximize financial benefits through incentives.

BE-5-2. Adopt a Maximum Efficiency Lighting Standard

Whether an indoor or outdoor construction or remodel, all projects should utilize energy efficient lighting. The energy efficiency standards at the time of the construction/remodel design process should be the standard for meeting this requirement.

BE-5-3. Adopt a Solar Readiness Minimum Standard

Require all new constructions and remodels to include a solar trade ally in the design process and to explore options for solar generation when re/developing projects. If solar panel installation is not cost-effective at the time of development, the project should still be held to a minimum standard of solar-ready design in the anticipation of future solar power being feasible.

BE-5-4. Use 100% Renewable Energy for New Constructions/Remodels of Pools

Pools can be particularly energy intensive facilities, but in recent years many communities have managed to build pools with much smaller emissions footprints using new technologies and design elements.⁴⁶ This is made possible through techniques like passive solar heating and shade structures to reduce the overall heating demand of a pool, and the use of alternative energy sourcing for the remainder of the heating needs of the facility (by using heat pumps powered in part by rooftop solar arrays). Over time, reduced operations costs will offset increased development costs to yield a net-positive return.⁴⁷

BE-5-5. Consider Energy Efficiency in Roof Design for All New Constructions and Roof Replacements

The design of a structure's roof can be a crucial component to its energy efficiency. White or light metal roofs have been identified as a best practice for reducing the energy footprint of a building because they reduce the building's absorption of heat.⁴⁸ As there are multiple strategies for ensuring a roof is designed to do this, this Plan does not recommend a single method, but only that the energy efficiency of roof design and construction be evaluated and maximized as appropriate.

BE-5-6. Further Microgrid Exploration

Consider microgrid incorporation for any new construction, especially those relating to the provision of essential services and/or having a sizeable energy footprint.

BE-5-7. Give Preference to Contractors/Firms with LEED and/or Energy Efficient Design Experience When Contracting for New Projects

During the procurement process, experience with **LEED** building/facility design or some comparable experience with energy-efficient design should be considered an additional factor for firm selection. Experience in these areas should not only lead to more energy-efficient design but will likely avoid additional costs imposed by firms considering energy-efficiency design to be an additional service rather than standard practice for their firm.⁴⁹

BE-5-8. Involve Operators in the Design Process

Those who will be operating the building/facility should be brought into the design process to best ensure energy



LEED stands for Leadership in Energy and Environmental Design. It provides a framework for efficient and cost-saving buildings.

efficiency. Operators need to be able to not only inform design for this purpose, but also be able to learn about the facility's design from this process so that they are able to operate it as intended to maximize energy savings.

BE-5-9. Design Pumping Systems for Energy Efficiency

Given their high energy consumption,⁵⁰ optimizing the energy efficiency of all pumping should be factored into new facilities and/or infrastructure that require this kind of equipment.

BE-5-10. Adopt Natural Hazard Resiliency Standards for New Energy Infrastructure

As a major goal of this Plan is to achieve resiliency in power sourcing, it is important that we also ensure that new systems for energy infrastructure can accomplish their intended purposes, even during natural disasters. This means that charging systems, solar installations, and other such infrastructure discussed in this Plan must be installed with consideration for their ability to survive natural disaster events. Ease in repairing these systems must also be considered.



Project BE-6. Develop Dedicated Renewable Energy Generation Sites

Generating enough solar to power even just essential services will likely not be possible relying on on-site micro-grid systems alone. In order to produce power at the scale demanded by municipal operations, some additional renewable energy generation projects may be needed. Furthermore, these projects will be critical to the goal of energy savings. Energy production at these sites is estimated to possibly extend beyond projections of municipal usage,⁵¹ providing an opportunity to create a new revenue stream and/or a **community solar** system. Some potential sites are outlined below.

BE-6-1. Convert the Retired Foothill Landfill Brownfield Into a Solar Field

The retired Foothill landfill site has been evaluated by Pacific Power’s Alan Meyer as a potential site for solar generation, and the results were promising.⁵² Both this site and the Merlin landfill site discussed below have been given special attention since they are large, clear spaces, and most importantly, **brownfields**.⁵³ Because these sites must remain under City ownership and have little to no potential usages beyond that of energy generation, they are ideal locations for a solar field installation. In addition, a solar generation project at either site would more than likely qualify for grant funding for both renewable energy production and for brownfields renewal,⁵⁴ as discussed in Appendix XI.

Community Solar systems provide opportunities for citizens to use solar energy to power their home even if they do not have a suitable space for panels to be installed at their address.

Brownfields are pieces of land that are or are perceived to be contaminated due to their past uses. This status makes redevelopment of them eligible for additional funding.



BE-6-2. Convert the Retired Merlin Landfill Brownfield Into a Solar Field

The Merlin landfill site is much larger than the Foothill landfill site discussed above, but the absorptive capacity of the grid currently at this location is limited. The total land area that the City owns at this location is more than 300 acres. However, the substation at this site can only support an amount equivalent to what can be produced on approximately 8-10 acres.⁵⁵

Given the magnitude of solar production capacity possible at the Merlin site, it is worth considering building infrastructure to increase the City’s ability to benefit from additional solar production on this land. This site, like the Foothill site, is required by law to remain under City ownership, and given this mandate, and the challenge involved in converting brownfields into any other sort of property, it is worthwhile for the City to invest in a more sizeable solar field at this site, as discussed in Appendices XII and XIII.

Additional electricity production could be used to offset other electricity costs involved in utility provision or to create an additional revenue stream for the City. Projections including this larger installation can be found within the *Full Municipal Energy Use Report* (Appendix II).



In order to make this possible, an infrastructure investment to connect this generation site to the grid will be necessary. Additional funding resources are likely to be available for such a project.



BE-6-3. Put a Solar Field at One of the Wastewater Pump Stations

One of the wastewater collections pumps is located on about 7 acres of land. Unlike the majority of land on which current City property is located, future development or expansion is not anticipated at this property, making it a promising location for a solar field installation.



BE-6-4. Explore Micro Hydroelectric Generation Potential Throughout the City’s Drainage/Stormwater Systems

While micro hydroelectric installations are not presently worthwhile given current technology, hydroelectric generators continue to improve, meaning that the City’s existing stormwater systems may eventually become a source of energy generation. The City should stay alert to developments in this technology.

BE-6-5. Evaluate the Renewable Energy Productive Capacity of City Property

By conducting a renewable energy generation assessment across City properties, the City will be able to best determine additional projects that may be worth considering and where opportunities

for rooftop solar or other such installations might lie. This will provide for a better allocation of resources to maximize potential impact.

BE-6-6. Support Renewable Hydrogen Generation and Distribution Efforts

While it is unlikely that the production of **renewable hydrogen** by the City itself would prove worthwhile, there are other ways the City can support the rollout of this energy source so that it will be available for municipal purposes. As conversations around the construction of hydrogen pipelines take place, the City should advocate for these pipelines reaching Southern Oregon, and Grants Pass specifically if possible. If there are opportunities for renewable hydrogen generation facilities to be built in the region, the City should support these efforts. Regional or direct access to this energy source will prove invaluable when it comes to the further development of the fleet and improvements to hauling of City waste.

Renewable hydrogen is a liquid fuel alternative that shows promise, particularly when EVs may not be practical, such as for buses and long-haul trucking.







TRANSPORTATION

Transportation

Second to Buildings and Energy, the largest source of emissions in municipal operations is transportation, clocking in at about 1,078 MTCO₂e in 2021, 674 from City vehicle usage/fleet and 404 from employee commuting.⁵⁶

Not surprisingly, fuel usage makes for a hefty bill, especially with volatile increases in fuel pricing. In 2021, the City spent \$213,000 on fuel for its fleet alone. In 2022, despite almost identical emissions/fuel usage, the bill increased to more than \$299,000, a 40% increase in a single year!⁵⁷ This illustrates the downside of relying on only liquid fuels to power City vehicles because of how it leaves the City vulnerable to supply chain disruptions and cost increases. Completion of the projects recommended in this Plan will increase resilience and manage costs.

Diversifying the fuel sources of both City and employee vehicles and moving toward greater renewable fuel sourcing is an essential component of the steps necessary

to accomplishing the goals of the **SEAP**. The transportation goals of this Plan are to: 1) reduce consumption of both gasoline and diesel fuels (thereby reducing emissions and saving the City money); 2) increase the number of City vehicles and employee commute vehicles that can run without depending on outside fuel resources; 3) make sustainability a consideration in both vehicle purchasing selections and office policy decisions affecting employee commuting; and 4) have a standing committee investigate potential barriers to alternative commuting and advise on community development measures to address these obstacles. By accomplishing these goals, great strides will be made in the overall Plan objectives.

Projects in this section target reductions in gasoline and diesel consumption in order to reduce liquid fuel purchasing expenses and the public health impacts of fuel combustion.



Progress to Date

Numerous policies and projects have been enacted and are ongoing that have or should eventually improve sustainability of operations and reduce fuel usage:



11 Hybrid Fleet Vehicles



Virtual Meetings



4 Employee Hybrids/ EVs



Flex Schedules



Safe Routes to School

Going Forward

Goals

- Reduce consumption of both gasoline and diesel fuels
- Increase the number of City vehicles and employee commute vehicles that can run without depending on outside fuel resources
- Make sustainability a consideration in both vehicle purchasing and office policy decisions affecting commuting
- Have a standing committee investigate and advise on potential barriers to alternative commuting

Potential Indicators

The following measures could be used to indicate successful improvement in sustainability in the Transportation sector of Grants Pass' operations over time:

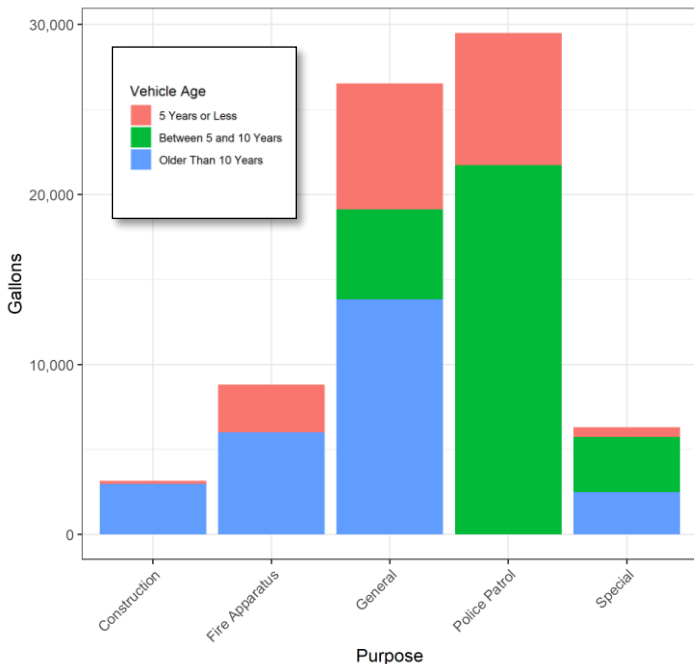
- High participation in incentivization programs for employee commuting
- Reduced liquid fuels purchasing
- High rate of **zero emission vehicles (ZEVs)** adoption by employees/use of charging stations by employees

Projects and Steps

Project T-1. Transition Rolling Stock to Zero Emission Vehicles (ZEVs)

63% of transportation-related emissions, and 10% of the City's emissions overall, originate from the mobile combustion from City rolling stock.⁵⁸ **ZEVs** would eliminate these hazardous emissions, and save the City money as well. Over the life of the vehicle, **ZEVs** have substantially lower operating and maintenance costs, creating long-term budget savings. As of 2022, the City owns approximately 139 vehicles. In determining an appropriate timeline for converting different types of vehicles to **ZEVs**, the departments using these vehicles, as well as the Fleet Department that manages City vehicles overall, were consulted and their input was incorporated into the plan's design. Information on the suggested timeline for transitioning the entirety of the City's rolling stock can be found in Appendix V.

Vehicle Fuel Usage by Purpose 2021



Fuel usage by vehicle purpose for 2021. The proportion of fuel usage by vehicle age category is also shown within each bar.⁵⁹

T-1-1. Transition General Purpose Vehicles to ZEVs

General purpose vehicles are vehicles for which there are not performance demands that might make transitioning them more complicated. Approximately 68 of the City's current vehicles would be considered general purpose vehicles suitable for conversion, including fleet vehicles used by staff for local and regional travel, Community Service Officer trucks, and other light duty vehicles. For more detailed information on what might be ready for immediate transitioning, see Appendix V.

T-1-2. Transition Police Pursuit Vehicles to ZEVs

Police patrol vehicles are highly specialized, and given the state of current technology, and conversations the Taskforce had with staff, the Taskforce determined it will take longer to transition to **ZEVs**. However, new **ZEV** products are being introduced by vehicle manufacturers at a rapid pace. Once these vehicles have proven themselves with law enforcement agencies elsewhere, the department should consider transitioning police pursuit vehicles to **ZEVs**. These vehicles should be a priority because they account for over half of all gasoline usage by the City fleet, making this category of conversion alone capable of producing a cost savings of at least \$100,000 annually.⁶⁰



T-1-3. Transition Heavier Duty/ Construction Vehicles to ZEVs

Current technology is limited when it comes to alternatives for heavy duty vehicles with sizeable lift or hauling requirements. However, by 2040, technology will likely have reached a point where it is possible to transition these vehicles to **ZEVs** as well, whether due to improved battery technology, the rollout of renewable hydrogen, or something else entirely. A review of such technology should be included in the vehicle replacement selection process.



hydrogen fuels are not suitable for).⁶¹ Furthermore, fire apparatus must be able to remain in remote areas of the community for extended periods of time, supplying enough power for both the vehicle and equipment on board to run continuously. The **International Association of Fire Fighters (IAFF)** local union should be consulted to ensure firefighters feel confident about a vehicle's ability to keep them safe and out of harm's way in wildland firefighting situations. Significant progress is needed to meet the rigorous requirements of rural firefighting, but trends in the zero-emission technology field indicate that transitioning all fire apparatus may eventually be possible.

T-1-4. Transition Fire Apparatus to ZEVs

Fire apparatus present a significant challenge for transitioning to **ZEVs** and are therefore the last stage for **ZEV** conversion. While some vehicles (like inspector vehicles) used by the Fire Department are general purpose vehicles suitable for immediate conversion, the vast majority of the City's fire apparatus is heavy duty, sizeable vehicles that must reach high speeds (something



Project T-2. Install Charging Stations to Support a Zero Emission Fleet

A systematic installation of rapid charging stations (likely leveraging currently available and sizeable grant funding – see Appendix III) will be necessary to support the transition of fleet vehicles and is therefore one of the highest priority projects recommended. Each step to this project should be done in advance of the corresponding step within the T-1 project.

It is further recommended that this vehicle electrification process be done in conjunction with the energy generation work involved in project BE-6 to avoid a step backward in energy independence. For those locations where solar will be installed (most notably at the Police Department), chargers can be connected directly to those solar installations, bolstering resiliency of those facilities' operations even further. The development of solar fields can help cover the electricity demanded by other charging infrastructure, and charging stations could be located at those solar field locations to minimize dependency on transmission lines in the event of a natural disaster. Electric vehicles could even serve as portable backup generators by charging at these fields and then connecting to a building or facility that is in need of power. Altogether, by using power generated by City-owned solar, the benefits of rolling out electric vehicles (674 **MTCO₂e** of emissions reductions and \$300,000 in annual savings that will result from transitioning vehicles off gasoline and diesel)⁶² will be even greater by reducing the cost of the electricity fueling these vehicles and providing additional resiliency measures.

It is also likely that some other forms of fueling infrastructure beyond electric charging stations may be needed in later years in order to facilitate the conversion of vehicles less suitable for electrification.

T-2-1. Install an Initial Round of Charging Stations for General Purpose Vehicles

Before general purpose vehicles can be transitioned to **ZEVs**, charging stations will need to be installed to support them. This first stage of charging station installation would likely involve the installation of approximately 22 dual-port Level Two (or better) charging stations at up to 11 City locations, including City Hall, the City Yard, Parks, Fire Stations, the Water Restoration Plant, the Police Station, and the new Water Treatment Plant. Potential design and engineering contractors and likely funding sources are shown in Appendix VI.



T-2-2. Install Fast Charging Stations for Emergency Response Vehicles

The Police Department building is likely to see a significant increase in electrification of its rolling stock in the second stage of **ZEV** rollout, since this location houses police pursuit vehicles. Prior to the transition of these vehicles to a zero-emission alternative, additional charging infrastructure will need to be put in place. This will include direct current fast chargers, which can provide a full charge in 20 to 30 minutes, depending on the configuration of the specific vehicle. While Level Two chargers are less expensive to install, the charging rate of 10-20 miles of range per hour makes them suitable only for vehicles that can be charged overnight or for extended periods during the day.⁶³

T-2-3. Install Fueling Infrastructure for Heavy-Duty and Specialized Vehicles

Additional charging station installations may be needed as battery technology improves to be able to meet the needs of heavier duty vehicles, or an alternative fuel, such as **renewable hydrogen** (the sourcing of which is discussed in BE-6-6), may be a more feasible source of clean energy for some or all of these vehicles. As manufacturers develop heavy equipment that utilizes either electricity or other alternatives, sufficient charging and/or alternative fueling infrastructure will need to be installed.

T-2-4. Install Fueling Infrastructure for Zero Emission Fire Apparatus

The final stage of **ZEV** adoption – transitioning fire apparatus – is most likely to require the use of new, technology beyond battery electric. While it is possible that battery technology will develop enough to cover the transition of at least some fire

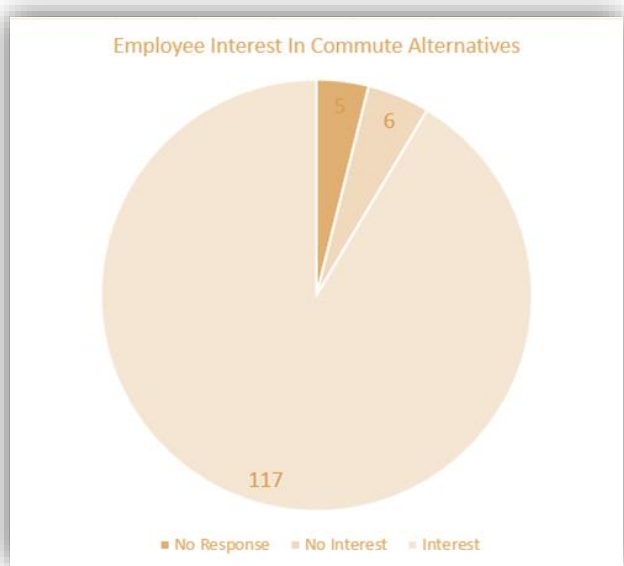
apparatus, meaning additional chargers using the newest technology will need to be installed at this stage, it is likely that something additional, like **renewable hydrogen** fueling infrastructure, will be required.

Renewable hydrogen is a liquid fuel alternative that shows promise, particularly when EVs may not be practical, such as for buses and long-haul trucking.



Project T-3. Reduce Employee Commute Emissions

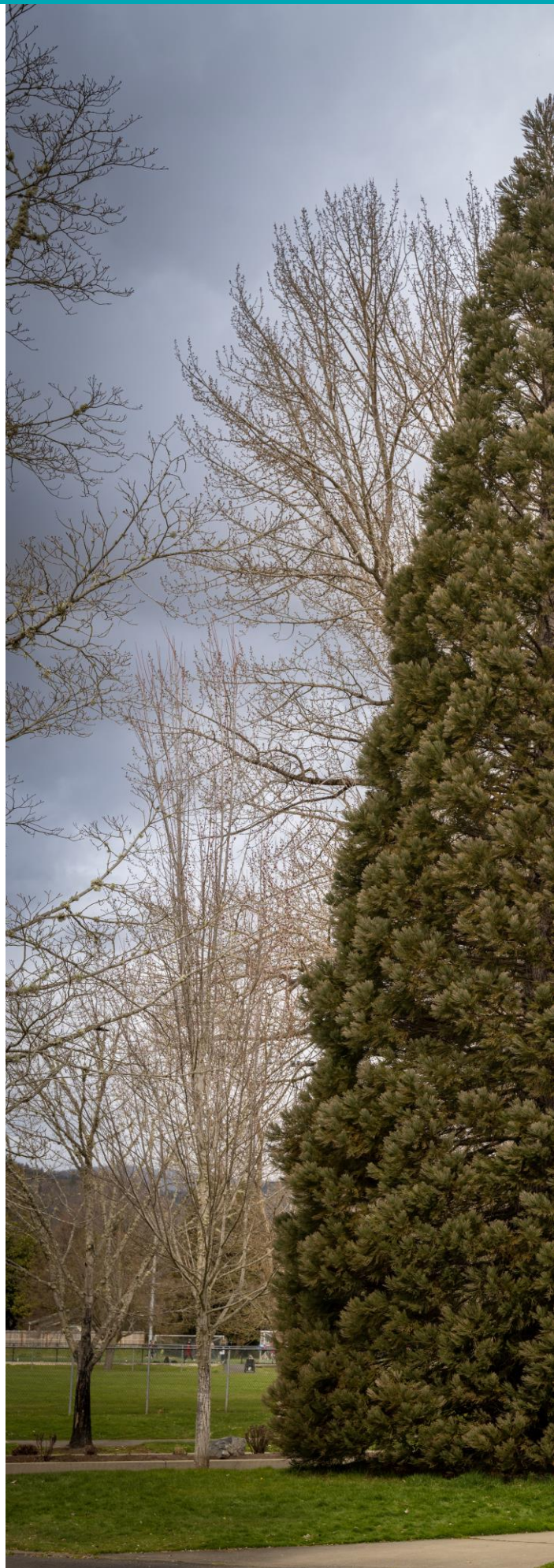
Using data collected from employee surveys, employee commuting was estimated to generate approximately 404 **MTCO₂e** per year, or 10% of overall City emissions⁶⁴. In order to reach net-zero by 2045, this source of emissions will need to be addressed. While the City's lack of direct control over employee commuting makes this a unique challenge, other workplaces have had success with strategies like those discussed in this section, and employee survey results indicate significant employee interest.⁶⁵



Summary of employee responses to commute survey. Count of employees with no response, no interest in any alternative, and employees with interest in at least one alternative are shown.⁶⁶

T-3-1. Implement Programs to Incentivize Low Emission Commuting

By implementing various programs to incentivize alternative commuting methods among City employees, the City can help to



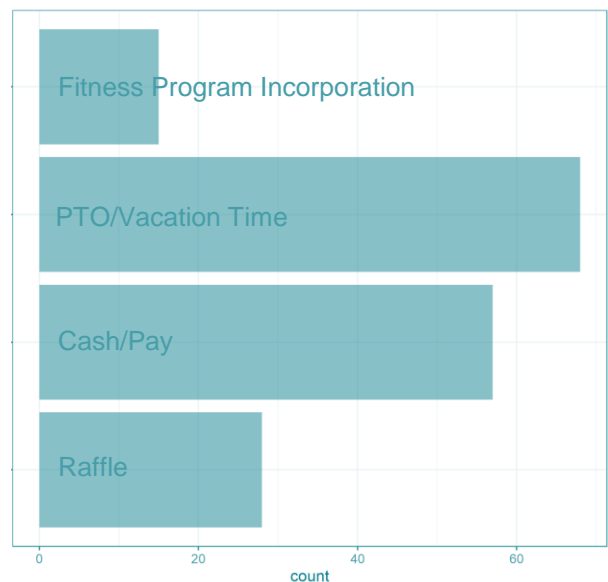


Decrease total employee commuting emissions. Programs should include incentives for walking, biking, carpooling, and using public transit. If the City wanted to include commuting in a **ZEV** as well, it could, but that is not the main purpose of this program recommendation.



Incentives for employees participating in alternative commuting could include raffle entries for an e-bike or similar, or other prizes provided by area businesses; enhancement of the existing fitness incentivization program to include alternative commuting methods involving fitness; additional paid time off (**PTO**) and/or vacation time; and cash/pay incentives.

Alternative Commute Incentive Preferences



Number of employees showing interest in alternative commute incentives.⁶⁷

T-3-2. Provide Resources to Employees to Improve Feasibility of Low Emission Commuting

Incentivization of low emission commuting methods will not be sufficient if staff simply do not feel that these are feasible options for them. Efforts to improve the perceived feasibility include employee education, and the provision of both physical and financial resources.

Educational efforts through programs and events like “Bike or Walk to Work Day,” and bicycle and pedestrian safety education can help staff to feel more comfortable on the roads.

Similarly, the City can promote **ZEV** adoption through employee education on both the emerging and currently available technology (many people may not be aware of just how far technology has come), and on the available financial incentives that are available from the state and federal government in support of purchasing **ZEVs**.

Given the physical distances of many employee commutes, which reduces the convenience of other options, the only practical low emission commuting options for some employees will be carpooling and making the switch to **ZEVs**. Both these commute methods’ adoption by employees will likely depend on the provision of resources like emergency rides, **EV** charging, and a **vanpooling** program.

A guaranteed ride home in case of emergency for employees who use alternate commuting methods (not single passenger vehicle), is recommended to increase employee comfort (with carpooling and vanpooling in particular).

EV charging infrastructure for fleet vehicle use should already be installed at most, if not all, work sites, so all that would be needed to provide charging for employees is to allow employees to use City-owned charging infrastructure as it becomes available. This

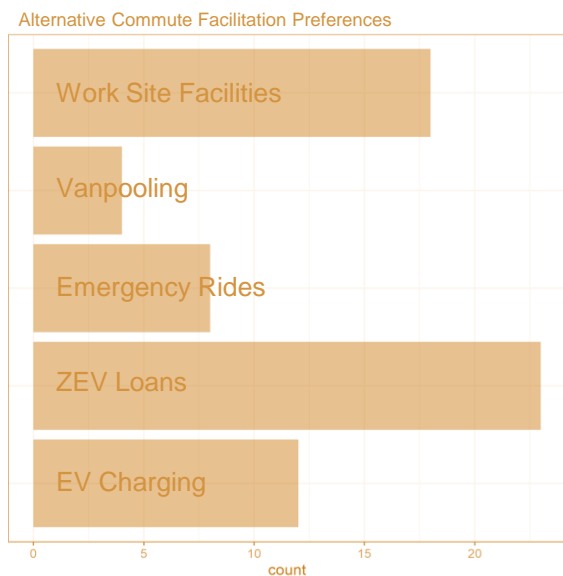
could be for free at first, and then for a reduced rate, and eventually at market rate.

Given the number of employees at the City with more sizeable commutes, **vanpooling** programs may be a good step beyond that of including carpooling for T-3-1 incentives. Putting a real effort into coordinating carpooling efforts by providing vans (preferably **ZEVs**) and organizing vanpooling would likely prove to be even more effective.

Employee survey data also suggests that physical resource provision (adding facilities like showers and bike storage to City work sites) might be important for supporting alternative commute options such as walking and biking.

Another possible option for improving the accessibility of alternative commute methods is targeting the use of public transit. While current bus options are quite limited, offering bus passes may help some employees to reduce their commute emissions as well.

Providing additional financial resources (like subsidies or no-/low-interest loans) for employee **ZEV** purchasing is another program employees expressed interest in. This can be done either directly through grant funding, or by establishing a partnership with local auto dealers to provide City employees with fleet pricing on **ZEV** purchases from those dealerships.



Number of employees expressing interest in alternative commute facilitation incentives.⁶⁸

T-3-3. Allow for Greater Schedule Flexing and Remote Work

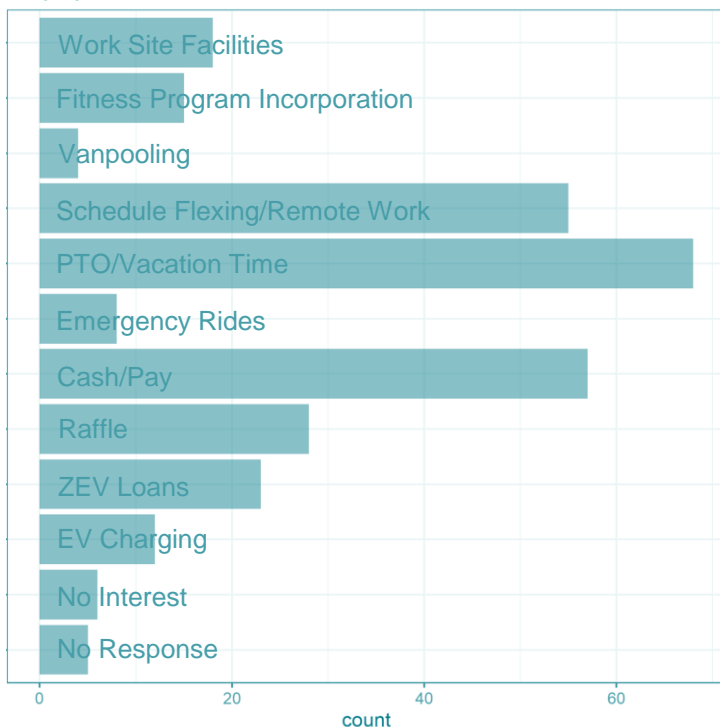
Allowing employees to flex their schedules so they have an extra day off, and/or are able to work remotely some days, is another way to decrease employee commuting. The implementation of these systems of work will allow for a substantially reduced work to commute time ratio, and, therefore, a sizeable reduction in overall annual commute time. Even allowing employees to flex their schedule so that they only work a half day on one day instead of a full day could produce reductions in commute time, as many employees go home during their lunch break.⁶⁹

Both of these policies are probably some of the most effective and fast-acting ways to reduce employee commute emissions since they do not require employees to adopt new transportation methods, but are able to produce a sizeable impact, nonetheless. For example, if 50% of employees transitioned to remote work two days a week, associated emissions would be reduced by 20%.⁷⁰ This was also one of the most popular strategies for employee commute reductions among

T-3-4. Conduct a “Safe Routes to Work” Study to Determine Barriers to Zero Emissions Commuting and Potential Fixes

Further discussion with surveyed employees found that employees don’t necessarily lack a desire to walk or bike to work but feel that it is unsafe to do so in Grants Pass. An investigation of what routes to work are available to employees and what obstacles lie on these routes (such as a lack of available public transit, absent sidewalks or crosswalks, or unsafe biking routes), can inform potential future efforts to improve alternative commuting options.

Employee Commute Interventions



Number of employees expressing interest in employee commute interventions.⁷¹







CONSUMPTION AND MATERIALS

Consumption and Materials

The ways in which the City of Grants Pass consumes, sources, and disposes of all materials is another significant contributor to its sustainability. Solid waste currently contributes an estimated 470 **MTCO₂e**, or nearly 9% of the total to the City's overall emissions.⁷² The City spends an estimated \$340,000 on waste disposal annually.⁷³ Reducing consumption and making sustainable purchasing decisions in this area can make for substantial savings, significant reductions in greenhouse gas emissions/livability improvements, and the difference between functionality and failure in the event of a natural disaster.

In order to meet overall Plan goals, the goals for the Consumption and Materials section of the Plan are to 1) reduce the City's long-term

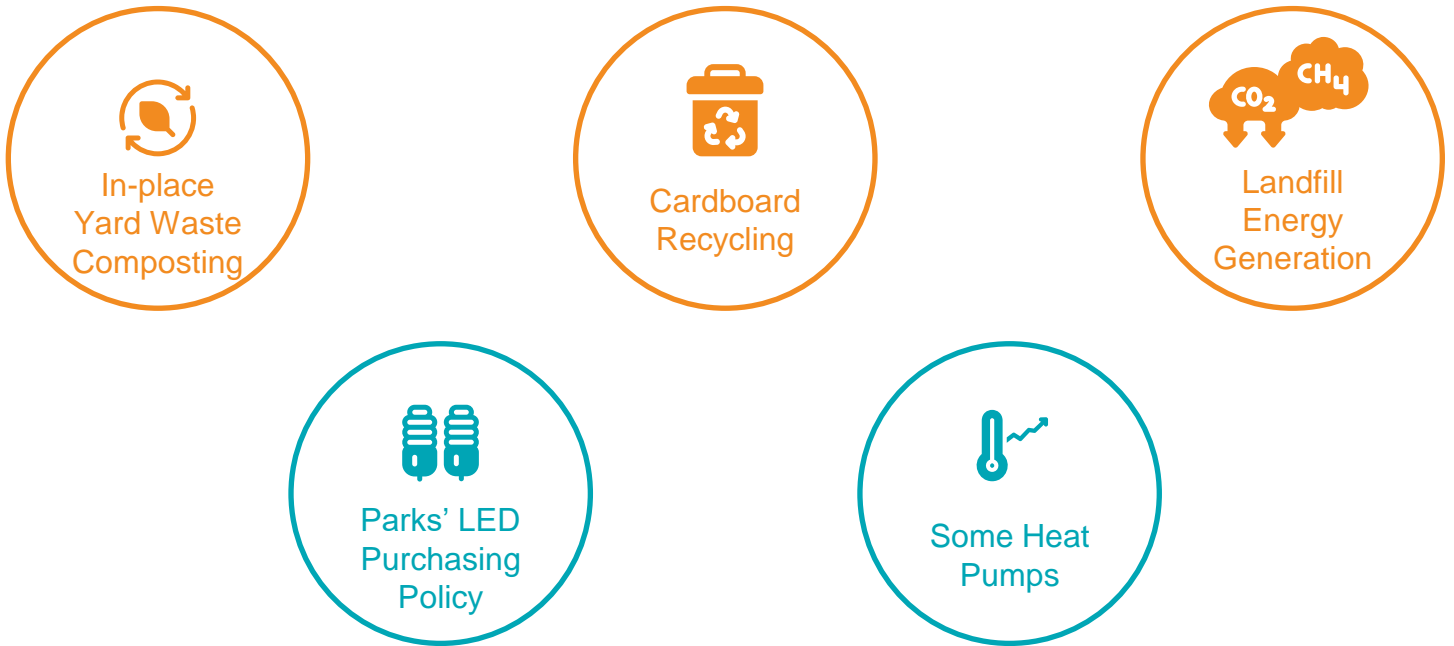
costs associated with consumption and waste disposal; 2) reduce **GHG** emissions associated with consumption and waste disposal; 3) improve resiliency of waste management by keeping the ultimate destination for waste more local when possible; 4) incorporate sustainability standards into all City purchasing decisions; and 5) create a dialogue between a standing committee and waste haulers on sustainability improvement options

Projects in this section follow a traditional reduce, reuse, recycle approach, as well as materials selection improvements and changes in disposal methods beyond an expanded availability of recycling in order to produce reductions in solid waste emissions.



Progress to Date

Grants Pass' solid waste emissions are estimated to account for 470 **MTCO₂e**.⁷⁴ However, there have been a handful of practices in consumption and materials management that have improved City sustainability:



Going Forward

Goals	Potential Indicators
<ul style="list-style-type: none"> Reduce the City's long-term costs and emissions associated with consumption and waste disposal Improve resilience of waste management by keeping the ultimate destination for waste local when possible Incorporate sustainability into all City purchasing decisions Create a dialogue between a standing committee and waste haulers on sustainability improvement options 	<p>The following measures could be used to indicate successful improvement in sustainability in the Consumption and Materials sector of Grants Pass' operations over time:</p> <ul style="list-style-type: none"> Downward trend in WARM calculator derived emissions Decreased waste production Increased recycling opportunities Downward trend in materials purchasing rates

Projects and Steps

Project CM-1. Reduce Consumption by Introducing Environmentally Preferable Purchasing Guidelines

Products designed to be more sustainable might be more expensive upfront but will often generate long-term savings and reduce overall waste. The City should consider sustainability factors in all its purchasing decisions, making a concerted effort to consume less overall, and to choose better options when selecting what to consume. A few more specific guidelines follow.

CM-1-1. Select Lighting for Energy Efficiency

New bulbs or lighting fixture purchases must be an energy-efficient option, such as **LED** lights.

CM-1-2. Choose Energy-Efficient and Durable Appliances

New appliance purchases must meet energy efficiency standards, as well as durability and lifespan standards. Choosing "built-to-last" appliances over less durable models will reduce long term spending on those purchases, as well as reduce waste.

CM-1-3. Phase Out Natural Gas

When purchasing technology that can run on either natural gas or electricity, electric options should be chosen in order to both reduce emissions (as emissions from electricity drop with grid power increasingly consisting of renewable energy), and reduce costs (as the City builds its own renewable

energy generation sites).

Such equipment purchases include heat pumps for water and building heating, and ovens/stoves.

CM-1-4. Choose Automated Options

Automated technology should be incorporated when available to allow for better management and reduced energy usage, for example, in lighting automation and smart thermostats.

Project CM-2. Identify Opportunities for Material Reuse and Improved Materials Selection

Basic environmentally preferable purchasing guidelines are a great first step towards more sustainable materials practices by reducing consumption, but in order to make them most effective, and allow for action beyond that, more strategic analysis and planning must be done.

CM-2-1. Thoroughly Assess the City's Waste Production

Only minimal data on the City's waste production is available from billing records with Republic Services and Southern Oregon Sanitation. Billing records show the number of annual dump trips, but tonnage had to be estimated assuming most loads weigh the same amount. More importantly, there is little to no information on what materials are being disposed of. This makes for less exact emissions estimates, as most loads must be categorized as "mixed waste" (further discussion of how waste generation emissions were calculated can be found under "solid waste data" in Methodology, Appendix IV). The lack of data also makes it impossible to develop targeted strategies for reducing waste or improving disposal practices.

CM-2-2. Create a Tailored Waste Reduction Plan

Once baseline data for the **WARM calculator** has been established, calculations can be run to develop a tailor-made plan for reducing the City's solid waste emissions, considering what materials need to be dealt with and how best to deal with them. Including the staff using current materials in the selection of alternative materials and practices is recommended.

Project CM-3. Pursue Improvements in Waste Disposal

The City currently spends \$340,000 on waste disposal.⁷⁵ There is little being recycled, sludge from the Water Restoration Plant is hauled away with high water content, and hauling of waste makes up a large percentage of both emissions and spending in this arena. Thus, there is the potential for sizeable improvement in waste disposal.

Furthermore, the 2021 **Recycling Modernization Act (RMA)** will lead to significant improvements in recycling opportunities in rural areas like Grants Pass beginning in 2025.⁷⁶ It is recommended that the City leverage these opportunities as much as possible to reduce solid waste emissions.

CM-3-1. Increase Availability of Recycling at City Facilities

The only recycling currently available at City facilities is for cardboard. Extending the range of what can be recycled could allow for waste to be diverted from landfills. After 2025, this should be more financially feasible for the City as a result of **RMA** requirements.⁷⁷

CM-3-2. Explore Options to Reduce Waste Hauling

Emissions associated with solid waste by the City's operations are, in large part, generated from hauling waste to White City, and in some cases, to Portland. Hauling to these locations is also costly, and potentially problematic for resiliency as well. While not an easy problem to tackle, looking into possible options for more localized waste disposal should be something the City collaborates on with haulers, and potentially larger regional partnership bodies. In particular, encouraging the establishment of a Southern Oregon Recycling Center following the **RMA** changes in 2025 is recommended.

Another recommended strategy to reduce hauling emissions is to encourage fuel efficiency and/or the use of biodiesel, and the adoption of **ZEVs** by haulers, especially as renewable hydrogen trucks become more readily available.

The largest contribution to the City's Consumption and Materials emissions and costs is the hauling of sludge from the Water Restoration Plant to the landfill. Significant cost and energy reductions could be achieved if sludge drying and/or hauling technologies and practices improve. Continued research into the latest findings in sludge management will likely prove important for City staff and potentially the standing Sustainability and Energy Committee, in order to make **GHG** and cost management targets.

The Recycling Modernization Act (RMA) is a 2021 State Senate Bill measure (OR SB 582) to expand access to recycling services and upgrade recycling facilities.





NATURAL SYSTEMS

Natural Systems

Natural systems, particularly the trees making up the Grants Pass urban forest, are major contributors to City sustainability through the provision of **ecosystem services**, like **carbon sequestration** and temperature regulation through shading. Supporting and improving these natural systems can improve sequestration rates and increase the amount of shading available, which will reduce net greenhouse gases, improve quality of life, and save the City and citizens money.

Increased sequestration, coupled with greater cooling effects and additional ecosystem resources that improve community resilience in the face of natural hazards, have a net positive impact on the quality of life in Grants Pass.

In order to meet overall Plan goals, the goals for the Natural Systems section are to 1) save money through bolstered ecosystem services; 2) improve natural systems to create a more resilient climate as extreme

weather events (particularly extreme heat) increase in frequency and severity; 3) contribute to hitting the target of net-zero **GHG** emissions by lowering the requirements for reductions; 4) incorporate sustainability considerations into the urban forestry management planning decisions; and 5) establish a dialogue between a standing sustainability committee and the existing Urban Tree Advisory Committee regarding the relationship between the urban tree canopy and sustainability goal achievement.

Additional (albeit modest) contributions to these goals and more can be found in the achievement of broader sustainability through a sustainable ecosystem management plan. Some strategies involved in such a plan can be found in Appendix XIV.

Projects in this section target increased sequestration from the City-owned tree canopy of Grants Pass in order to offset emissions, and thereby ultimately achieve Plan goals as well as improve the quality of life in Grants Pass.



Ecosystem Services refers to the benefits provided by the natural ecosystem, including cooling effects, flood and erosion controls, air purification, and carbon sequestration.

Carbon Sequestration refers to trees and other plants' removal of CO2 from the atmosphere.

Progress to Date

Based on limited data, trees on City land alone sequestered around 1,026 **MTCO₂e** in 2021. ⁷⁸



Going Forward

Goals	Potential Indicators
<ul style="list-style-type: none"> • Save money through bolstered ecosystem services • Improve natural systems to create a more resilient climate as extreme weather events increase in frequency and severity • Contribute to hitting the target of net-zero greenhouse gas emissions by 2045 	<p>The following measures could be used to indicate successful improvement in sustainability in the Natural Systems sector of Grants Pass’ operations over time:</p> <ul style="list-style-type: none"> • Improved data collection • Trend of increasing tree canopy • Sequestration matching or exceeding emissions by 2045

Projects and Steps

Project NS-1. Enhance the Urban Forest

To make the most of limited expansion opportunities, a significant part of efforts to increase the carbon sequestration of the Grants Pass Urban Forest should be dedicated to strategic planning.

NS-1-1. Employ a Software System to Better Manage the Urban Forest

Subscribing to an urban forest management software system like [TreePlotter](#) or one of its competitors could allow Grants Pass staff to track tree health and make maintenance decisions to support a rigorous urban forest.⁷⁹ Consideration should be given to ensure that any data entered into a system could be transferred in the future should the need arise. As shown in the methodology for Urban Forest Sequestration calculations, there is very limited data currently available for which to base measurements of current urban forest sequestration.⁸⁰ Adopting this software would allow for improved measurements that would likely increase sequestration estimates,⁸¹ ultimately requiring less of the City to meet Plan goals. This software adoption would also act in support of the **Urban Tree Advisory Committee (UTAC)** in creating their comprehensive inventory of City trees, assist City Staff with maintenance which will also help in meeting Plan objectives, provide savings calculations, and generate a publicly accessible interface that would allow community members to see information on the trees around them.⁸² In fact, training members of the public who volunteer could serve as a method for expanding data collection efficiency.

NS-1-2. Update Relevant Existing Tree Management Plan(s)

Update relevant plans like the Urban Forest Framework or Urban Forest Management Plan to include:

- sequestration as a goal and benefit of forest management;
- including sequestration capabilities as a consideration in species selection (choosing tree species which typically sequester more carbon over those that do not, all other factors being equal);
- including resilience of species to increasing natural hazards and higher temperatures as a consideration in species selection; and
- selection of planting locations to better utilize existing resources to maximize results.

NS-1-3. Follow Urban Forest Enhancement Recommendations

Follow recommendations from UTAC and other advisory bodies on efforts towards enhancement of the urban forest, increasing urban forest sequestration by a minimum of 1% every 5 years, reaching 5% total increase from 2021 by 2045.



Project NS-2. Prioritize Tree Disposal Methods With the Greatest Retention of Sequestered Carbon

When tree waste is disposed of, the tree can release all the carbon it has been sequestering back into the atmosphere, reducing the efficacy of urban forest carbon sequestration.⁸³ However, some alternative tree waste disposal methods can reduce the extent to which this happens.⁸⁴

Staff can encourage these methods in the order listed either by directly engaging in that disposal method themselves or by giving preference to contractors who use the methods listed below.

NS-2-1. Establish Custom Milling and Biochar as Preferred Tree Disposal Options

Prioritize disposal through either custom milling when a tree is of a high enough value to be eligible for such, or through the production of **biochar** when custom milling is not an option.

NS-2-2. Establish Disposal Through Burial/Hügelkultur as Secondary Disposal Options

Whether through a contractor or City staff, returning the tree waste to the soil matrix (**Hügelkultur**) should be seen as a secondary preference before more traditional disposal methods are utilized.

NS-2-3. Establish Wood Chipping for Mulch or Composting as the Minimum Standard Disposal Options

Tree disposal through wood chipping for mulch or composting should be a minimum standard to avoid landfilling of tree waste.

Biochar is a material similar to charcoal produced by heating up tree waste in a special kiln. It is considered a sustainable product that helps decrease the need for fertilizers while also helping to reduce carbon emissions.

Hügelkultur is a horticultural technique in which a mound of logs, branches, leaves, and other biomass is covered with soil and used as a garden bed.





IMPLEMENTATION

Implementation

The Implementation Section of the Sustainability and Energy Action Plan covers:

- Year 1 Implementation Summary
- Implementation Benchmarks
- Project Prioritization
- [Projections](#)
- [Gradual Changes through Immediate Policy](#)
- [Pathway to 65% Reductions by 2030](#)
- [Pathway from 65% to 75% Reductions by 2035](#)
- [Pathway from 75% to 90% Reductions by 2040](#)
- [Pathway from 90% Reductions to Net-zero by 2045](#)
- [Pending Technological Feasibility](#)
- [Monitoring, Reporting, and Facilitating Good Data](#)
- [City Staffing and Leadership](#)
- [Funding and Affordability](#)

Year 1 Implementation Summary

- New Project Standards
- Implementing New HR Policies/programs (Project T-3)
- Grant Applications for Solar Fields and Microgrids
- Begin Charging Station Installation Process
- Environmental Purchasing Policy
- Evaluate Waste Generation
- Tree Management Policies

Implementation Benchmarks

The implementation of the projects within this Plan can be guided by the emissions reduction targets of this Plan (based off a 2021 emissions baseline). These benchmarks are used as a guide for tracking progress in order to meet the ultimate target of net-zero emissions by 2045.

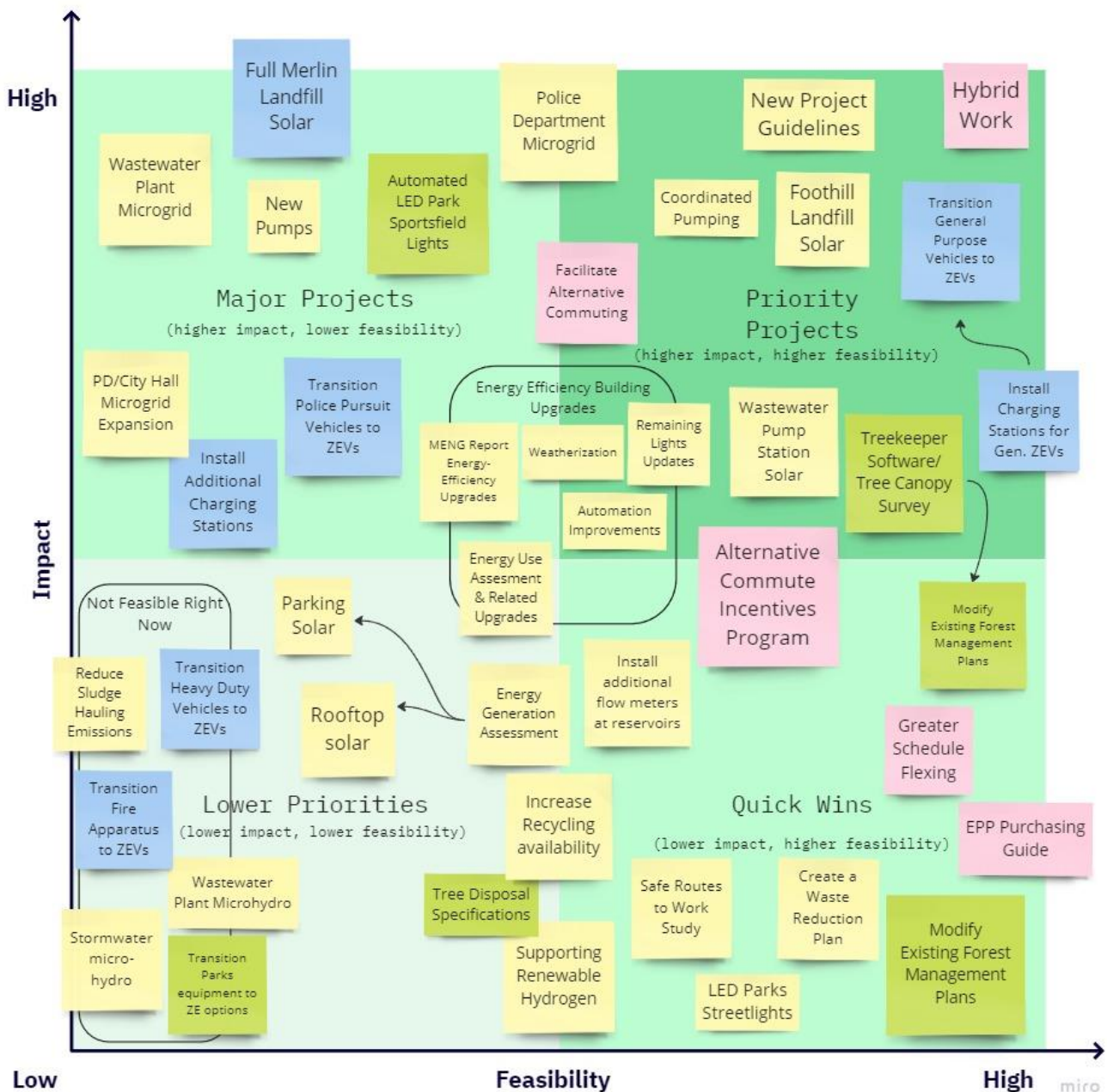
- 65% emissions reduction by 2030
- 75% reduction by 2035
- 90% reduction by 2040
- Net-zero emissions by 2045

Using these benchmarks, a minimum standard for the projects that will need to be implemented can be established based on their impact towards emissions reductions. In order to select which projects to fulfill the requirements of this overall emissions reductions timeline designed to maximize Plan goal achievement (managing costs, building resiliency, reducing emissions, incorporating sustainability, and establishing a standing committee), projects had to be prioritized.

Project Prioritization

The next step to develop a model for project implementation was creation of a system for comparing the various projects in terms of their contributions towards achieving Plan goals (Impact) and their feasibility (considering project costs weighed against available financial resources, current state of technology, and the capacity and support of City staff). In order to simplify this evaluation process, the Taskforce used a visual priority matrix, which can be used by City staff as well.

PLAN RECOMMENDATIONS PRIORITY MATRIX

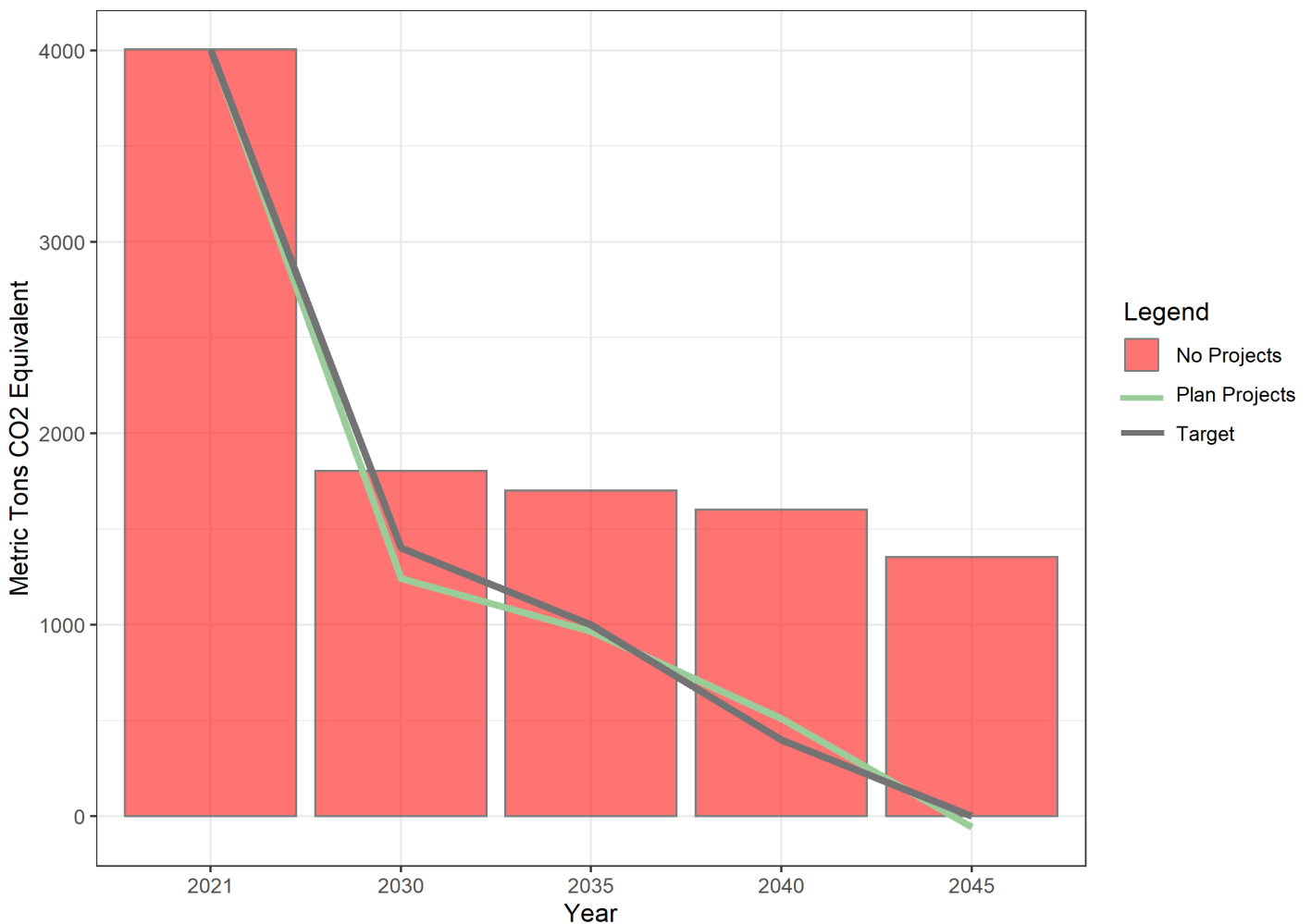


The only consideration factored into project prioritization not fully visualized here is that of urgency, which is discussed further under [Funding and Affordability](#).

Projections

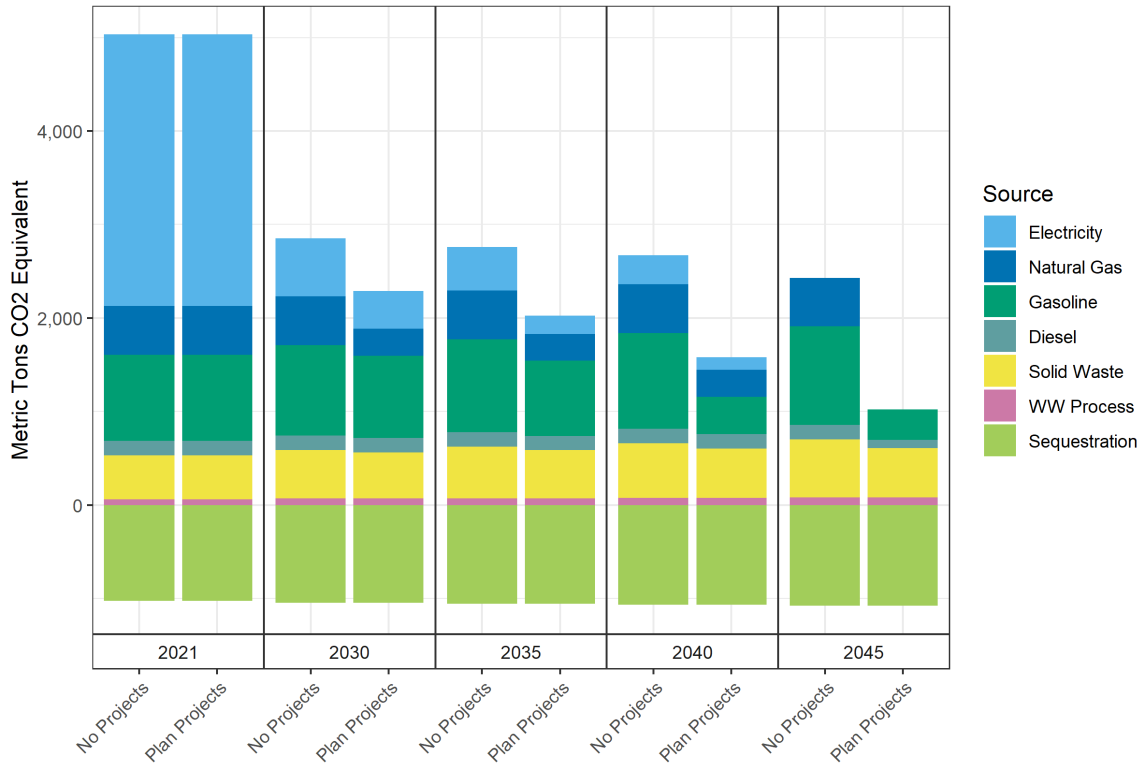
Upon establishing a prioritization of projects, projections were made to determine how well Plan projects could meet the **GHG** benchmarks of the Plan. The results were promising. Projections indicated that by implementing Plan projects, emissions targets would likely be reached at every stage, and energy spending could be maintained within 30% of the 2021 baseline.⁸⁵ In fact, even with implementation of only the fraction of projects included in the most conservative model alone (as shown in the graph below), these targets are almost achieved. While most projects used in the projections were already considered technologically feasible, some emerging and new technologies were assumed to be promising enough to contribute to these benchmark achievements. Furthermore, a big boost to emissions reductions as a result of changes in grid sourcing was a major aid in meeting the emissions goals established by this Taskforce. More on assumptions involved in these projections can be found in the Plan’s [Methodology \(Appendix IV\)](#).

GRANTS PASS’ GHG EMISSIONS PROJECTIONS v. GOALS



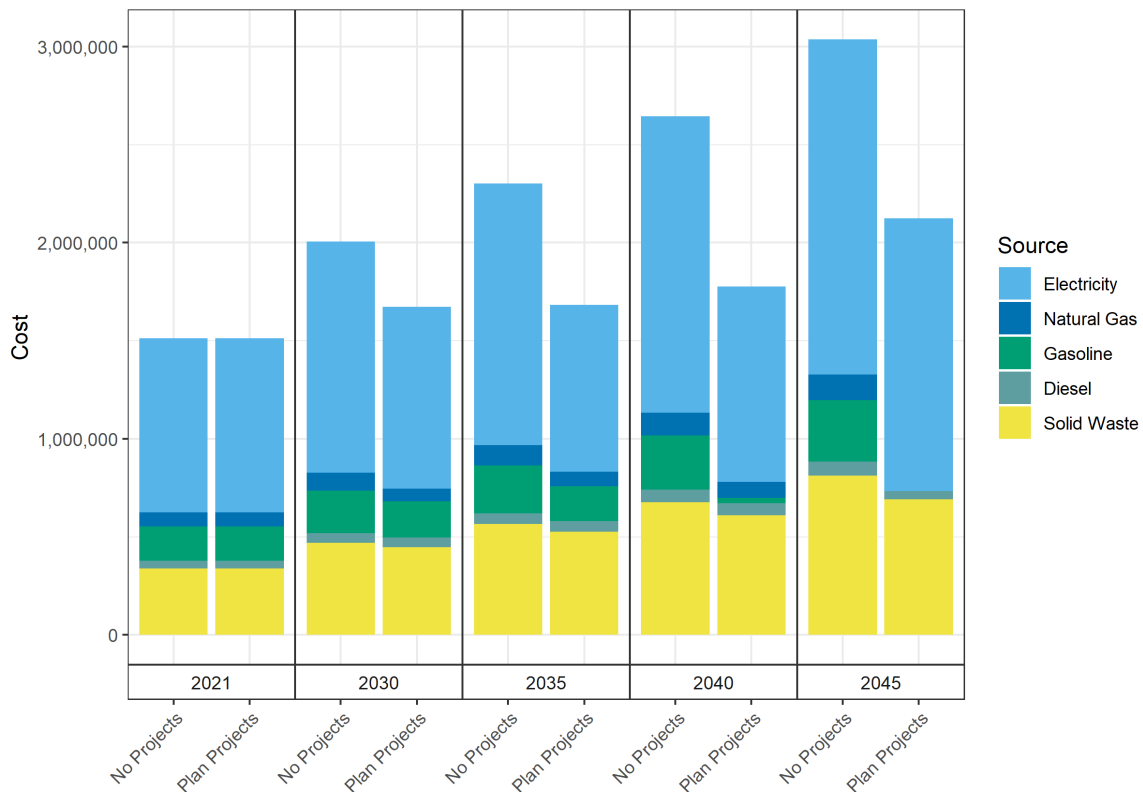
Annual estimated greenhouse gas emissions per milestone year. Emissions projected without impact of Plan projects are shown as bars. Emissions expected after reductions from Plan projects are shown as a line graph. Target emissions levels are shown as an additional line for comparison.⁸⁶

GRANTS PASS' GHG EMISSIONS PROJECTIONS BY SOURCE ⁸⁷



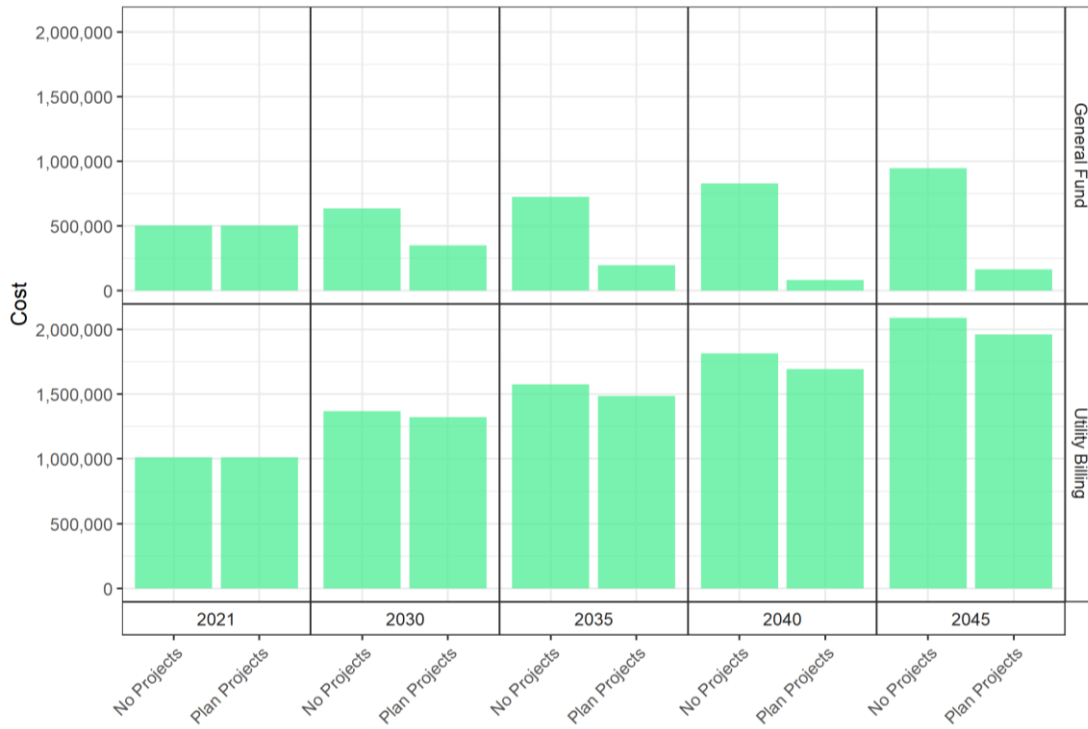
Projected emissions comparing plan project impact for selected milestone years using LGOP protocol. See Methodology section.

GRANTS PASS' ENERGY COST PROJECTIONS BY SOURCE ⁸⁸



Projected energy costs by source of energy per milestone year. Projections are shown with and without impact of Plan projects for comparison.

GRANTS PASS' GENERAL FUND SAVINGS POTENTIAL



Projected energy costs per milestone year separated by general fund and utility billed operations. Costs with and without impact of Plan projects are shown in order to see the cost savings realized by projects.⁸⁹



EMISSIONS REDUCTION POTENTIALS BY GENERAL PROJECT

The timeline included in this Plan is only one model for reaching emissions goals, meant to serve as a useful tool for staff, not a mandate. Staff may feel the need to deviate from the model used in this Plan, and shuffle projects around. In order to facilitate this reshuffling, the following table shows the general category improvements the Taskforce estimated reductions for between 2021 and 2045.

Project	Anticipated Emissions Reduction (MTCO ₂ e) ⁹⁰
Rolling Stock Transition	584
Electrifying Heating Systems	287
WRP Digester Heat Exchanger	234
Employee Commuting	213
Consumption and Materials Improvements	93
Urban Forest Enhancement	51
TOTAL	1,462

ENERGY SAVINGS POTENTIAL FOR SOLAR LOCATIONS

Projects in which the primary component is the installation of solar on a piece of property would not contribute to emissions reductions as much after Pacific Power begins switching over to renewables. However, these projects do provide significant contributions to projected cost reductions. If City staff want to reshuffle these projects while still staying within the 30% of baseline goal, or are interested in producing even greater, these ballpark estimates may prove a helpful guide as well.

Project	Anticipated Annual Energy Cost Savings ⁹¹
Foothill Landfill Solar Field	\$334,592
Merlin Landfill Solar Field (small - max)	\$223,945-\$1,215,951
Pump Station Solar Field	\$36,270
PD Microgrid or Civic Center Microgrid	\$27,426-\$95,117
TOTAL	\$912,575 - \$1,972,272

Gradual Changes through Immediate Policy

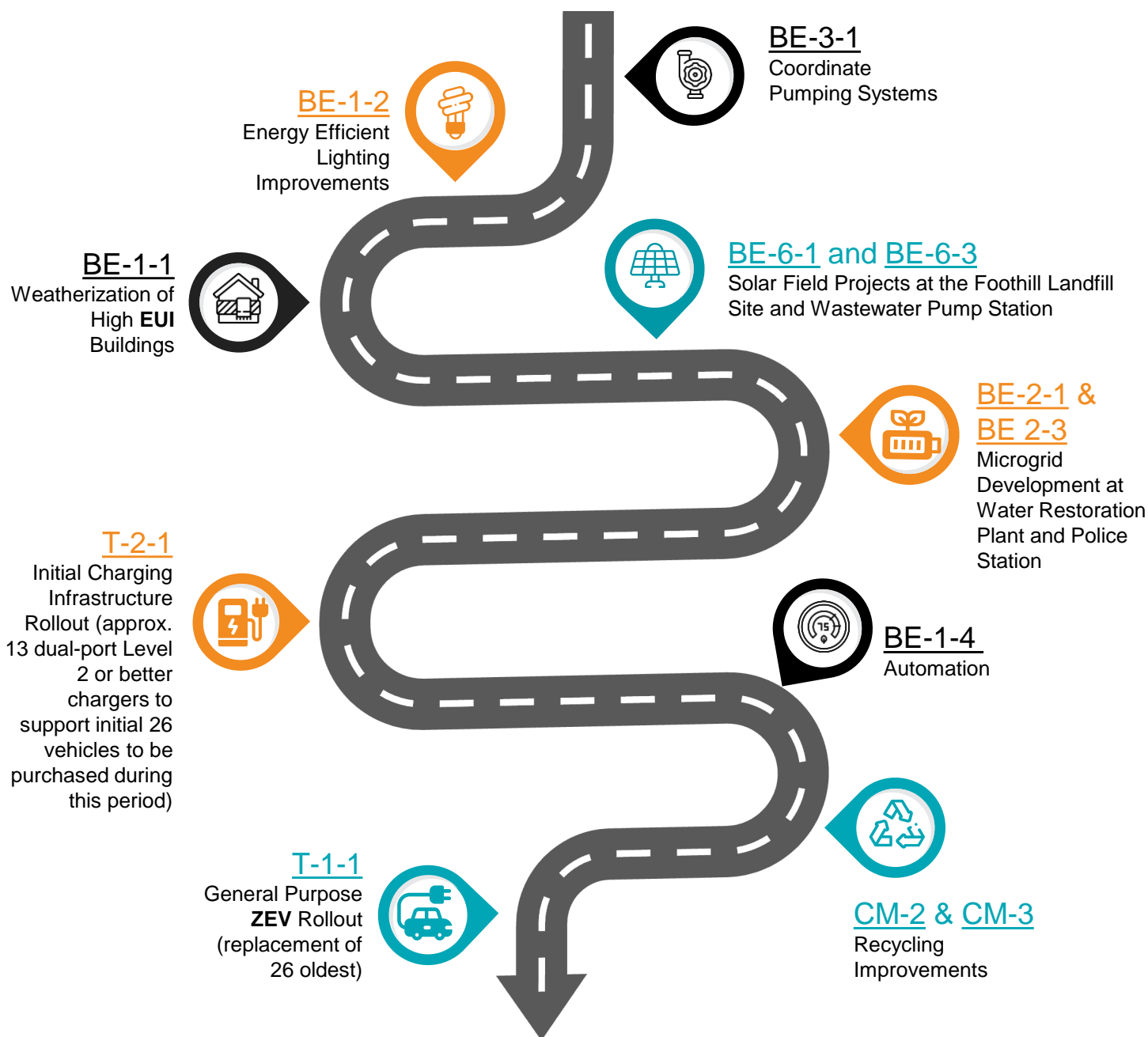
A number of the projects and/or steps included in this Plan are not one-time significant capital projects but involve making an initial change to current policy to facilitate gradual changes in the City’s energy usage and sourcing over a larger period of time. These sorts of policy changes factored into projections accordingly, under the assumption that they would be adopted within the first 6 years following Plan adoption (before 2030), since, as shown in the [priority matrix](#) (p.81), the majority of these projects are considered to be “Quick Wins” – highly feasible/easy to implement – but the impact of which will likely take a while to become noticeable.⁹² These policies for pre-2030 implementation include:



Accomplishing these steps is projected to produce a reduction in emissions and a reduction in energy costs annually. Starting these projects early, while staff may need to wait for grants or other funding to be secured before being able to tackle larger capital projects, will allow these policies to contribute to goal accomplishment in the background while staff take on the larger, more intensive capital projects later on.

Pathway to 65% Reductions by 2030

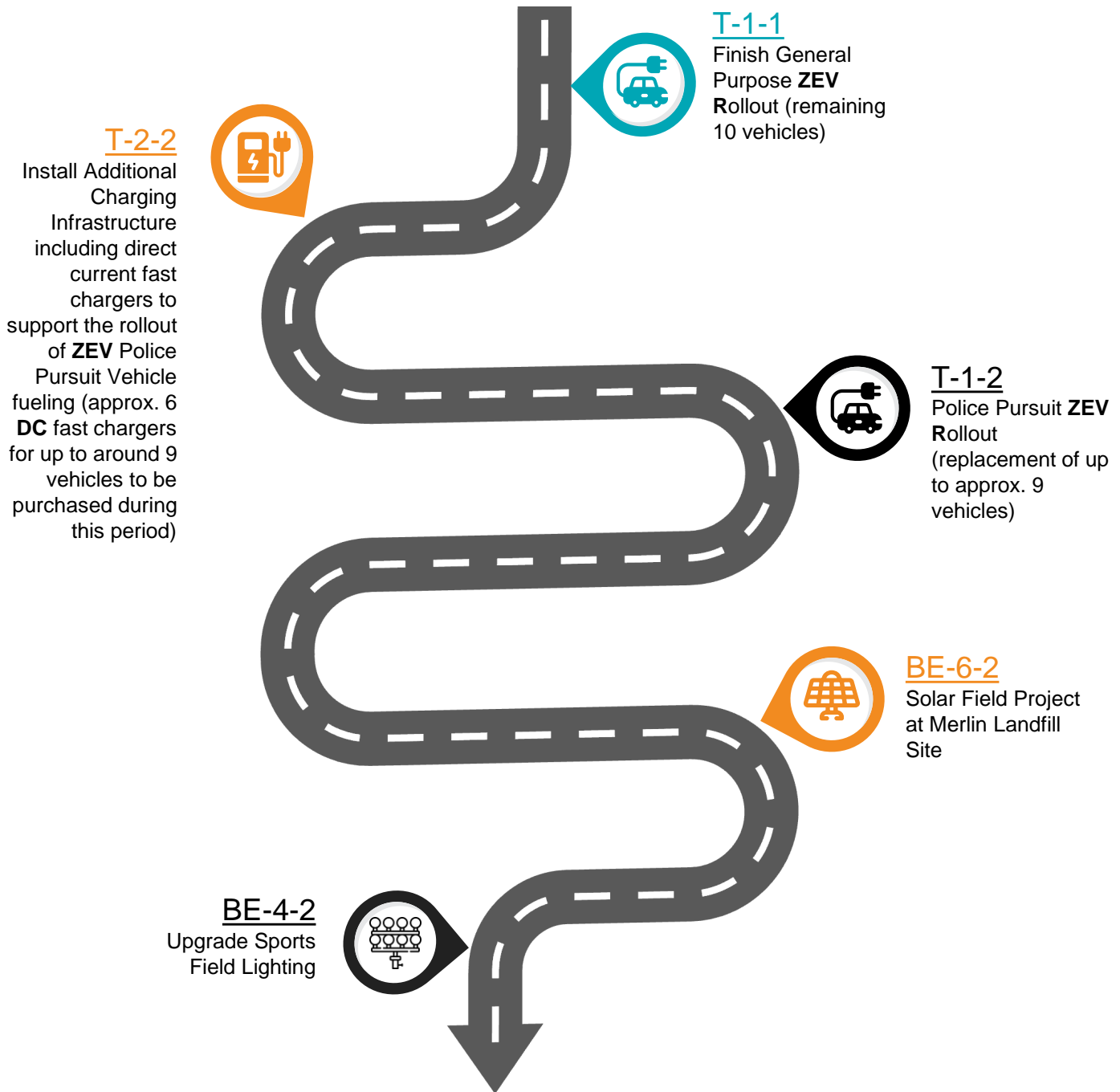
Achieving the first Plan benchmark of 65% reductions by 2030 will be far more feasible than it might seem due to State-mandated reductions in fossil fuels in public electric utility grids which will account for around a 60% reduction – leaving only 5% to the City.⁹³ The model used in this Plan has the following taking place during this time period:



Accomplishing these steps, combined with some modest gains anticipated from the initial implementation of policies, is projected to produce a 69% reduction in emissions and \$333,726 in savings annually.⁹⁴ The buffer room between this and the 65% goal should be sufficient to account for any increases due to population change beyond the 10.9% increase used in modeling⁹⁵, or delays in Pacific Power's own transition. The inclusion of some additional endeavors for the sake of their project timelines should be allowed for as well. Starting these projects now to benefit from currently available funding resources⁹⁶, and so that reaching later goals does not become more challenging, is critical.

Pathway from 65% to 75% Reductions by 2035

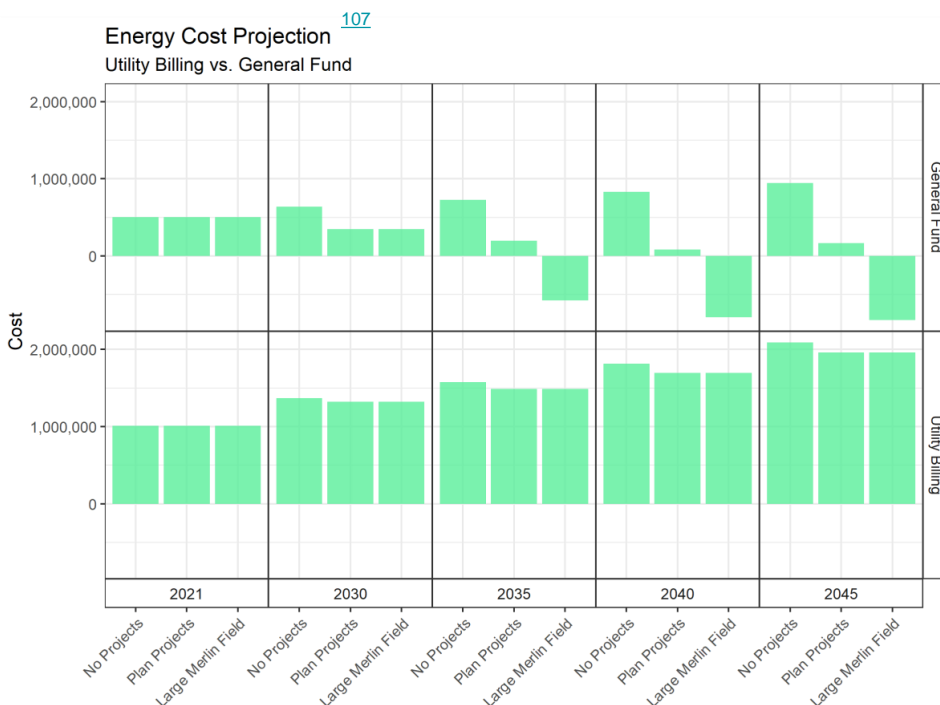
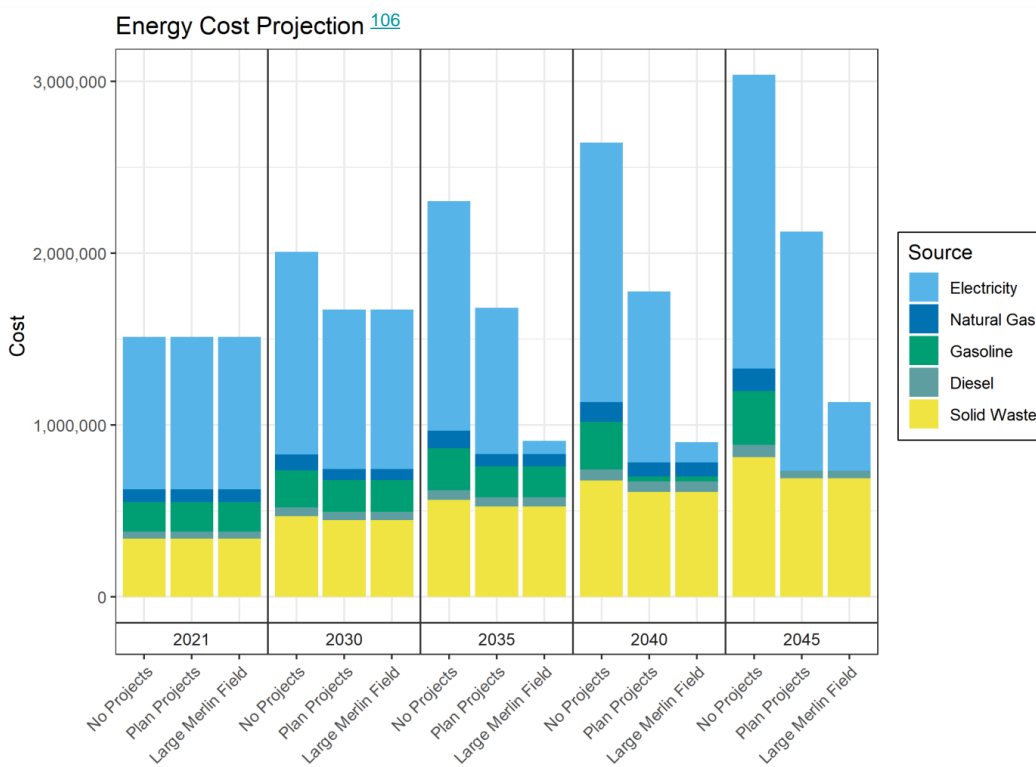
Meeting the second benchmark of 75% reductions (18% for the City) by 2035 requires an additional 10% reduction from the previous period (7% for the City).⁹⁷ This could be accomplished through the following 5 steps:



Accomplishing these steps is projected to produce an additional 7% reduction in emissions and an additional \$257,352 in energy savings annually.⁹⁸ The result are emissions approximately 76% less than 2021 emissions, and annual energy savings of nearly \$600,000.⁹⁹ The buffer room between this and the 75% goal should be sufficient to account for any increases due to population change¹⁰⁰, or delays in Pacific Power’s own transition. Starting these projects (especially the high capital ones) now is critical, as after 2035 the availability of grant funding will likely decline significantly.¹⁰¹

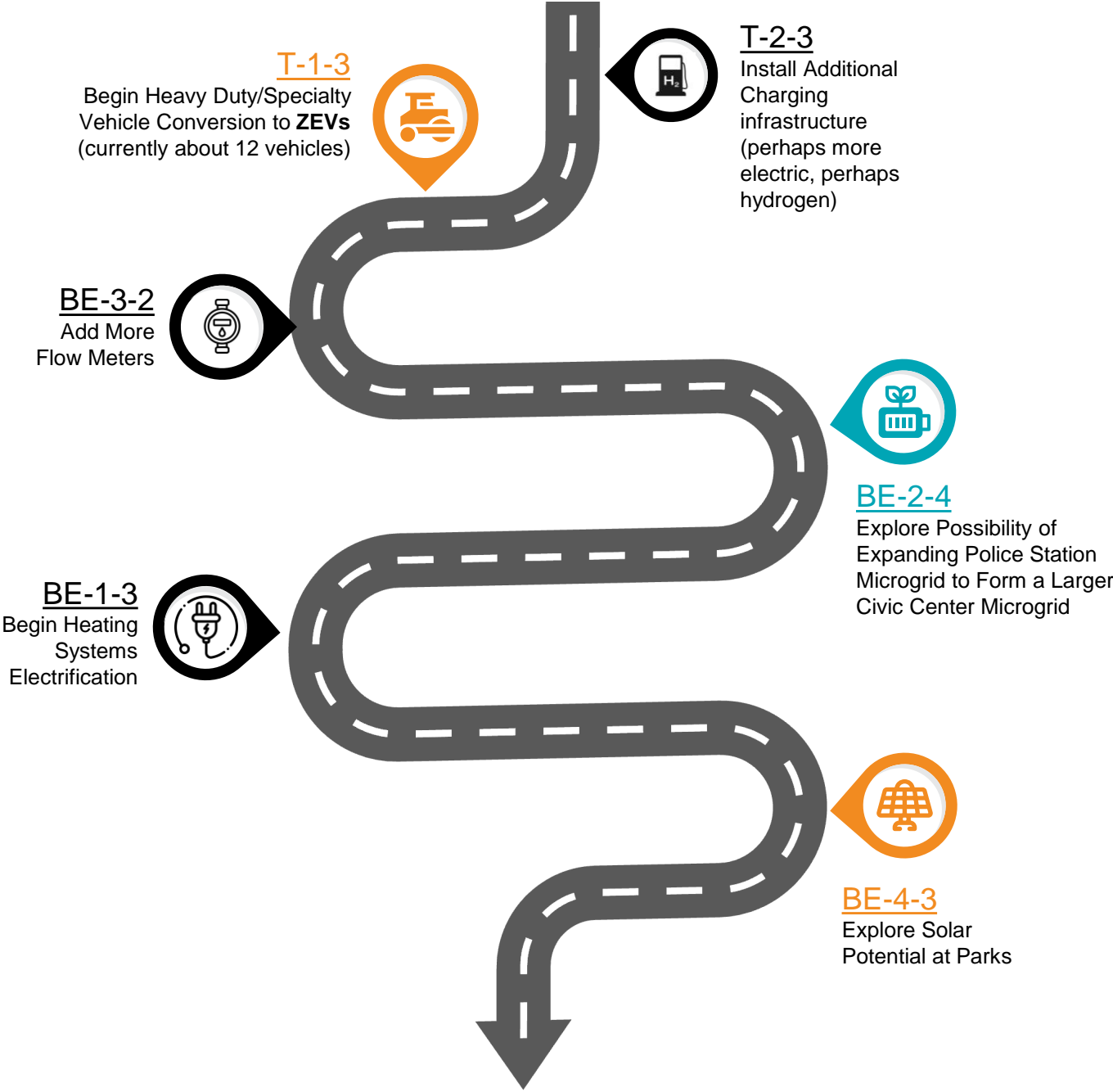
BE-6-2 LARGER MERLIN FIELD IMPACT ON ENERGY COSTS

If funding can be secured to upgrade the substation at this location¹⁰², the potential cost savings resulting from solar generation would dwarf the impact of all other projects.¹⁰³ Due to both the high up-front investment this project requires, and the immense impact this project alone would have¹⁰⁴, this larger Merlin solar field was not included in the model scenario used for benchmarking and assessing goal feasibility. However, the merit of this project does warrant its inclusion as a potential alternative scenario. While a more thorough assessment of cost and energy generation potential would certainly be necessary, preliminary numbers suggest that despite its high cost, it is likely this project could pay for itself within the first five years of its implementation.¹⁰⁵



Pathway from 75% to 90% Reductions by 2040

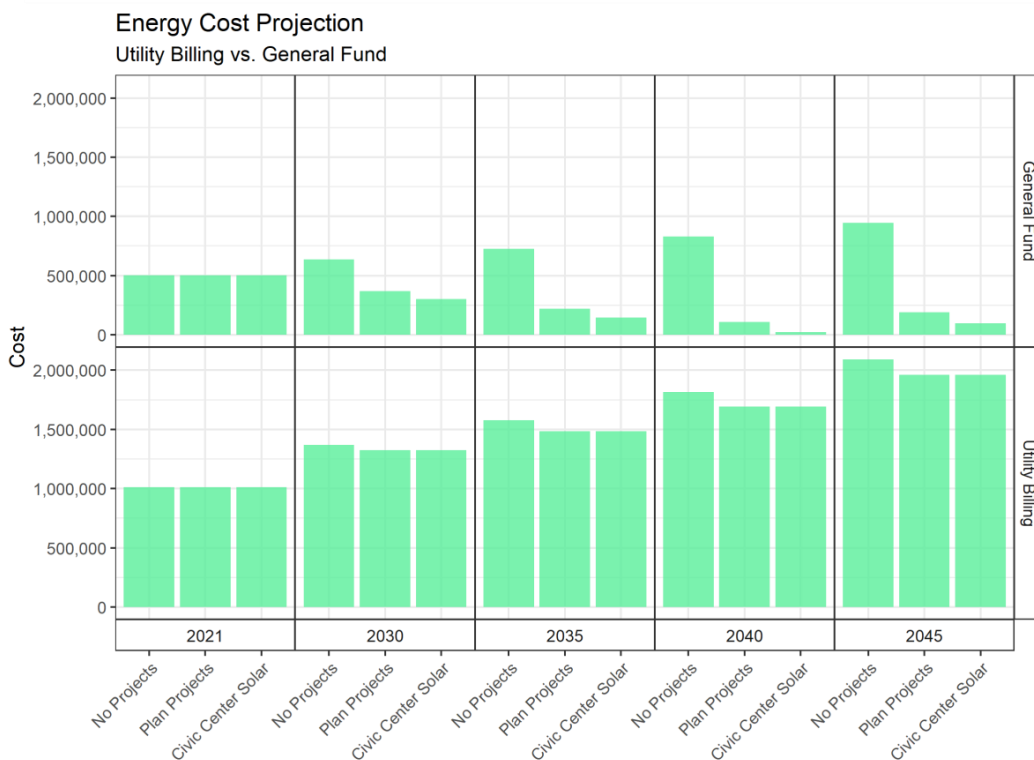
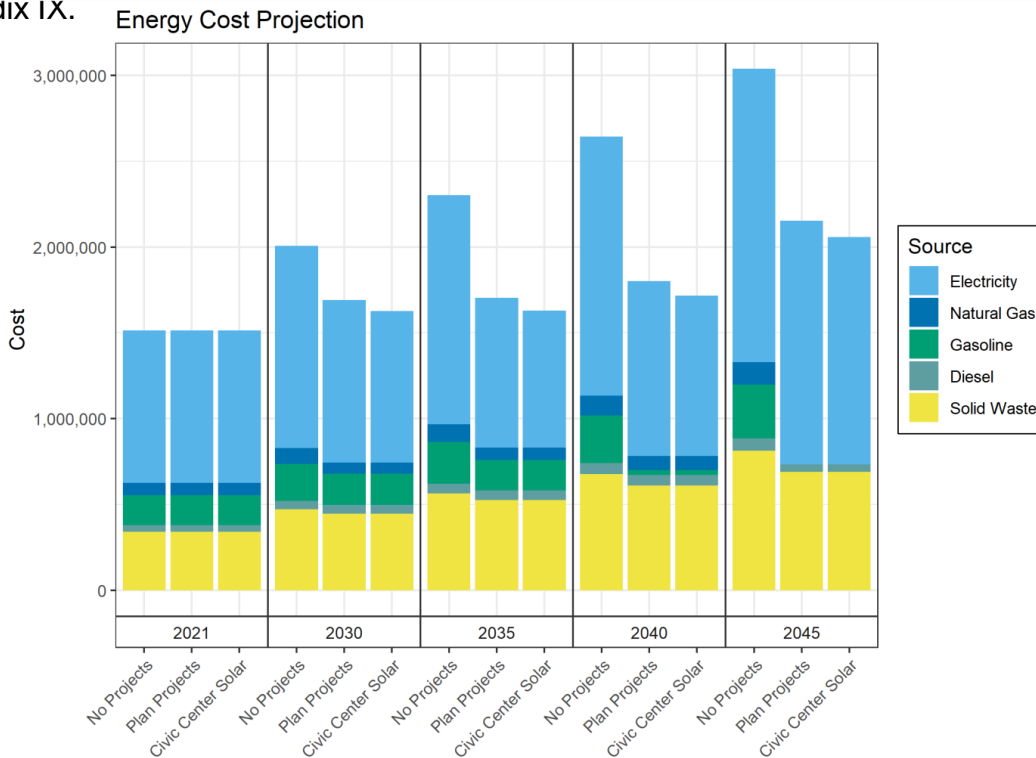
In later years, closing small gaps might be more challenging than making greater progress was earlier on. However, doing so is not by any means impossible or financially irresponsible. This stage will require a 13% reduction from the previous goal on the City's part.¹⁰⁸ The timeline laid out by this Plan has the following taking place during this time period:



Accomplishing these steps is projected to produce an additional 11% reduction in emissions and \$245,047 in energy savings annually.¹⁰⁹ The 4% gap between this projected reduction and the 15% target reduction for 2035-2045 could be addressed through implementation of projects for which new technology comes online, or by installing the larger Merlin solar field (see more in the [Full Municipal Energy Usage Report](#), Appendix II and [Larger Merlin Landfill Helioscope](#), Appendix XIII)¹¹⁰. This phase of implementation will be critical in achieving net-zero.

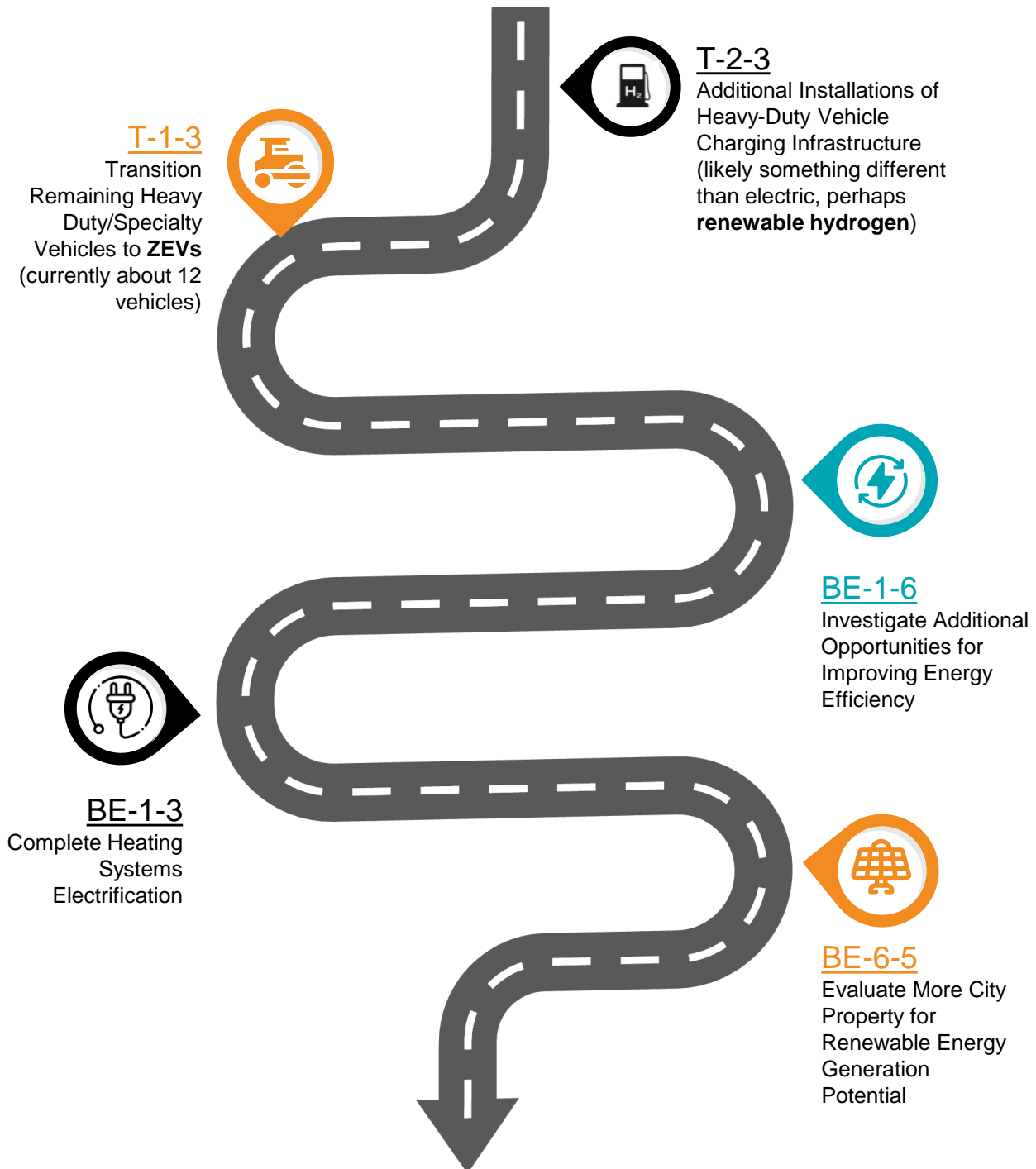
BE-2-4'S CIVIC CENTER MICROGRID IMPACT ON ENERGY COSTS

This project especially would require more thorough feasibility analysis, and, depending on implementation year, the land suitable for inclusion might vary considerably. Because it is a highly complex project, this project was not factored into the primary model projections. However, it has a great deal of potential, given preliminary findings for energy cost reductions, plus it would significantly bolster the resilience of City operations.¹¹¹ For more information see *Full Municipal Energy Usage Report, Appendix II* and *Civic Center Microgrid Helioscope, Appendix IX*.



Pathway from 90% Reductions to Net-Zero by 2045

Although challenging, the goal of Net-Zero emissions by 2045 is achievable. This stage will require the city to make an additional 4% drop from the 2040 goal.¹¹² The timeline laid out by this Plan has the following taking place during this time period:



Accomplishing these steps is projected to produce a final 14% reduction in emissions and about \$40K in annual energy costs.¹¹³ This would result in reaching a 101% reduction from 2021 emissions levels by 2045, and \$876,306 in annual savings – less than a 30% increase from the 2021 base rate.¹¹⁴ The buffer between the total and the 10% needed for goal achievement should be sufficient to account for any increases due to population change, or delays in Pacific Power’s own transition.

Pending Technological Feasibility

The Taskforce determined the following projects would likely become feasible in the next 20+ years but had a low level of confidence as to when technological advancements would take place. Thus, these projects are not in the modeled reductions, but are still ones listed in the Plan to pursue dependent on feasibility improvements:



These projects could be implemented at any point in time once they become feasible and would help to close gaps between Plan goals and achieved reductions or provide additional buffer room between projections and what is needed for goal achievement to account for any increases due to population change, or Pacific Power lagging in their own transition.

Monitoring

The City could continue to use the equations from the [EPA GHG Calculator tool](#) to monitor and report the City's greenhouse gas emissions in terms of metric tons of **CO₂** equivalents (**MTCO₂e**). The equations are based on the Local Government Operations ([LGO](#)) protocol from the California Air Resources Board, California Climate Actions Registry, **ICLEI** – Local Governments for Sustainability, and The Climate Registry.¹¹⁵

One of the Taskforce members wrote code using [R, an open-source programming language](#) for data analysis and visualization, to provide more flexibility in how results can be sorted and presented.¹¹⁶ The code uses the same equations from the **LGO** protocol to allow for categorizing energy usage by building, for example, or by vehicle types.¹¹⁷ Data from 2021 were run through both the **GHG** calculator and the Taskforce's code, for quality assurance. Categories include stationary combustion, mobile combustion, solid waste, wastewater treatment, electricity, employee commute, water, ag and land management, and waste generation. Offsets from urban forestry are included.¹¹⁸

Facilitating Good Data

In order to support decision making and monitor progress associated with the City of Grants Pass Sustainable Energy Action Plan, it is essential that basic data be available from the various public utilities and service providers that serve the City. In the process of obtaining and preparing data from service providers there were a number of difficulties and delays encountered. These frequently involved inconsistent processes for service providers in requesting data, differences in format across data requests, and confusion in the scope of service across requests (for example, electrical meters being left off of requested data extracts). Since monitoring and accountability are a crucial part of the Plan, working out a simple, timely, and repeatable process for requesting and processing data is important.

The data needed is simple and limited to what appears on an ordinary billing statement:

- Unique Meter Number or Vehicle ID (as applicable)
- Service Address
- Date of Bill, Meter Reading Period, or Fueling Event
- Units (kilowatt hours for electricity, therms for natural gas, gallons for fuel, cubic yards for waste)
- Amount Billed

Reporting

The City could report improvements in energy efficiency and reductions in **MTCO₂e** through a dashboard on the City website. A dynamic, user-friendly dashboard will help to engage the public in important conversations about energy and sustainability. This dashboard may require purchase of a report publishing license, e.g., [Microsoft Power BI](#) or [Tableau](#). Some open-source options may be available, such as [R Studio](#), [Shiny](#), or [Apache Super Set](#), but they may also have steeper learning curves. Specific targets to be tracked on the dashboard include number (percentage) of electric vehicles in the City fleet, square footage of solar panels operated by the City, **MTCO₂e** from electricity, **MTCO₂e** from diesel, **MTCO₂e** from gasoline, **MTCO₂e** from natural gas, **MTCO₂e** from wastewater, and **MTCO₂e** from solid waste, annual energy savings, number of employees participating in alternative commute programs, and the amount of time essential services could be provided for without grid power. Emissions reporting could also be expressed through equivalencies instead of just **MTCO₂e**, using the [EPA equivalencies calculator](#).¹¹⁹

The granularity needed is one record per month per service meter or location, which matches the billing cycle of most service providers. For fueling, the data is typically provided as one record for each fueling event. The data scope could either be determined by a list of meter numbers provided by the requester (City) or using some agreed-upon tag or assigned identifier that is associated with a set of meters, addresses, or vehicles (a Customer ID, for example).

The format needed is simple, such as a text file with comma separated values (**CSV** file).

It is important that once such a data exchange is established, it remains consistent from one request or time period to the next. This reduces the effort required to process the information received and supports automation of data consumption to populate reports, monitoring dashboards, charts and summaries. Having a consistent, uniform format would also encourage reuse of tools, processing templates, and data sharing across public (or even private) entities.

While utilities have been responsive to requests for utility data when made, the following challenges have been encountered over the past year:

- 1) The format of the data provided changes depending upon the customer service person fielding the request or the methodology used in completing the request, including different data elements or elements with different headings or in different order or format. The response to each data request appears to be ad-hoc.
- 2) Data sets cover different sets of meters for each request, often with some meters missing from the data extract, requiring manual identification of missing meters and repeated follow-up requests to obtain missing data.
- 3) Basic fields such as kilowatt hours of electricity consumed may be missing from some meters due to underlying complexity on the utility's end related to their billing formula. This requires the data recipient to research and understand the complexity in order to "back in" to required basic data values using other data values provided in the extract.

In some cases, the City does not capture data that would be very useful in monitoring. For example, the City has almost no data regarding solid waste other than the capacity of the containers in which waste is collected. This makes it difficult to improve solid waste reduction to reduce costs and benefit the environment.



City Staffing

The wide variety of recommendations included in this Plan would be implemented/managed by different City departments and/or contracted out. This would allow for multiple projects to be underway at the same time without totally overwhelming City staff. As a general guide:

- [Buildings and Energy projects](#) → Public Works
- [City rolling stock conversion](#) → Fleet
- [Employee commuting recommendations](#) → Human Resources
- [Consumption and Materials recommendations](#) → Facilities Management
- [Natural Systems](#) → Parks

Leadership

[Goal 4](#) recommendations to appoint a sustainability coordinator and/or add sustainability to the job descriptions of appropriate members of staff would create leadership in the incorporation of sustainability into City operations. A sustainability coordinator would be able to oversee all matters related to sustainability. Alternatively, by adding sustainability to the jobs of many employees (e.g., all superintendents or execs) would create a point person for each department to take the reins for implementing sustainability measures.



Funding and Affordability

All projects in this Plan were chosen for their affordability/cost-effectiveness. The vast majority of these projects would not only balance out in the City's favor as a quality investment with or without funding assistance¹²⁰ but are even smarter financial choices because they qualify for an abundance of currently available, limited time funding options.¹²¹ The importance of implementing recommended projects sooner rather than later is critical to maximize the benefits of this current boon of sizeable funding opportunities for renewable energy, vehicle electrification and resiliency investments.

A list of potential funding opportunities is provided in [Appendix III](#).







APPENDICES

Appendices

I. [SUSTAINABILITY AND ENERGY ACTION PLAN AT-A-GLANCE](#) p.102

A comprehensive list of all recommendations contained in the Plan and their priority ranking from one (highest) to five (awaiting feasibility improvements).

II. [FULL MUNICIPAL ENERGY USAGE REPORT](#) p.104

An overview of all energy usage findings, both those cited in the Plan body and more. Covers **GHG** emissions data, energy cost data, and projections for the future relating to both emissions and costs and goal accomplishment in both these regards.

III. [LIST OF AVAILABLE FUNDING RESOURCES](#) p.136

A comprehensive list of all funding resources found that might prove fruitful in funding Plan projects.

IV. [METHODOLOGY](#) p.139

Methods and assumptions utilized when calculating both current emissions and projecting future scenarios (including the impact of Plan projects).

V. [MODEL ROLLING STOCK CONVERSION SCHEDULE](#) p.143

A scheduling of the vehicle conversion process broken down vehicle by vehicle based on current list of all rolling stock (to jumpstart T-1).

VI. [CHARGING INFRASTRUCTURE INSTALLATION PLAN MODEL](#) p.147

Supplemental information on the installation of charging stations on city property (to jumpstart T-2).

VII. [2022 MENG FACILITY CONDITION ASSESSMENT ENERGY INEFFICIENCY FINDINGS](#) p.149

A list of all recommended improvements in energy efficiency found in the 2022 MENG Facility Condition Assessment (to jumpstart BE-1-5).

VIII. [POLICE DEPARTMENT MICROGRID HELIOSCOPE](#) p.151

A map and calculations for a potential Police Department microgrid.

IX. [CIVIC CENTER MICROGRID HELIOSCOPE](#) p. 154

A map and calculations for a potential expansion of the Police Department microgrid that would connect across various downtown City properties, including City Hall.

X. WASTEWATER PUMP STATION HELIOSCOPE p.157

A map and calculations for a potential solar installation at a wastewater pump station.

XI. FOOTHILL LANDFILL SOLAR CALCULATIONS p.160

A map and calculations for a potential solar installation at the retired Foothill landfill property.

XII. MERLIN LANDFILL SOLAR CALCULATIONS p.162

A map and calculations for a potential solar installation at the retired Merlin landfill property.

XIII. LARGER MERLIN LANDFILL HELIOSCOPE p.164

A map and calculations for a potential expanded solar installation at the retired Merlin landfill property that would require improvements to the grid there.

XIV. SUSTAINABLE ECOSYSTEM MANAGEMENT SUGGESTIONS p.167

Suggested ecosystem management approaches to enhance sustainability beyond the energy side (such policies could also make mild contributions to improved sequestration).



THE SUSTAINABILITY AND ENERGY ACTION PLAN AT-A-GLANCE

The tables below summarize the Plan’s recommendations, showing the projects for each section including steps to achieve each project. Project steps have been given priority rankings from one (highest) to five (awaiting feasibility improvements) using the priority matrix ([p.81](#)) and considering urgency.

BUILDINGS AND ENERGY

Project BE-1. Address Energy Inefficiencies within Existing Buildings and Operations	
BE-1-1. Improve Weatherization of City Buildings	1
BE-1-2. Convert to Energy Efficient Lighting	1
BE-1-3. Electrify Heating Systems	3
BE-1-4. Automate Systems	1
BE-1-5. Utilize Most Up-to-Date Capital Report Findings	3
BE-1-6. Investigate Opportunities to Improve Energy Efficiency Further	4
Project BE-2. Develop Microgrid Systems (to support essential services)	
BE-2-1. Install a Dual-source Microgrid at the Water Restoration Plant	1
BE-2-2. Monitor Feasibility of Micro Hydropower Generators in the Water Restoration Plant Infrastructure	5
BE-2-3. Install a Microgrid System at PD	1
BE-2-4. Explore Feasibility of Expanding a PD Microgrid by Incorporating Nearby Property	3
Project BE-3. Improve Efficiency of Pumping Systems	
BE-3-1. Coordinate Pumping to Optimize Energy Usage	1
BE-3-2. Install Flow Meters at Reservoirs Currently Without Them	4
BE-3-3. Replace Pumps that are more than 20 Years Old	3
Project BE-4. Reduce Energy Footprint of Parks Operations	
BE-4-1. Use Energy Efficient Street Lighting in Parks	1
BE-4-2. Upgrade Sports Fields Lighting	2
BE-4-3. Explore Solar Potential at Parks	4
BE-4-4. Electrification of Parks Equipment	5
Project BE-5. Implement Sustainability and Energy Standards for All New Projects	
BE-5-1. Enroll All New Construction Projects in Energy Trust's New Construction Program	1
BE-5-2. Adopt a Maximum Efficiency Lighting Standard	
BE-5-3. Adopt a Solar Readiness Minimum Standard	
BE-5-4. Require Any New Constructions or Remodels of Pools to Not Use Natural Gas	
BE-5-5. Consider Energy Efficiency in Roof Design for All New Constructions and Roof Replacements	
BE-5-6. Further Microgrid Exploration	
BE-5-7. Give Preference to Contractors/Firms with LEED and/or Energy Efficient Design Experience When Contracting for New Projects	
BE-5-8. Involve Operators in the Design Process	
BE-5-9. Design Pumping Systems for Energy Efficiency	
BE-5-10. Adopt Natural Hazard Resiliency Standards for New Energy Infrastructure	
Project BE-6. Develop Dedicated Renewable Energy Generation Sites	
BE-6-1. Convert the Retired Foothill Landfill Brownfield into a Solar Field	1
BE-6-2. Convert the Retired Merlin Landfill Brownfield into a Solar Field	2
BE-6-3. Put a Solar Field at One of the Wastewater Pump Stations	2
BE-6-4. Explore Micro Hydroelectric Generation Potential Throughout the City's Drainage/Stormwater Systems	5
BE-6-5. Evaluate the Renewable Energy Productive Capacity of City Property	4
BE-6-6. Support Renewable Hydrogen Generation and Distribution Efforts	1

TRANSPORTATION

Project T-1. Transition Rolling Stock to Zero Emission Vehicles (ZEVs)	
T-1-1. Transition General Purpose Vehicles to ZEVs	2
T-1-2. Transition Police Pursuit Vehicles to ZEVs	3
T-1-3. Transition heavier Duty/Construction Vehicles to ZEVs	4
T-1-4. Transition Fire Apparatus to ZEVs	5
Project T-2. Install Charging Stations to Support a Zero Emission Fleet	
T-2-1. Install an Initial Round of Charging Stations for General Purpose Vehicles	1
T-2-2. Install Fast Charging Stations for Emergency Response Vehicles	2
T-2-3. Install Fueling Infrastructure for Heavy-duty and Specialized Vehicles	3
T-2-4. Install Fueling Infrastructure for Zero Emission Fire Apparatus	4
Project T-3. Reduce Employee Commute Emissions	
T-3-1. Implement Programs to Incentivize Low Emission Commuting	2
T-3-2. Provide Resources to Employees to Improve Feasibility of Low Emission Commuting	1
T-3-3. Allow for Greater Schedule Flexing and Remote Work	1
T-3-4. Conduct a "Safe Routes to Work" Study to Determine Barriers to Zero Emissions Commuting and Potential	3

CONSUMPTION AND MATERIALS

Project CM-1. Reduce Consumption by Introducing Environmentally Preferable Purchasing (EPP) Guidelines	
CM-1-1. Select Lighting for Energy Efficiency	1
CM-1-2. Choose Energy Efficient and Durable Appliances	1
CM-1-3. Phase Out Natural Gas	1
CM-1-4. Choose Automated Options	1
Project CM-2. Identify Opportunities for Material Reuse and Improved Materials Selection	
CM-2-1. Thoroughly Assess the City's Waste Production	2
CM-2-2. Create a Tailored Waste Reduction Plan	3
Project CM-3. Pursue Improvements in Waste Disposal	
CM-3-1. Increase Availability of Recycling at City Facilities	5
CM-3-2. Explore Options to Reduce Waste Hauling	1

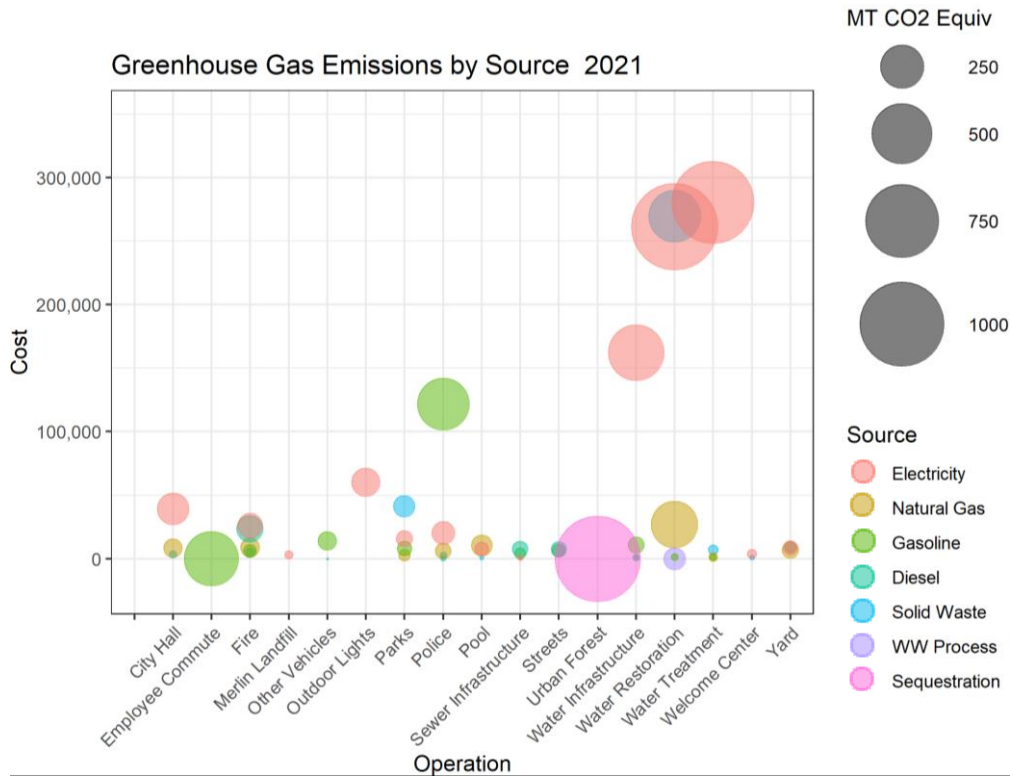
NATURAL SYSTEMS

Project NS-1. Enhance the Urban Forest	
NS-1-1. Employ a Software System to Better Manage the Urban Forest	1
NS-1-2. Update Relevant Existing Tree Management Plan(s)	3
NS-1-3. Follow Urban Forest Enhancement Recommendations	2
Project NS-2. Prioritize Disposal Methods with the Greatest Retention of Sequestered Carbon	
NS-2-1. Establish Custom Milling and Biochar as Preferred Tree Disposal Options	1
NS-2-2. Establish Disposal Through Burial/Hugelkultur as Secondary Disposal Options	1
NS-2-3. Establish Wood Chipping for Mulch or Composting as the Minimum Standard Disposal Options	3

FULL MUNICIPAL ENERGY USAGE REPORT

The data summaries included within this report cover emissions data on City operations spanning from 2021 to 2022, as well as projections for the future. For more information on how these calculations and projections were made and the assumptions involved, see Methodology in Appendix IV.

BASELINE YEAR (2021) ENERGY USAGE

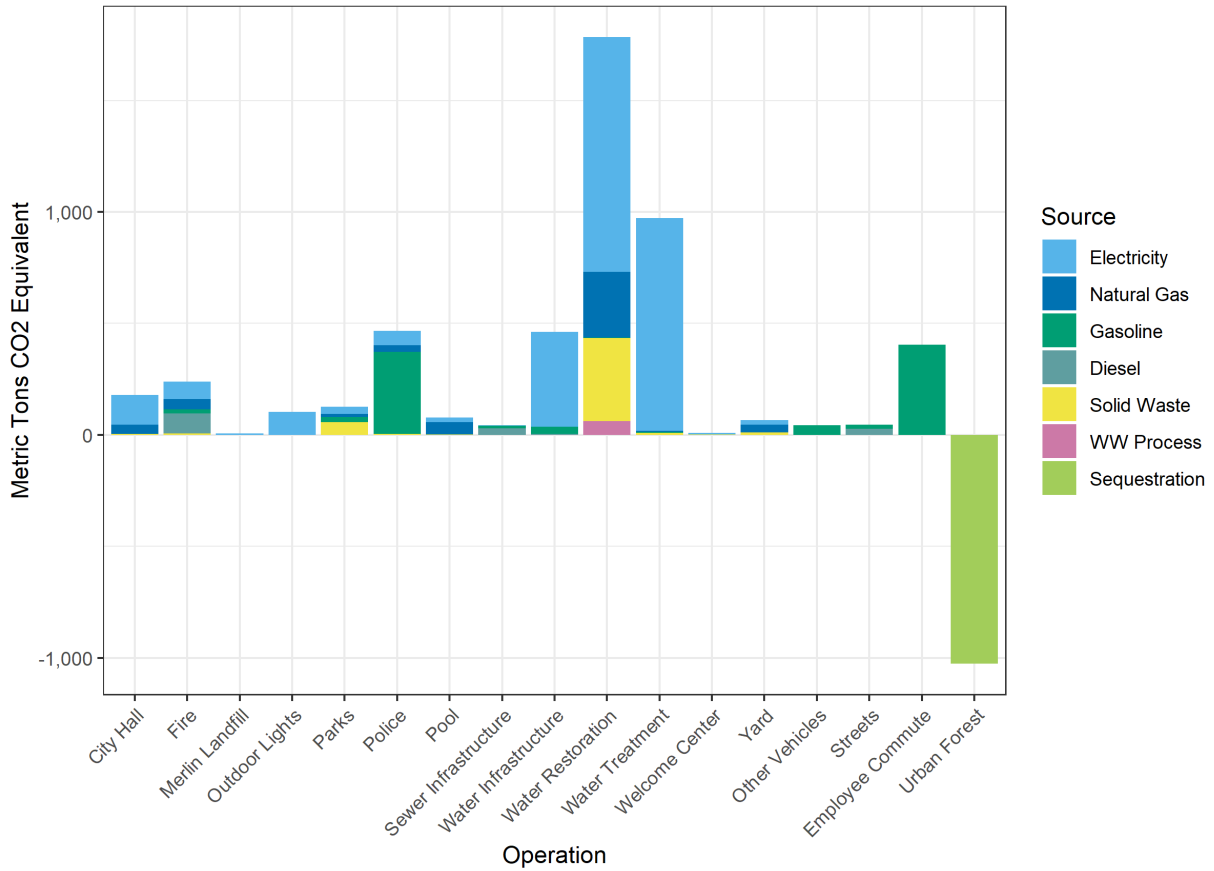


Greenhouse gas emissions and energy costs for each operation in 2021 separated by the source of the energy. The size of each circle represents the quantity of emissions for that operation and energy source.

2021 Greenhouse Gas Emissions by Source and Operation

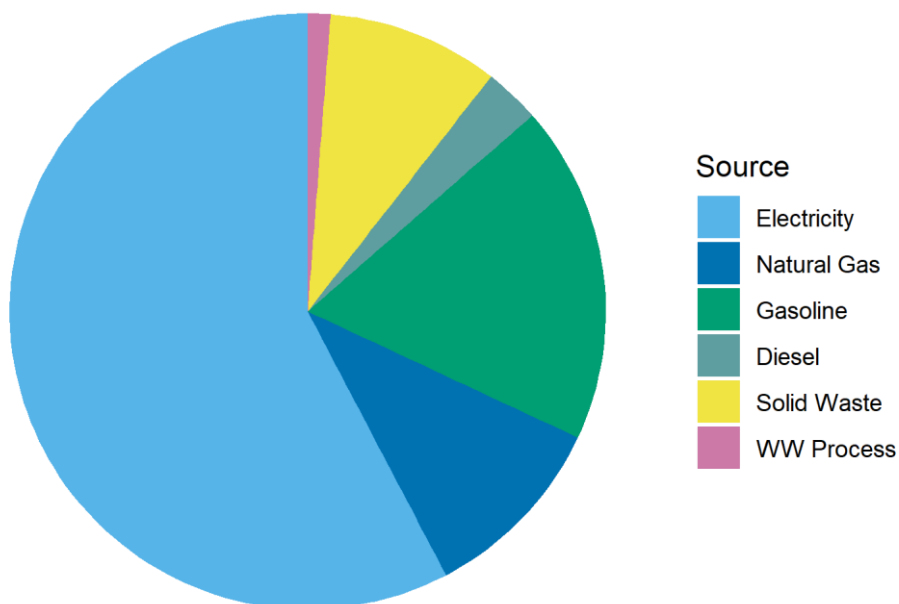
Operation	Diesel	Electricity	Gasoline	Natural Gas	Sequestration	Solid Waste	WW Process	Grand Total
City Hall		133.0		42.1		4.5		179.6
Employee Commute			404.2					404.2
Fire	90.0	77.6	17.9	45.8		7.3		238.7
Merlin Landfill		6.0						6.0
Other Vehicles	0.1		42.3					42.4
Outdoor Lights		103.4						103.4
Parks		31.9	24.3	13.4		57.0		126.7
Police	1.8	66.0	366.6	29.7		3.5		467.7
Pool		22.2		55.1		1.1		78.3
Sewer Infrastructure	29.0	1.3	12.3	0.1				42.7
Streets	28.1		18.6					46.6
Urban Forest					(1,026.7)			(1,026.7)
Water Infrastructure	3.7	426.4	32.0	0.8				463.0
Water Restoration		1,052.5	3.9	293.4		372.3	61.6	1,783.7
Water Treatment		953.7	3.1	6.6		9.5		973.0
Welcome Center		8.1				1.6		9.7
Yard		21.2		34.2		12.2		67.6
Grand Total	152.7	2,903.4	925.3	521.2	(1,026.7)	469.0	61.6	4,006.5

GHG Emissions by Operation 2021



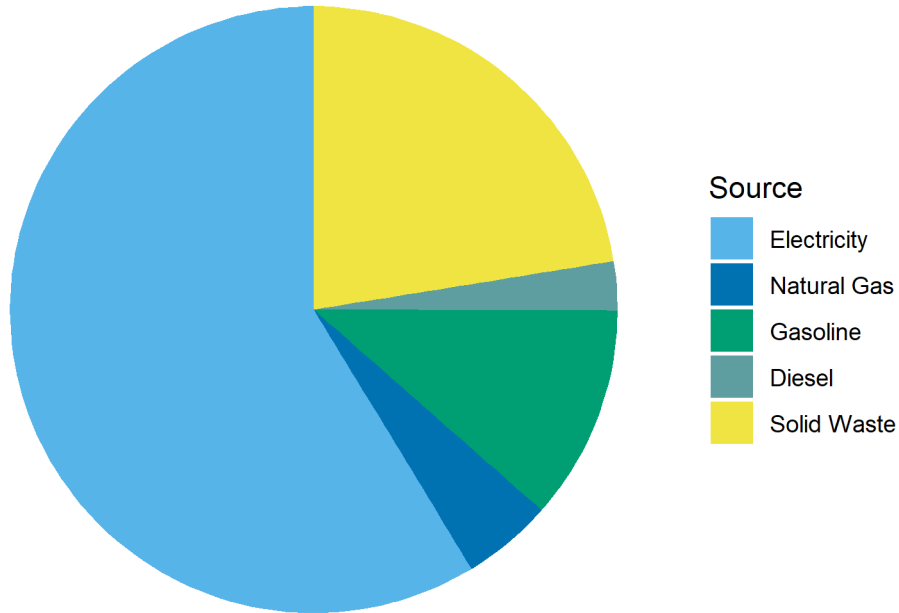
Greenhouse gas emissions by city operation in 2021. The source of emissions are shown as colors within each bar.

Greenhouse Gas Emissions by Source 2021



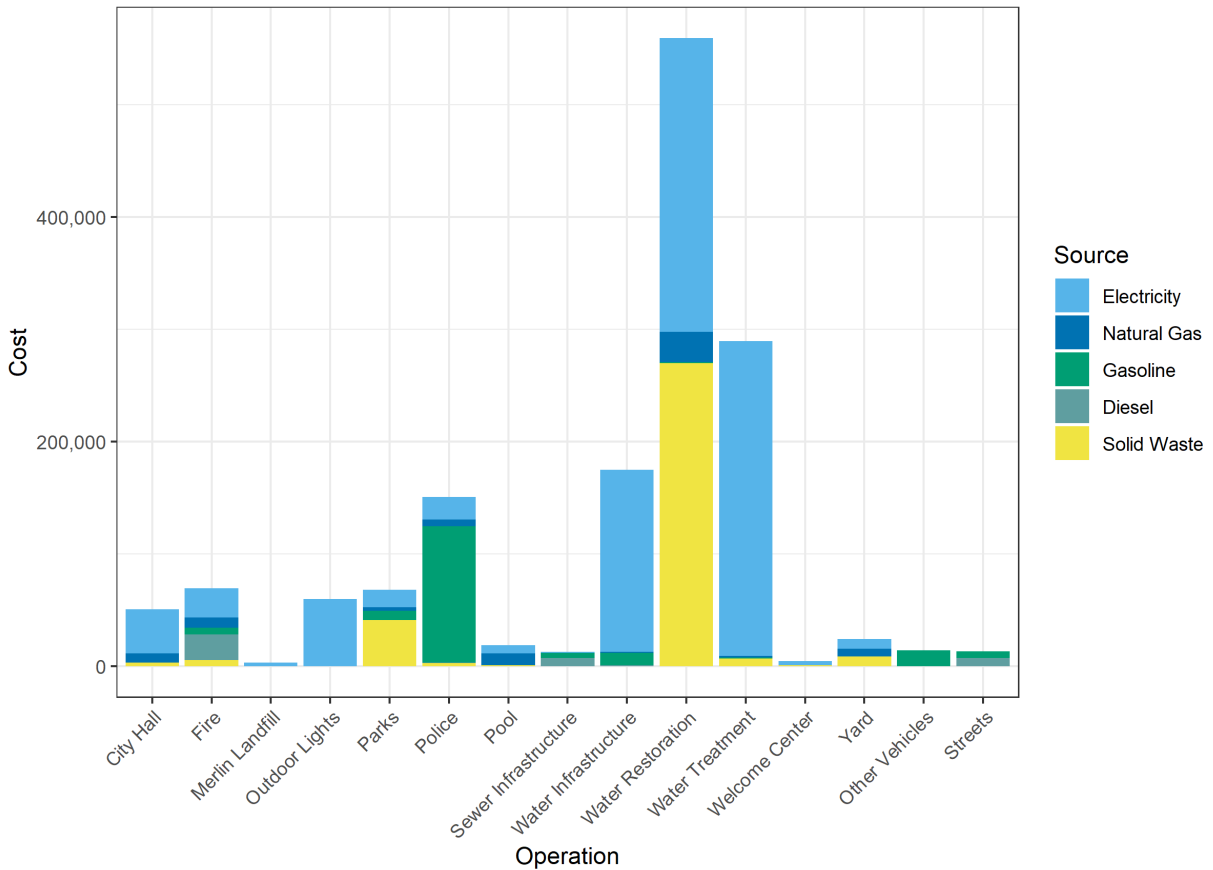
The proportion of greenhouse gas emissions generated by each energy source in 2021.

Energy Cost by Source 2021



Proportion of energy costs from each energy source in 2021.

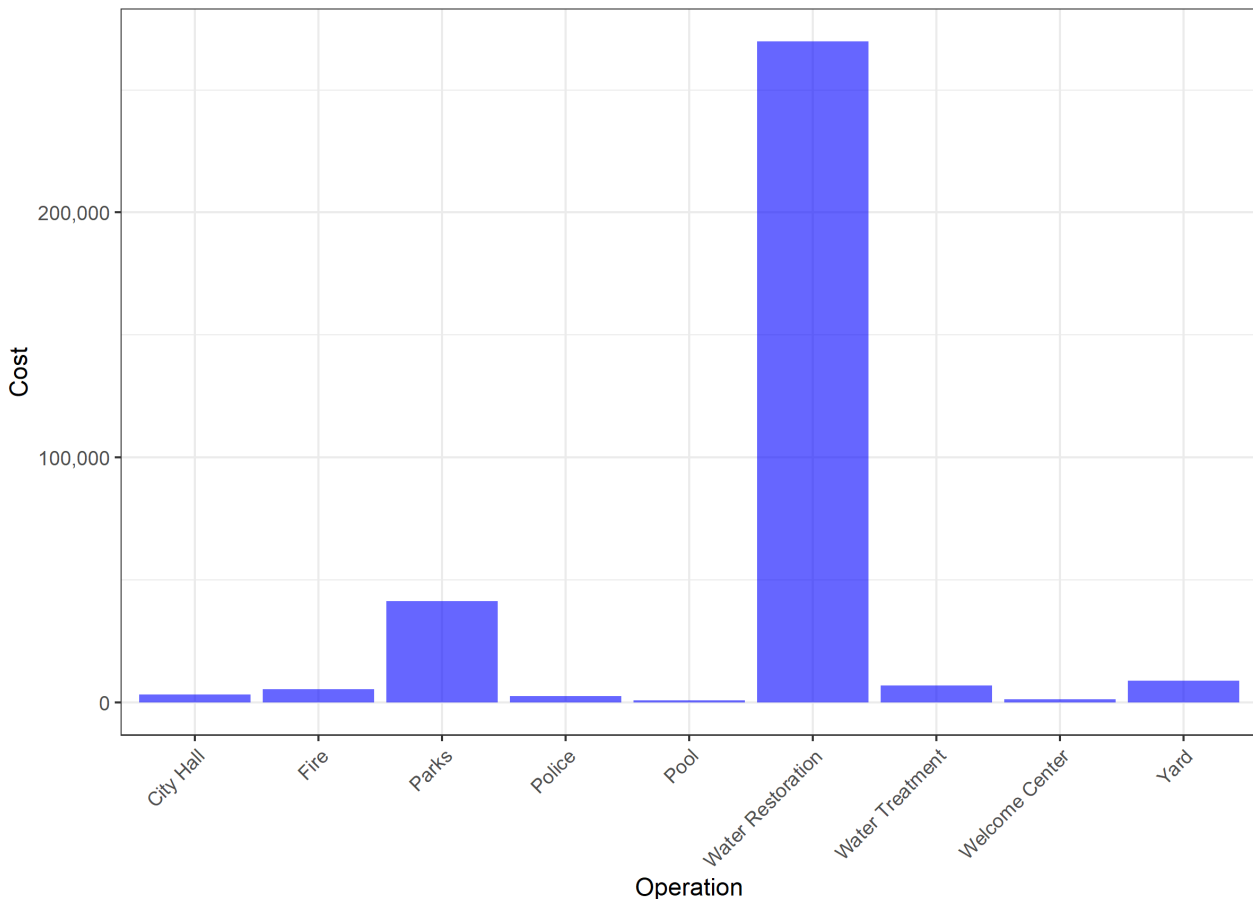
Energy Cost by Operation 2021



2021 Energy Costs by Source and Operation

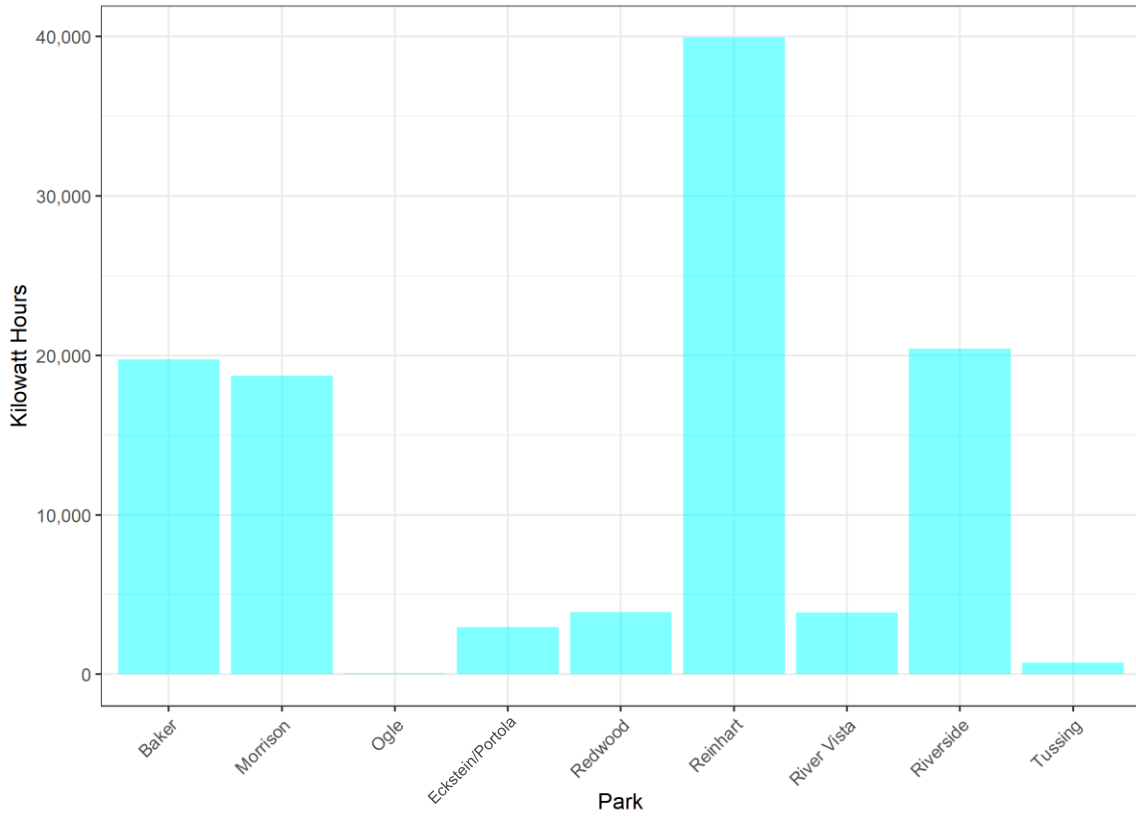
Operation	Diesel	Electricity	Gasoline	Natural Gas	Solid Waste	Grand Total
City Hall		\$ 39,229		\$ 8,124	\$ 3,235	\$ 50,588
Fire	\$ 23,248	\$ 26,065	\$ 5,924	\$ 8,940	\$ 5,309	\$ 69,486
Merlin Landfill		\$ 3,041				\$ 3,041
Other Vehicles	\$ 22		\$ 14,072			\$ 14,094
Outdoor Lights		\$ 60,053				\$ 60,053
Parks		\$ 15,620	\$ 8,125	\$ 3,064	\$ 41,266	\$ 68,075
Police	\$ 460	\$ 20,319	\$ 121,678	\$ 5,832	\$ 2,553	\$ 150,842
Pool		\$ 7,480		\$ 10,541	\$ 793	\$ 18,814
Sewer Infrastructure	\$ 7,544	\$ 792	\$ 4,176	\$ 221		\$ 12,733
Streets	\$ 7,278		\$ 6,180			\$ 13,458
Water Infrastructure	\$ 963	\$ 162,352	\$ 10,776	\$ 975		\$ 175,066
Water Restoration		\$ 261,406	\$ 1,277	\$ 26,822	\$ 269,753	\$ 559,257
Water Treatment		\$ 280,251	\$ 1,058	\$ 1,421	\$ 6,897	\$ 289,628
Welcome Center		\$ 3,561			\$ 1,158	\$ 4,719
Yard		\$ 8,449		\$ 6,829	\$ 8,839	\$ 24,117
Grand Total	\$ 39,516	\$ 888,619	\$ 173,265	\$ 72,769	\$ 339,803	\$ 1,513,972

Solid Waste Cost by Operation 2021



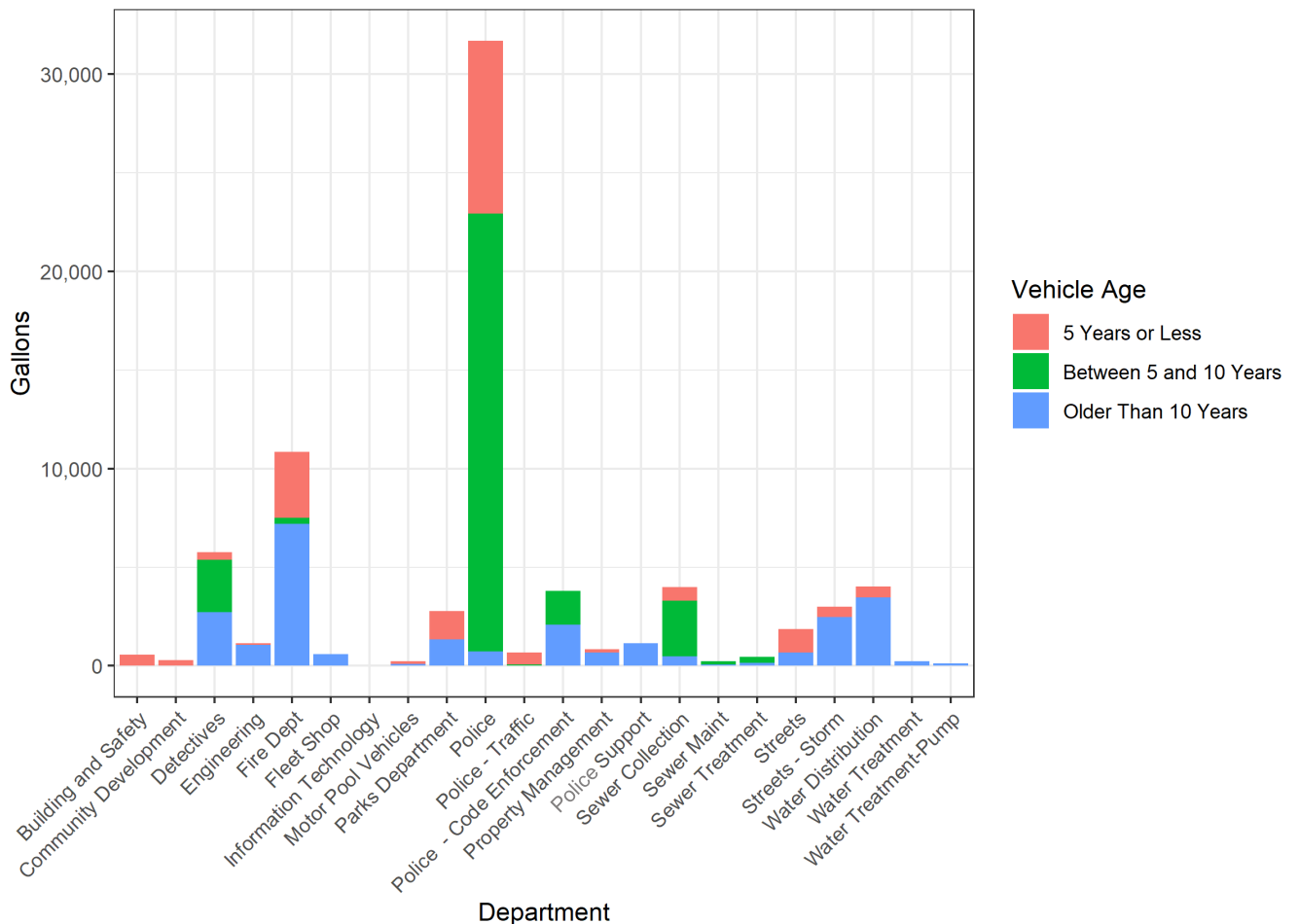
Cost for solid waste disposal for each city operation in 2021.

Parks Electrical Usage 2021



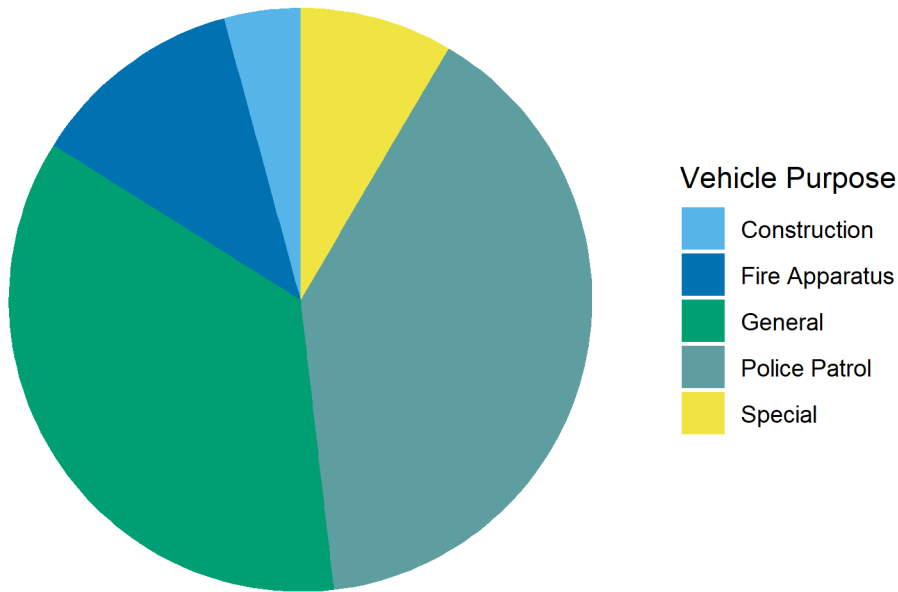
Electrical energy usage for city parks in 2021.

Vehicle Fuel Usage by Department 2021



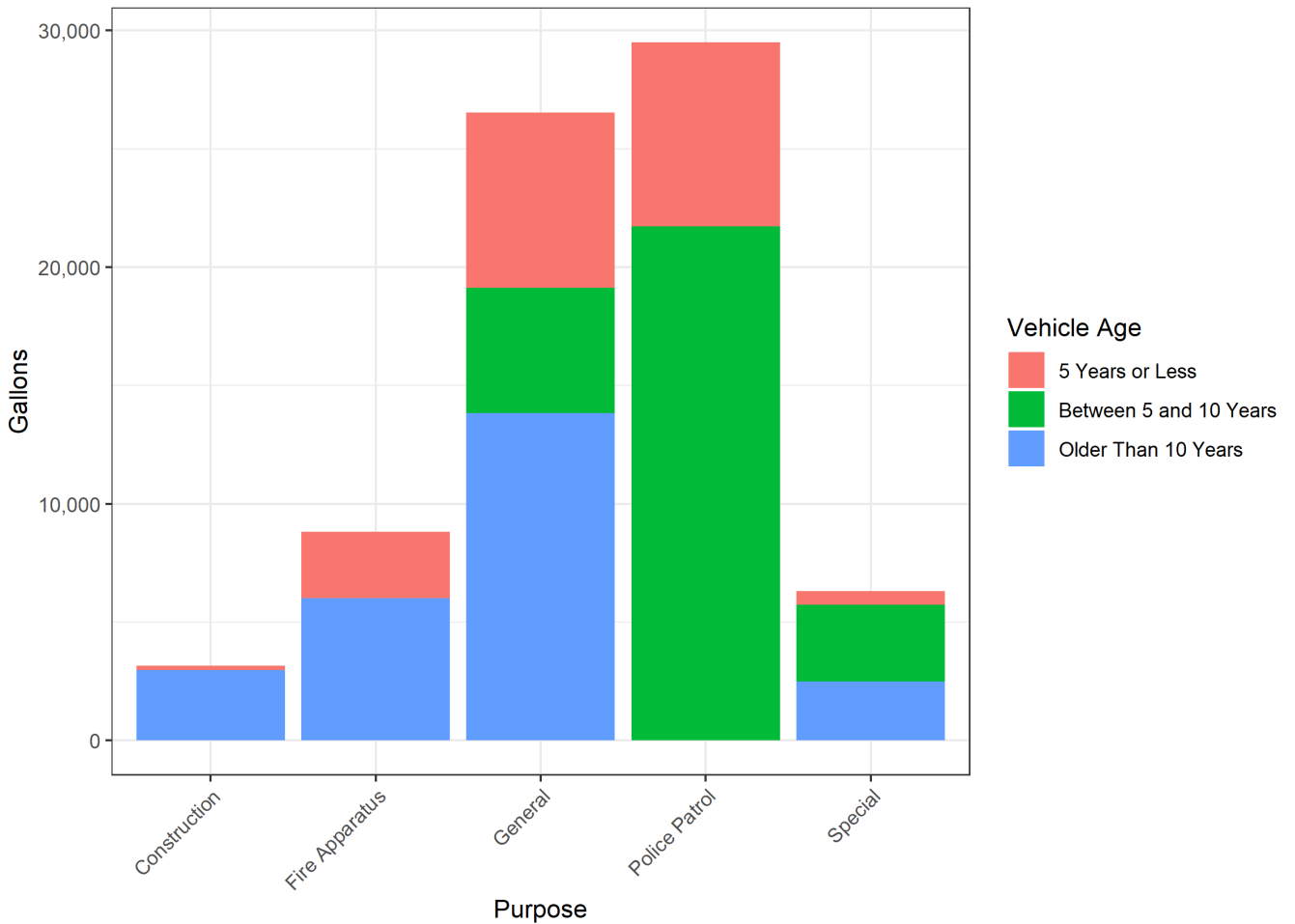
Vehicle fuel usage for each city department in 2021. The age category for vehicles consuming the fuel is shown as colors within each bar.

Vehicle Fuel Usage 2021



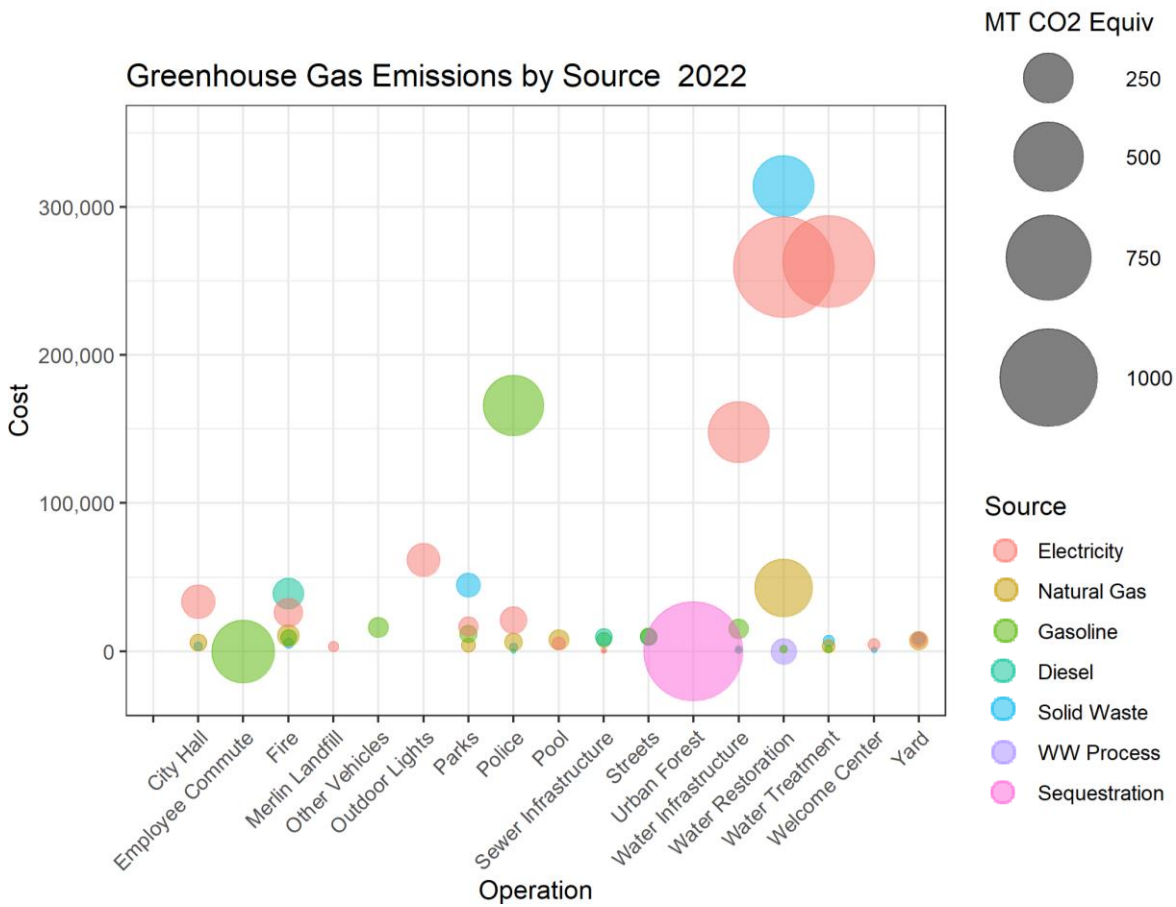
The proportion of vehicle fuel usage by each purpose is shown for 2021.

Vehicle Fuel Usage by Purpose 2021



Vehicle fuel usage by vehicle purpose in 2021. The age of vehicles consuming the fuel is shown as colors in each bar.

2022 ENERGY USAGE



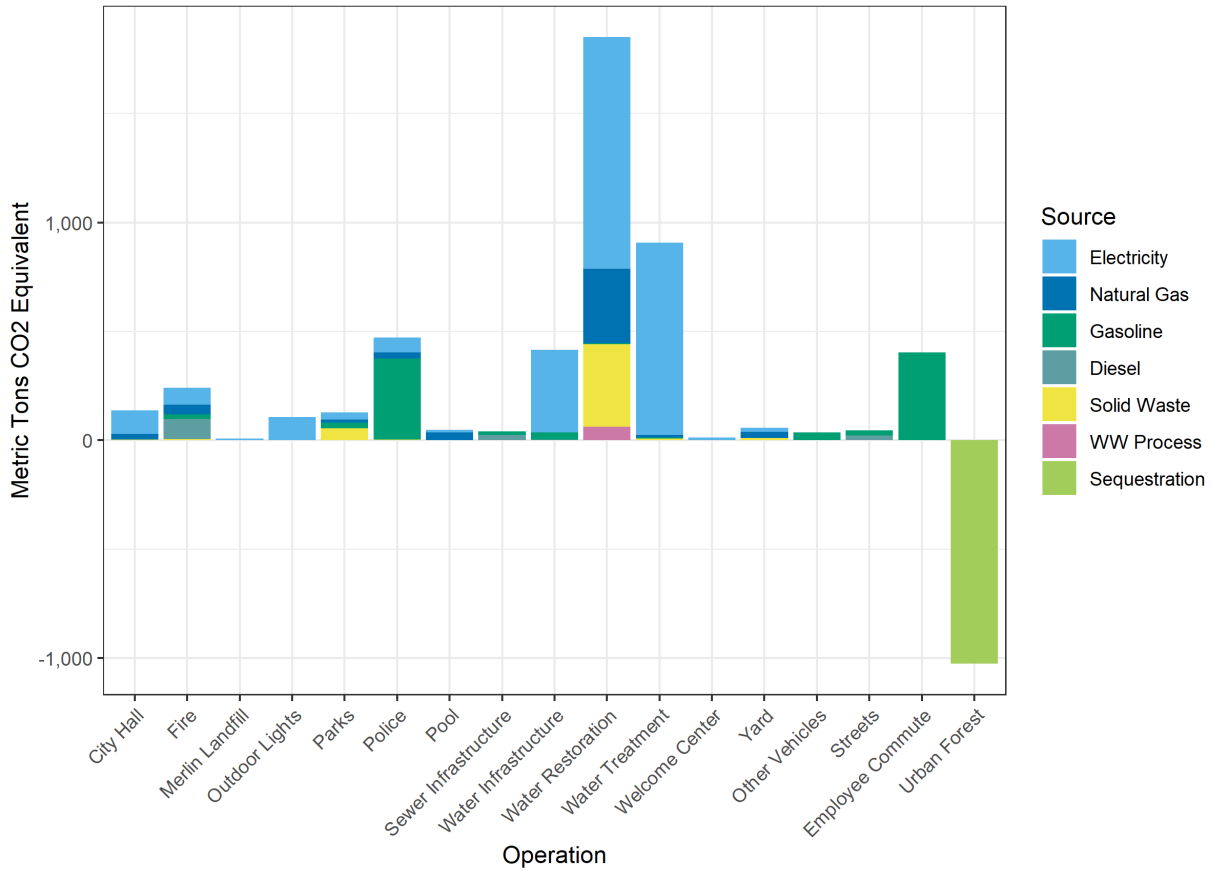
Greenhouse gas emissions and energy costs for each operation in 2022 separated by the source of the energy. The size of each circle represents the quantity of emissions for that operation and energy source.

2022 Greenhouse Gas Emissions by Source and Operation

Operation	Diesel	Electricity	Gasoline	Natural Gas	Sequestration	Solid Waste	WW Process	Grand Total
City Hall		109.8		23.8		4.1		137.7
Employee Commute			404.2					404.2
Fire	91.9	76.5	21.1	43.8		6.6		239.9
Merlin Landfill		7.1						7.1
Other Vehicles			36.4					36.4
Outdoor Lights		106.1						106.1
Parks		32.8	25.7	15.4		54.2		128.1
Police	0.8	68.5	370.9	27.4		3.3		470.9
Pool		13.4		35.2				48.6
Sewer Infrastructure	23.3	1.2	17.4	0.0				41.9
Streets	23.1		22.2					45.3
Urban Forest					(1,026.7)			(1,026.7)
Water Infrastructure	2.8	379.1	32.6	0.3				414.9
Water Restoration		1,063.9	3.3	341.7		380.4	61.6	1,850.8
Water Treatment		880.9	3.3	13.3		8.7		906.1
Welcome Center		10.2				1.5		11.6
Yard		18.1		29.2		10.3		57.6
Grand Total	141.8	2,767.7	937.0	530.3	(1,026.7)	469.0	61.6	3,880.7

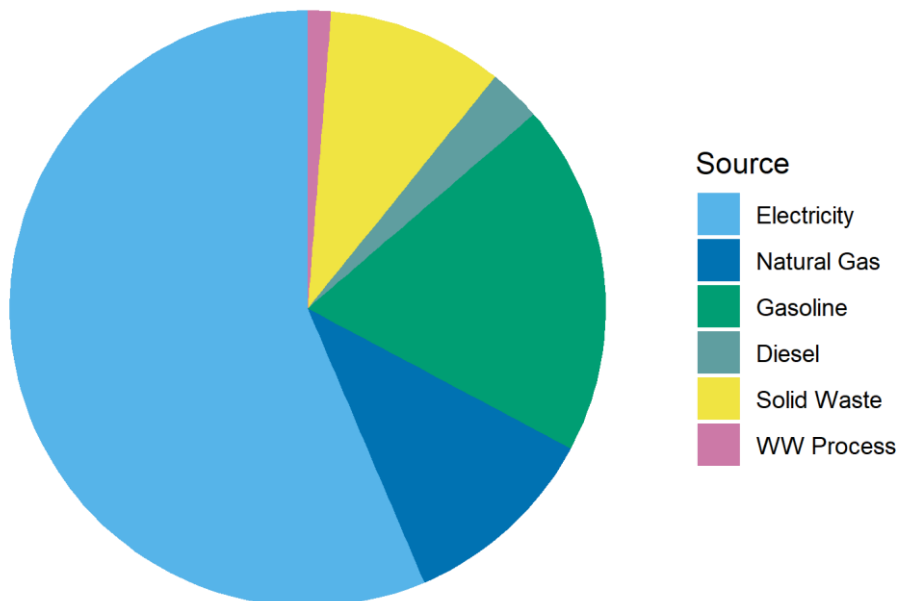
Greenhouse gas emissions in metric tons of CO₂ equivalent for 2022 for each city operation.

GHG Emissions by Operation 2022



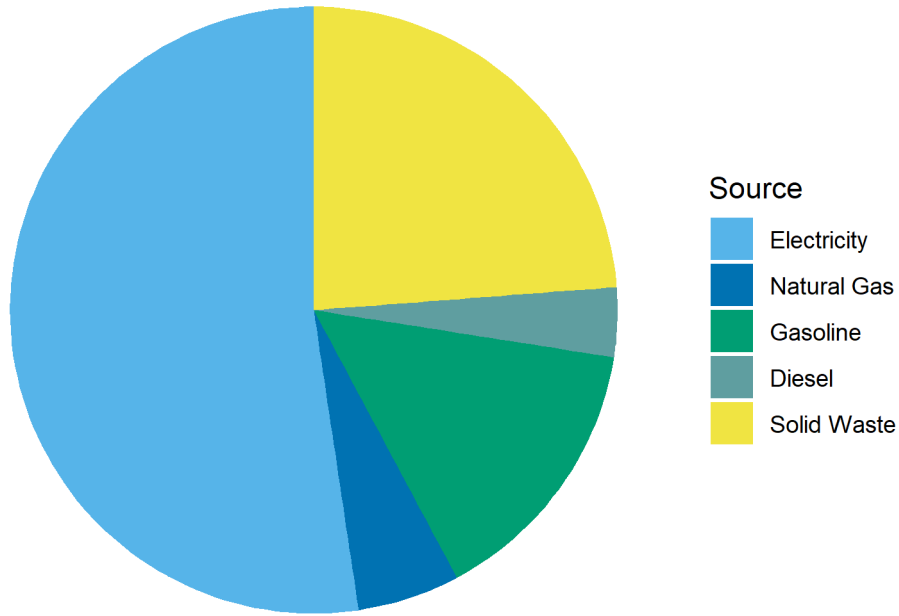
Greenhouse gas emissions for each city operation in 2022. The source of emissions is shown as a color within each bar.

Greenhouse Gas Emissions by Source 2022



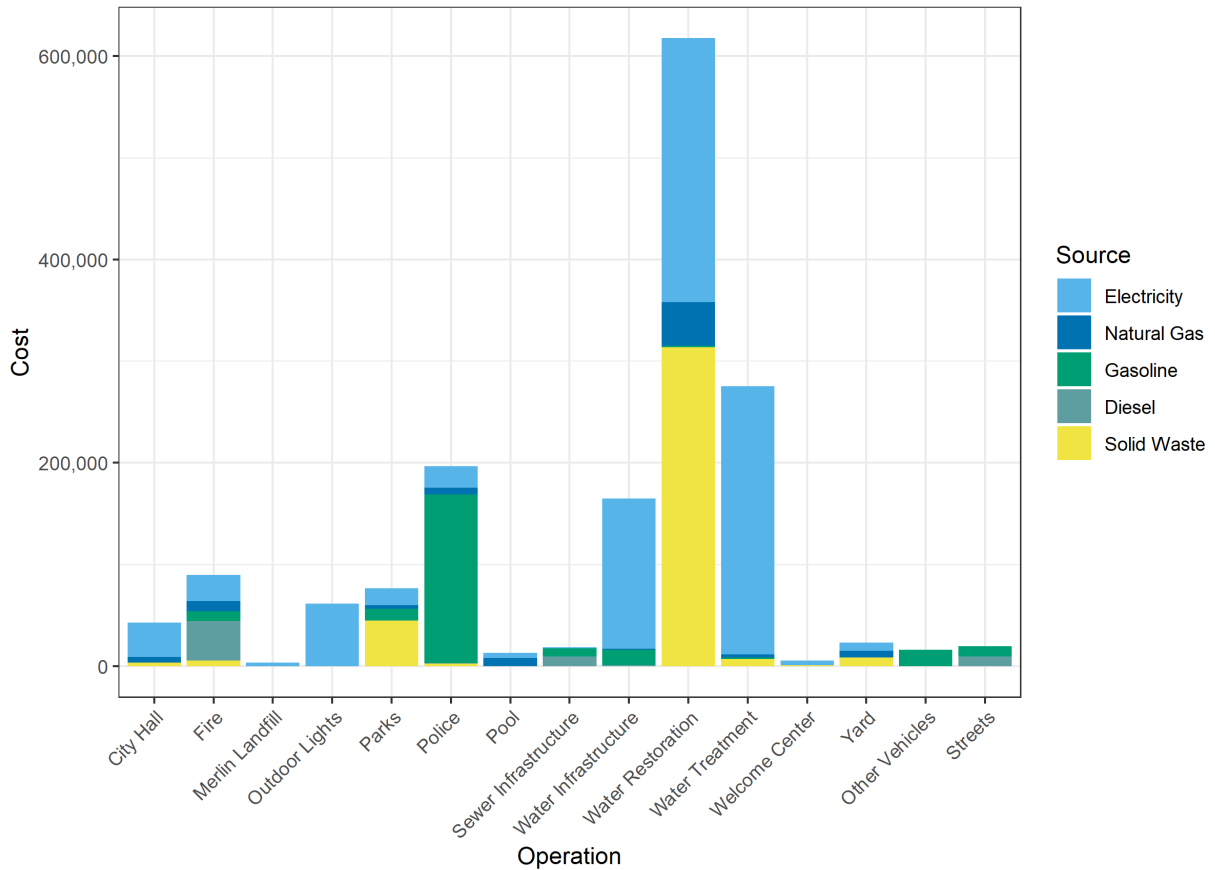
The proportion of greenhouse gas emissions emitted for each energy source in 2022.

Energy Cost by Source 2022



The proportion of energy cost by source of energy in 2022.

Energy Cost by Operation 2022

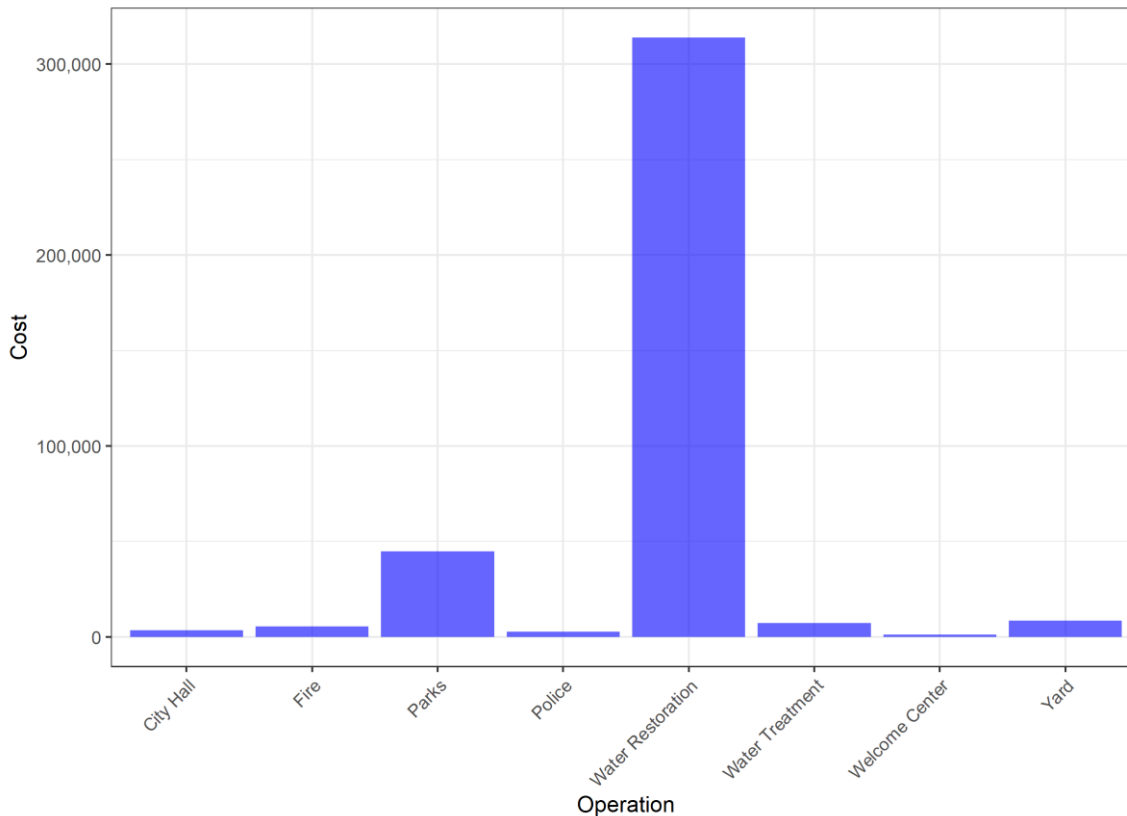


The cost of energy for each city operation in 2022. The source of energy is shown as color within each bar.

2022 Energy Costs by Source and Operation

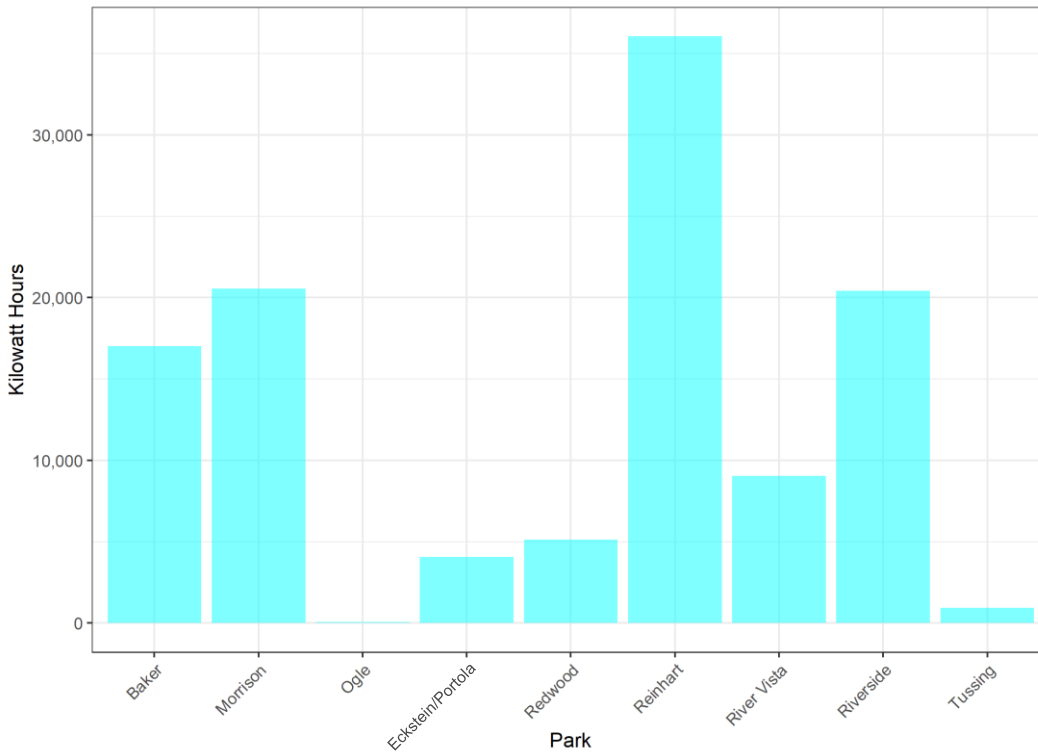
Operation	Diesel	Electricity	Gasoline	Natural Gas	Solid Waste	Grand Total
City Hall		\$33,593		\$5,805	\$3,359	\$42,757
Fire	\$38,949	\$25,823	\$9,536	\$10,303	\$5,432	\$90,043
Merlin Landfill		\$3,442				\$3,442
Other Vehicles			\$16,307			\$16,307
Outdoor Lights		\$61,599				\$61,599
Parks		\$16,559	\$11,576	\$4,008	\$44,698	\$76,841
Police	\$325	\$21,226	\$165,961	\$6,454	\$2,756	\$196,723
Pool		\$5,242		\$8,008		\$13,251
Sewer Infrastructure	\$9,798	\$761	\$7,752	\$218		\$18,528
Streets	\$9,782		\$10,126			\$19,908
Water Infrastructure	\$1,217	\$147,740	\$14,919	\$909		\$164,785
Water Restoration		\$259,565	\$1,434	\$42,715	\$313,838	\$617,552
Water Treatment		\$263,431	\$1,492	\$3,175	\$7,168	\$275,266
Welcome Center		\$4,476			\$1,200	\$5,676
Yard		\$7,913		\$6,940	\$8,458	\$23,311
Grand Total	\$60,071	\$851,369	\$239,105	\$88,535	\$386,909	\$1,625,988

Solid Waste Cost by Operation 2022



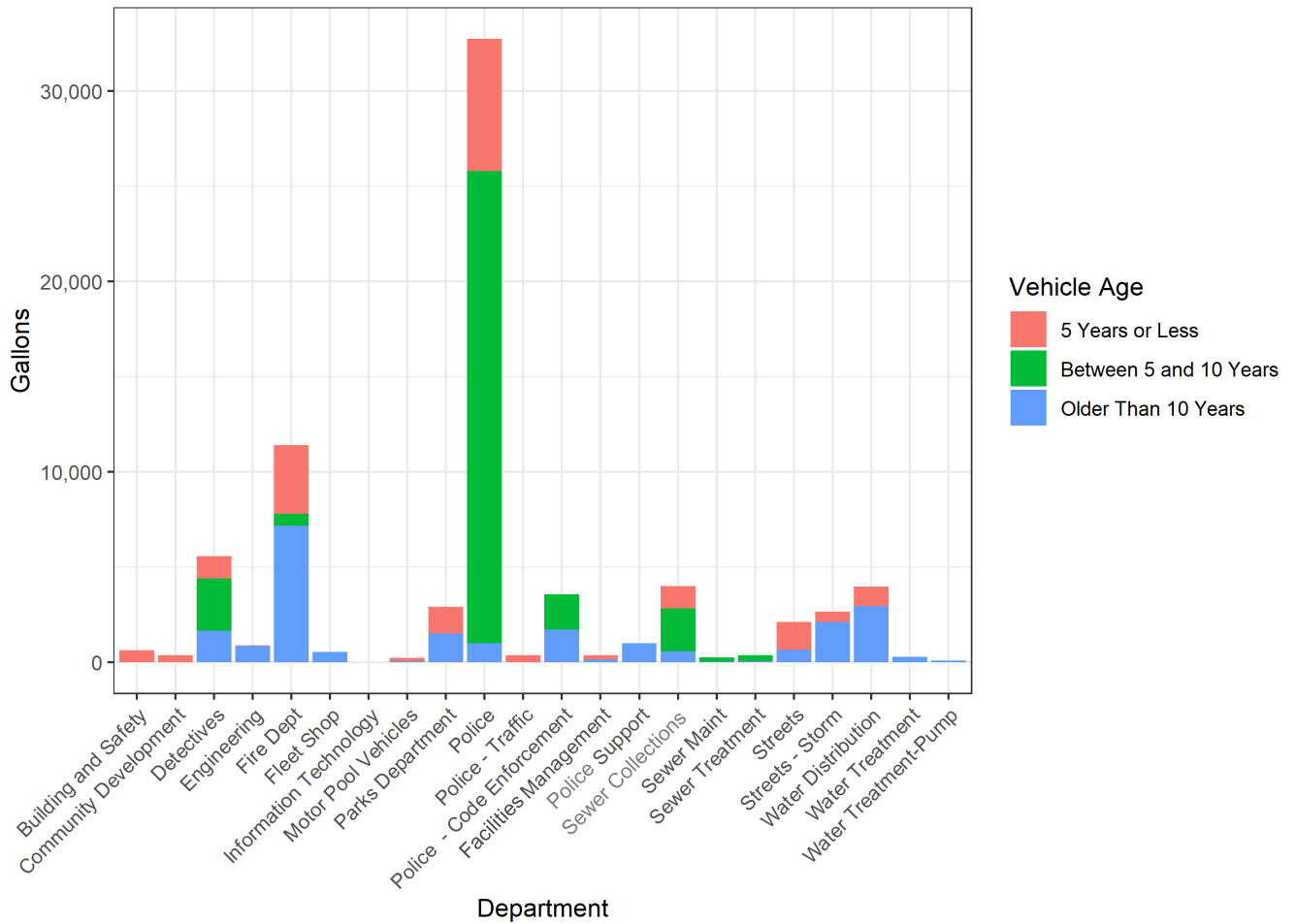
The cost of solid waste disposal for each city operation in 2022.

Parks Electrical Usage 2022



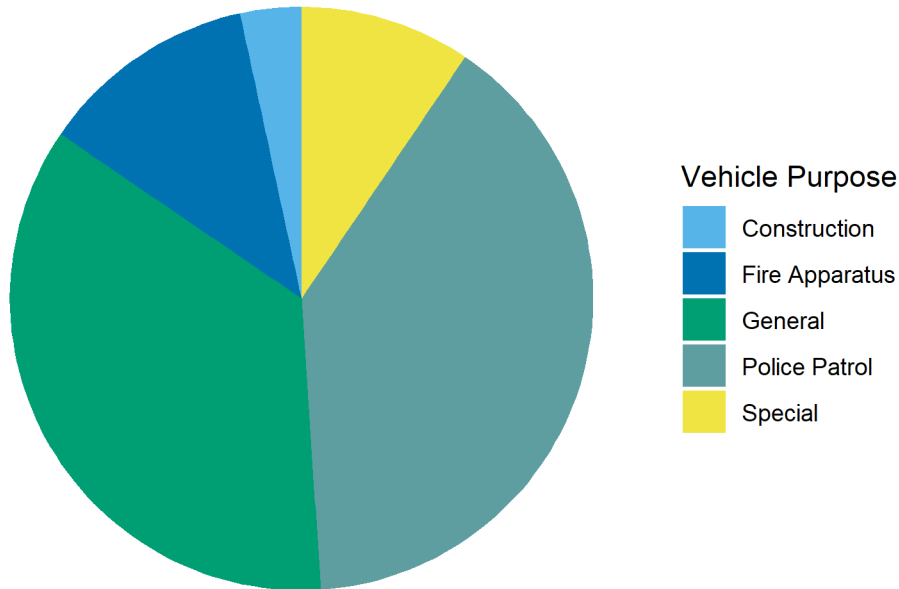
Electric energy usage by city parks in 2022.

Vehicle Fuel Usage by Department 2022



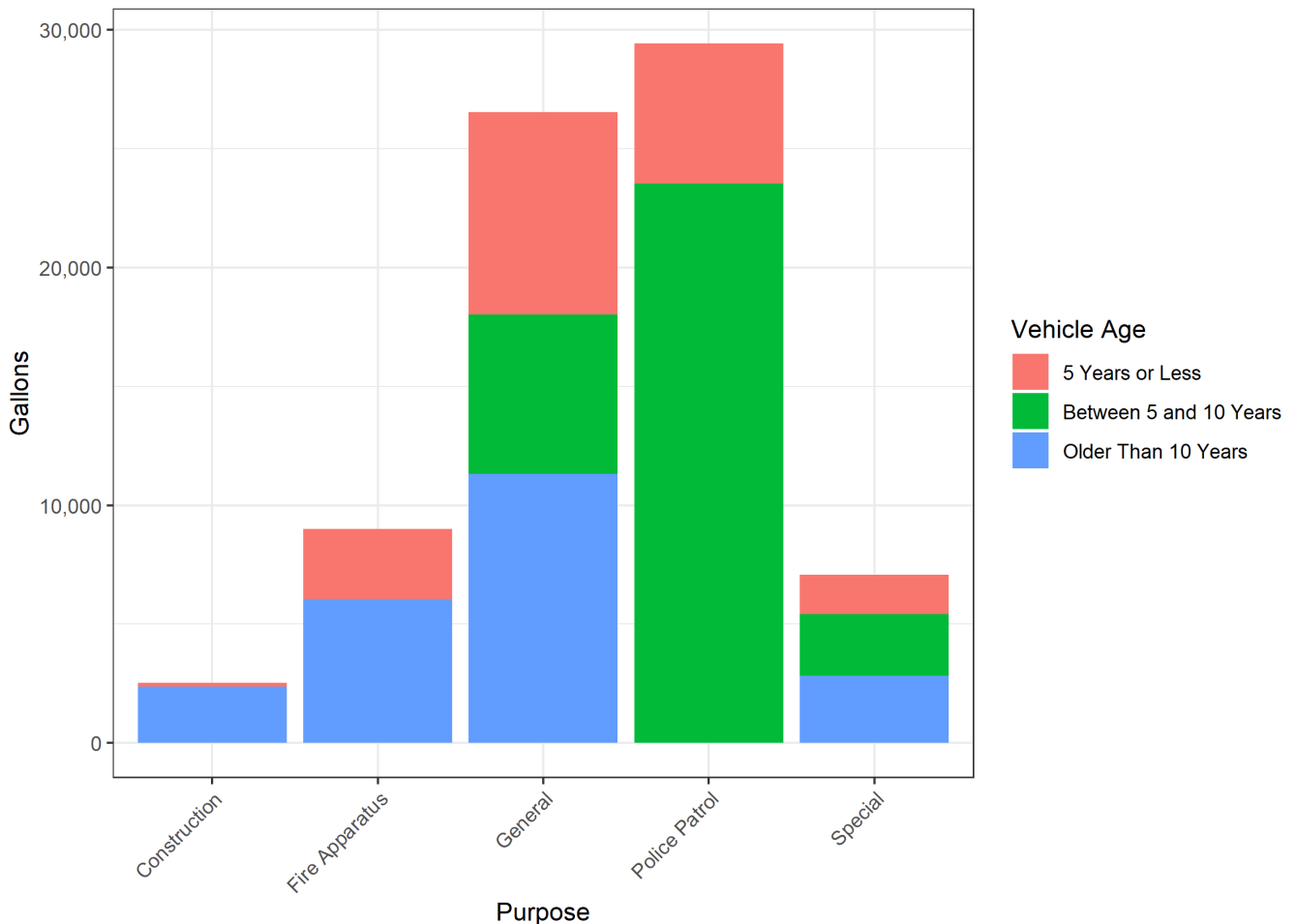
Fuel usage by vehicles in each city department in 2022. The age of the vehicles consuming the fuel is shown as color within each bar.

Vehicle Fuel Usage 2022



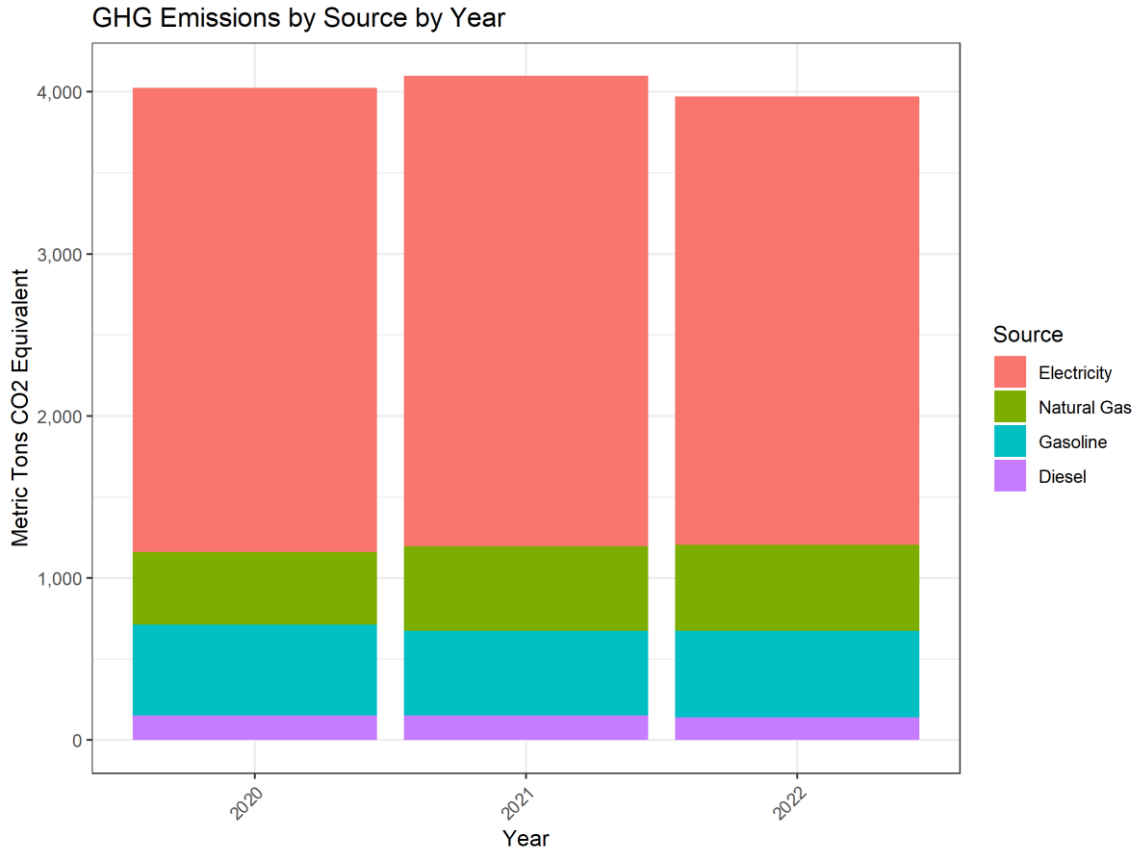
The proportion of vehicle fuel usage by vehicle purpose in 2022.

Vehicle Fuel Usage by Purpose 2022

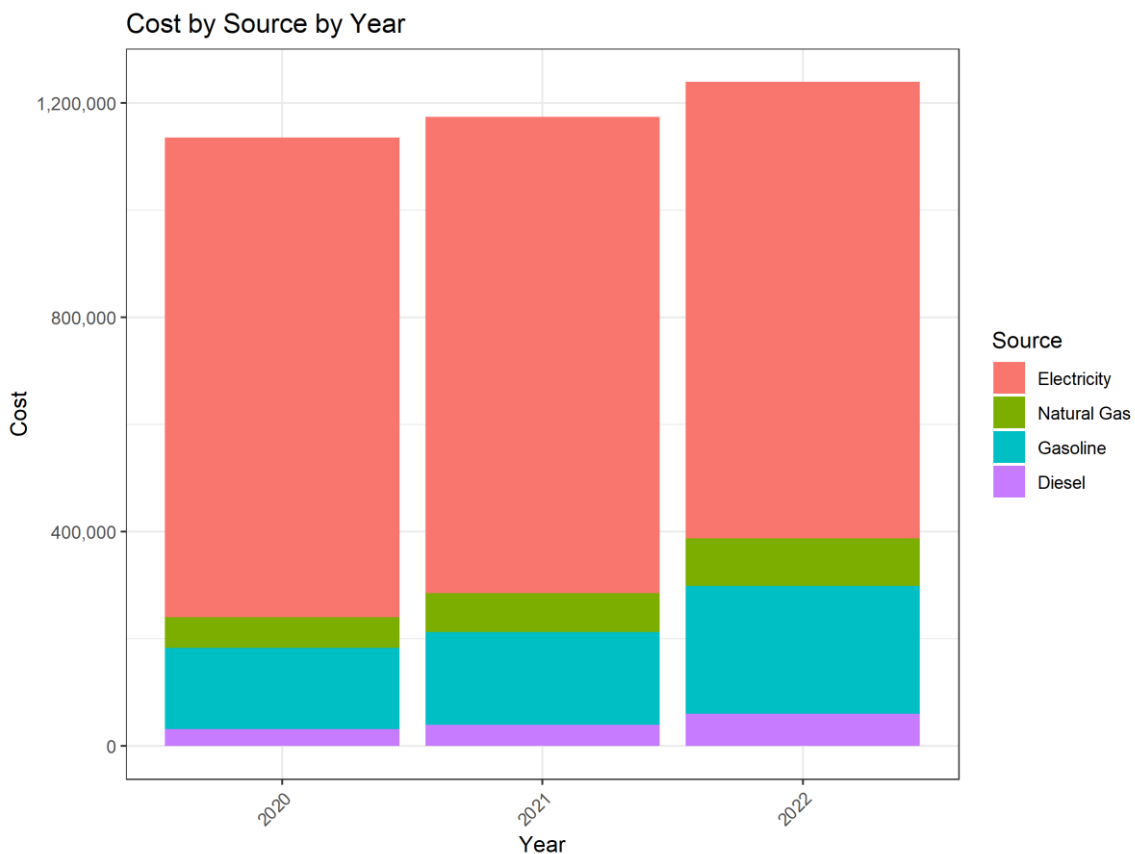


Vehicle fuel usage by vehicle purpose in 2022. The age of vehicles consuming the fuel is shown as color in each bar.

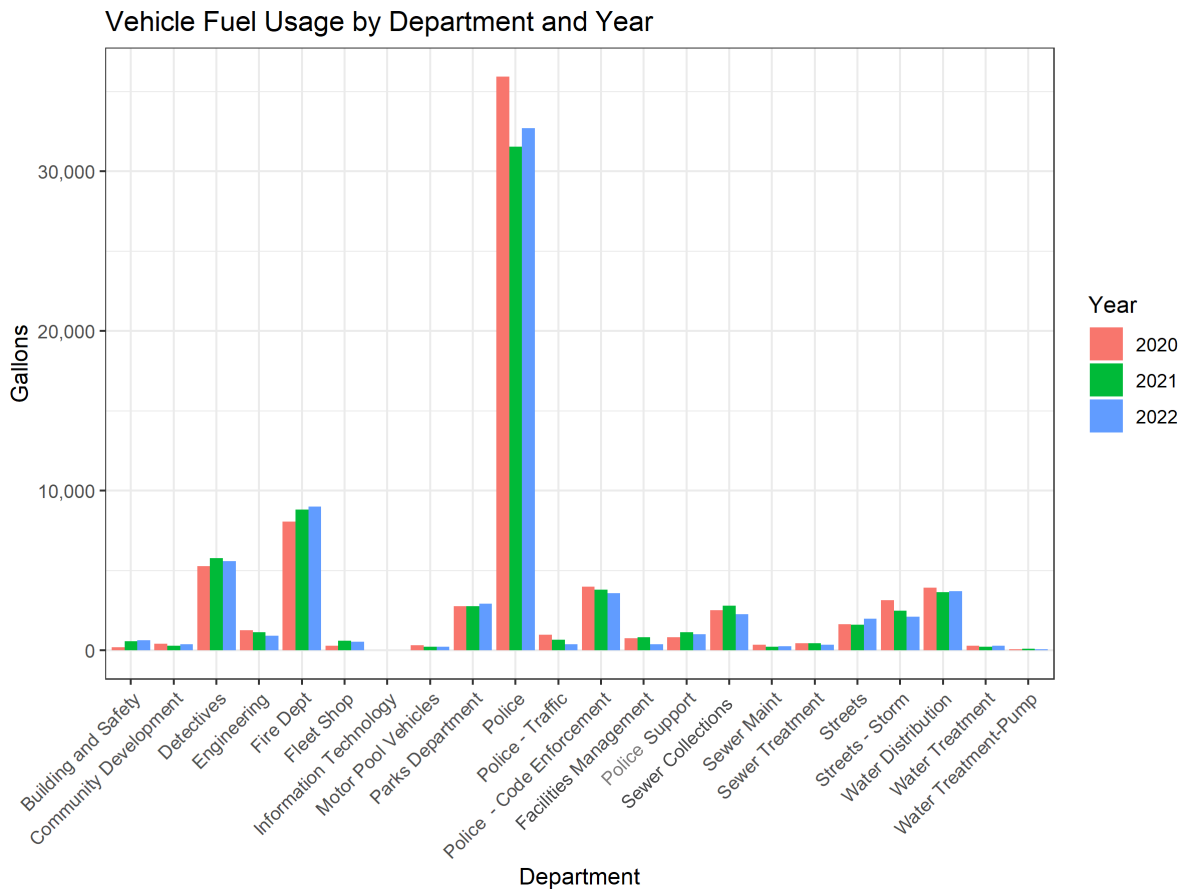
MULTI-YEAR COMPARISONS



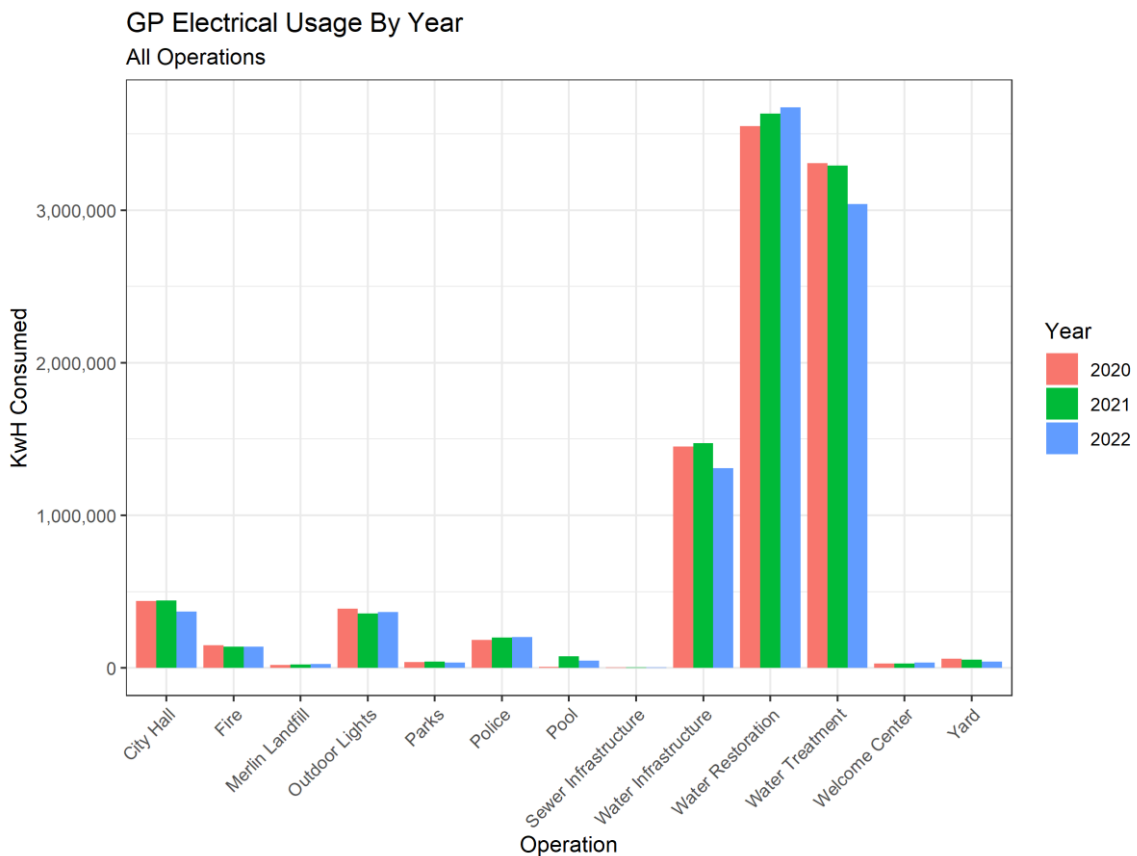
Greenhouse gas emissions by source for years 2020-2022.



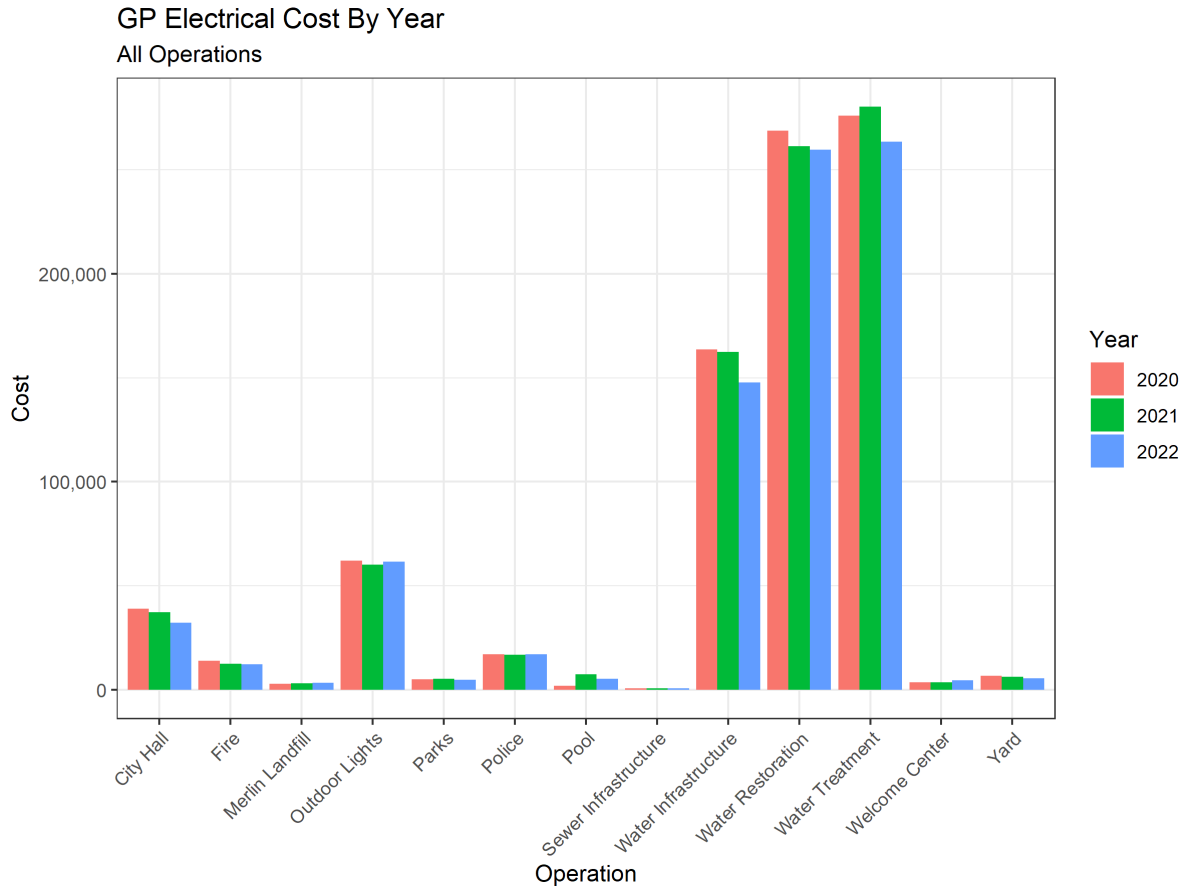
Energy costs by source for years 2020-2022.



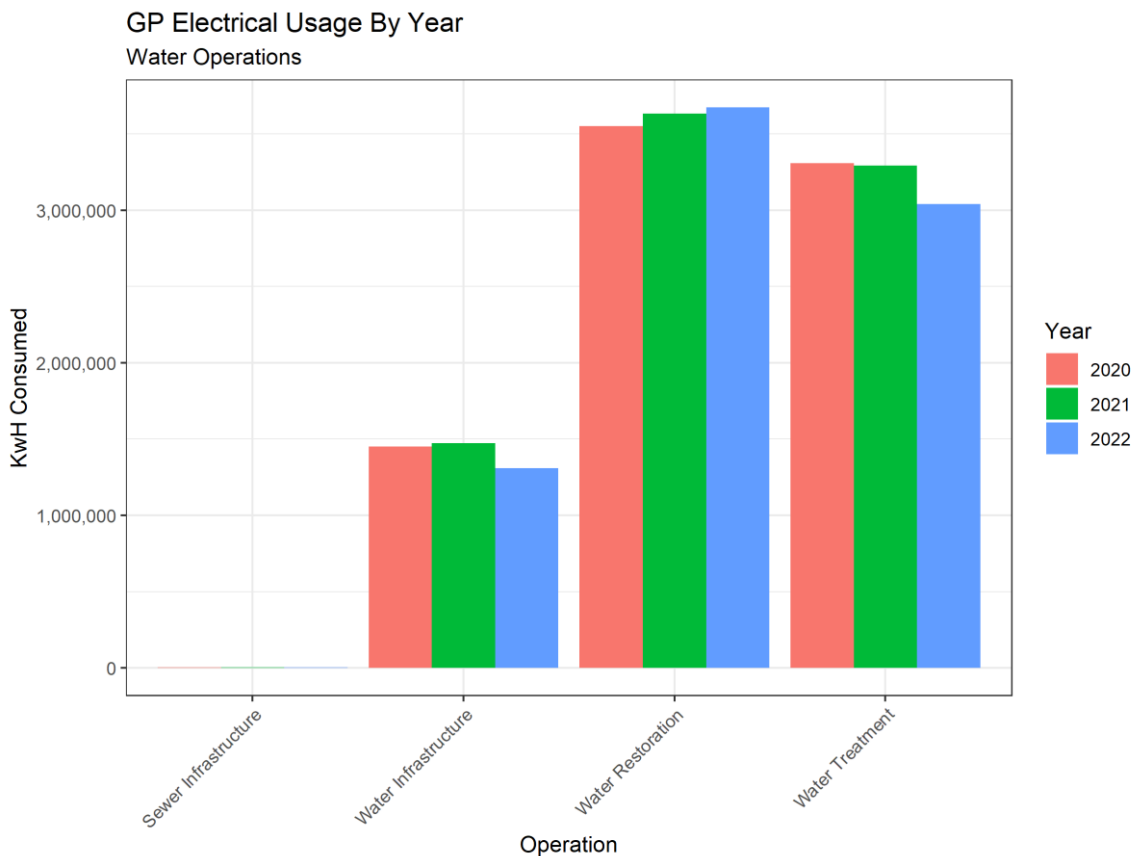
Vehicle fuel usage by city department for years 2020-2022.



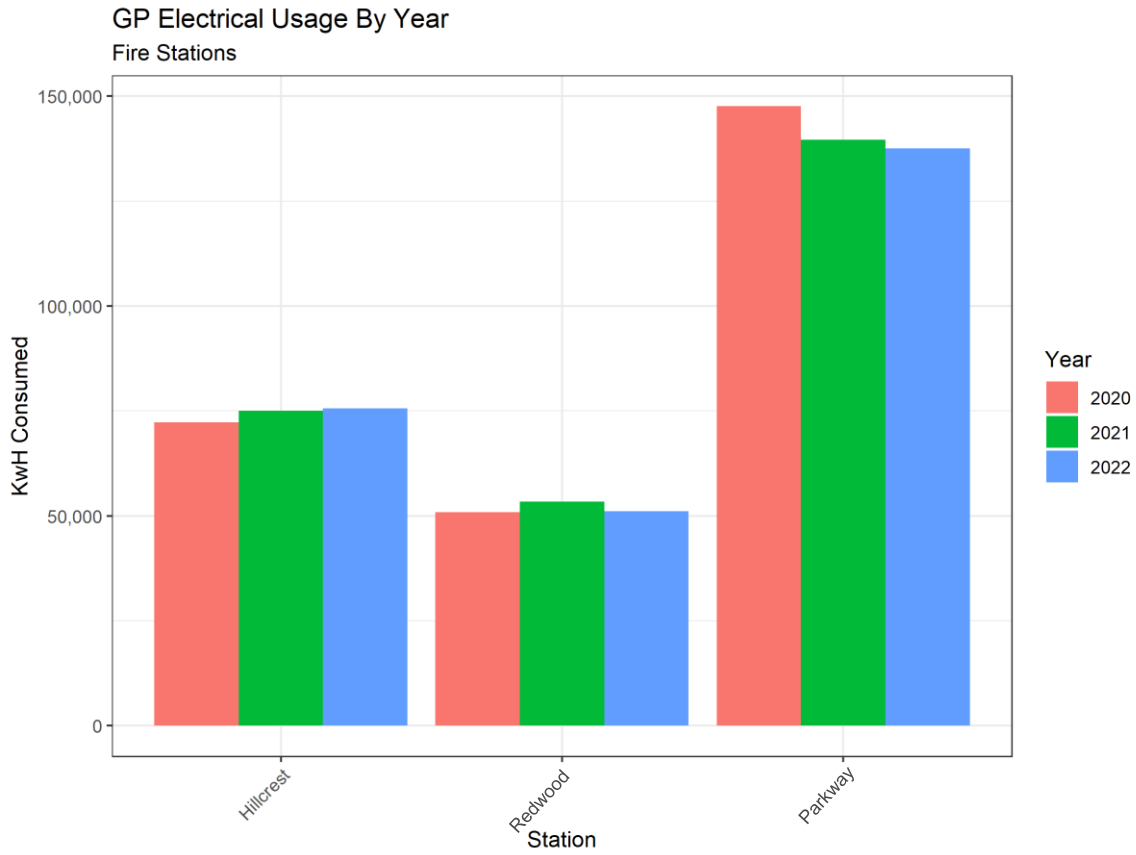
Electricity usage in kilowatt-hours by city operation for years 2020-2022.



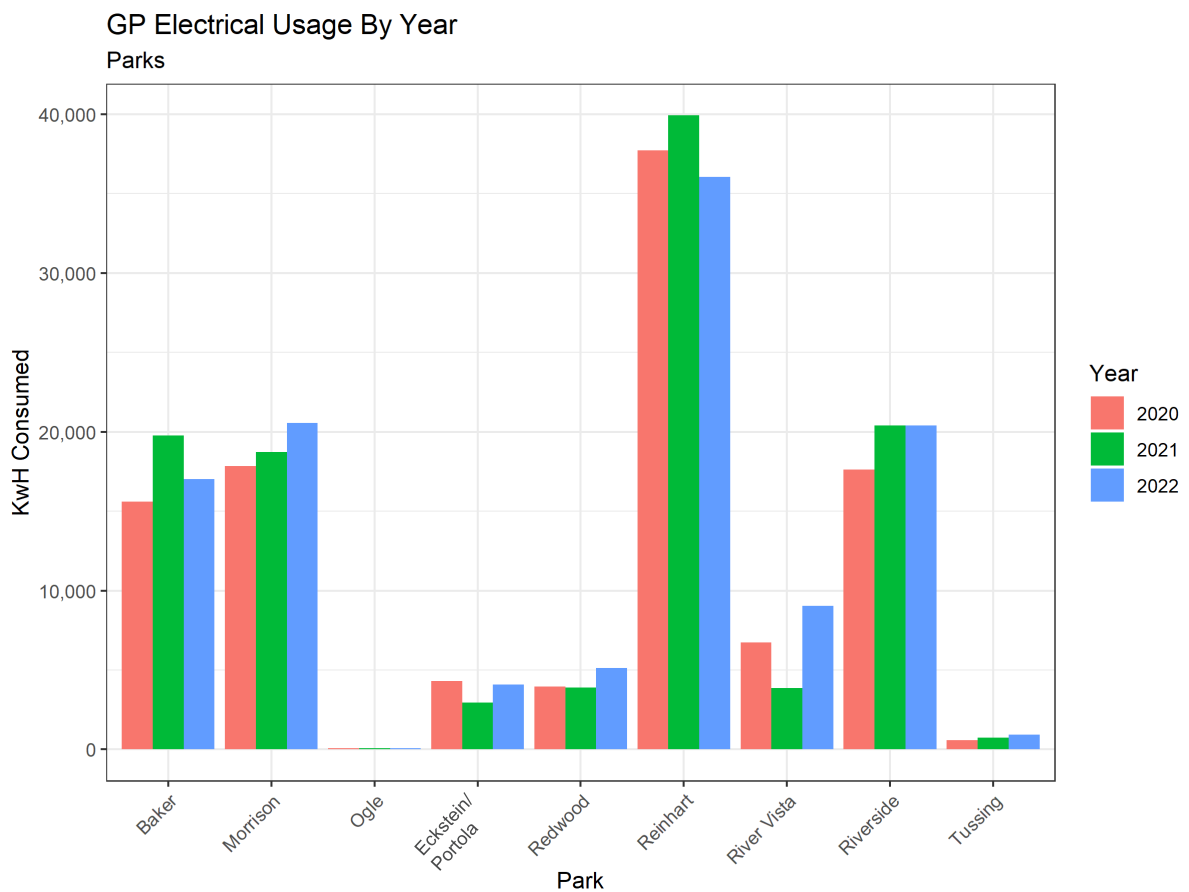
Cost of electrical energy by city operation for years 2020-2022. Note that operations are charged different rates under agreement with Pacific Power.



Electrical energy consumption for water related operations in years 2020-2022. Water Infrastructure represents pumps that transport water within the city's system.

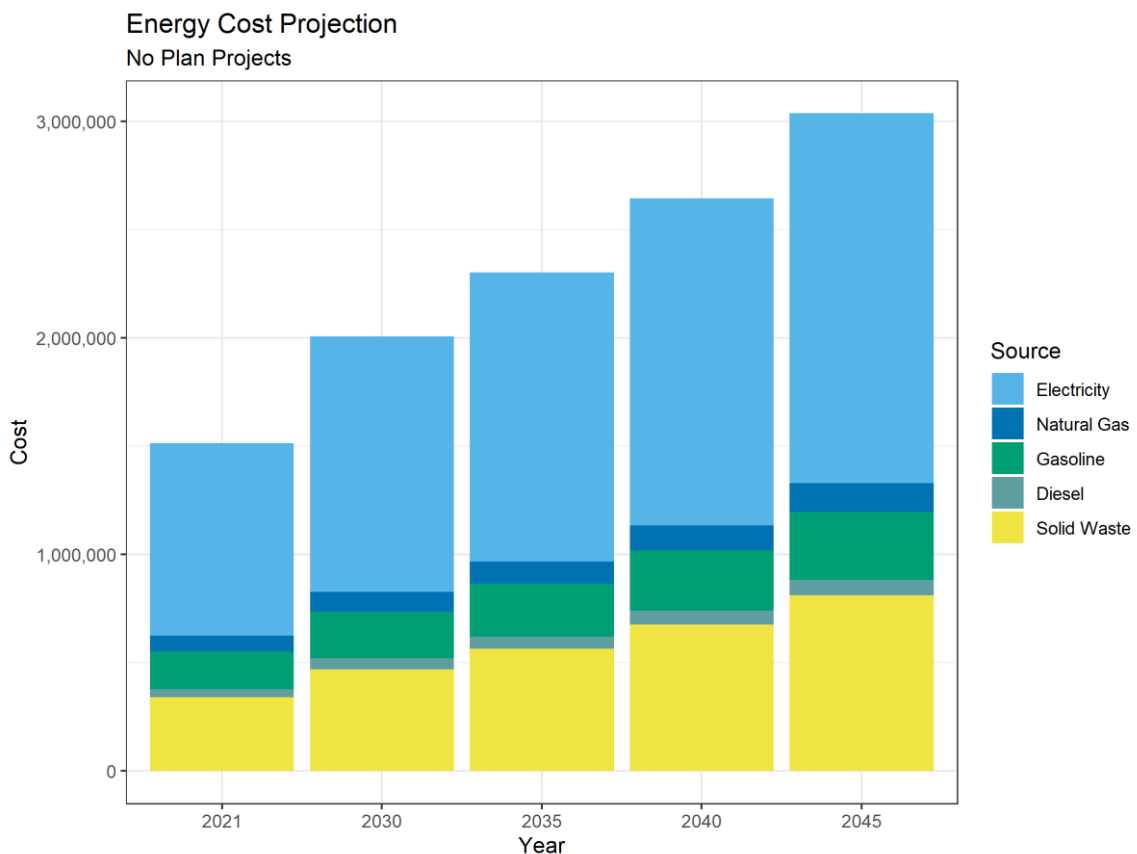
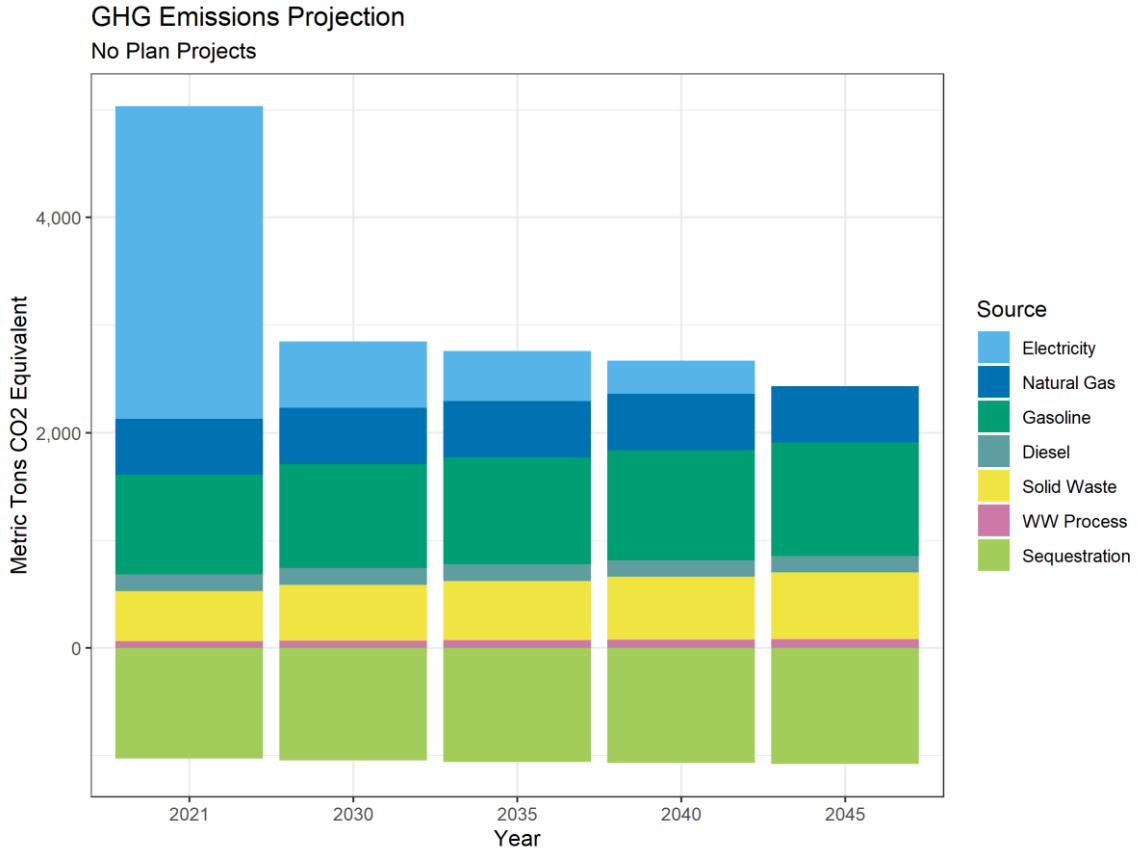


Electrical energy usage for the city fire stations in years 2020-2022.

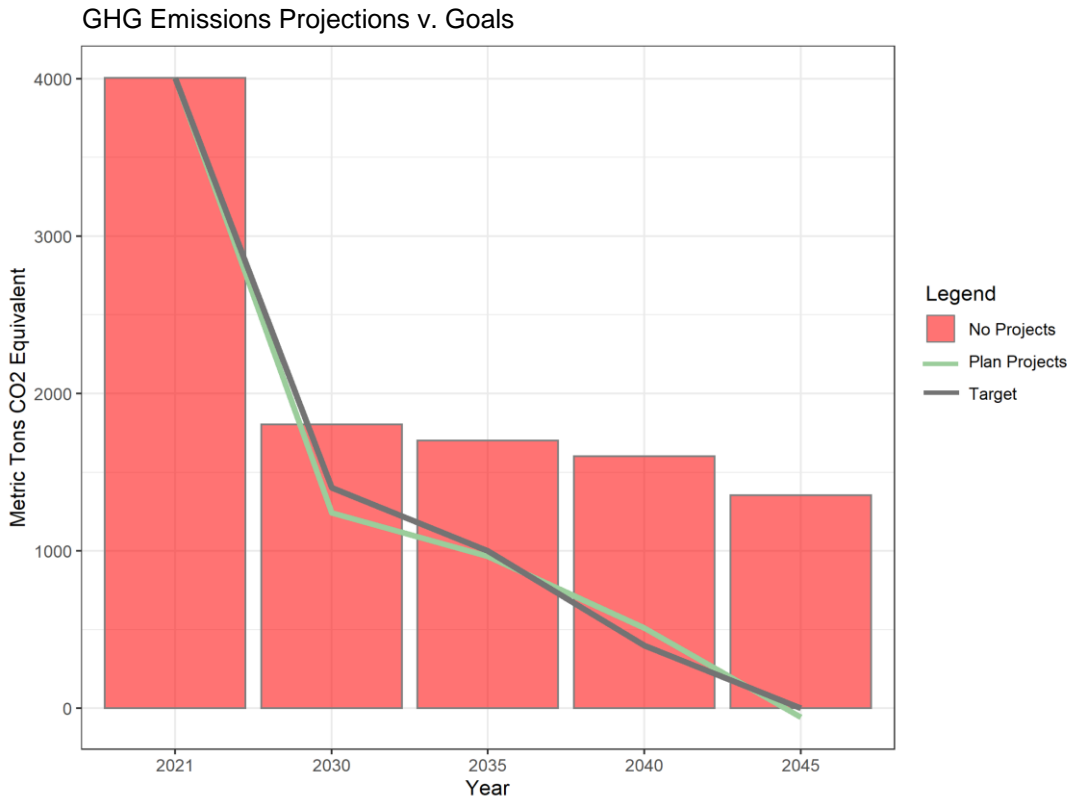


Electrical energy usage by city parks in years 2020-2022.

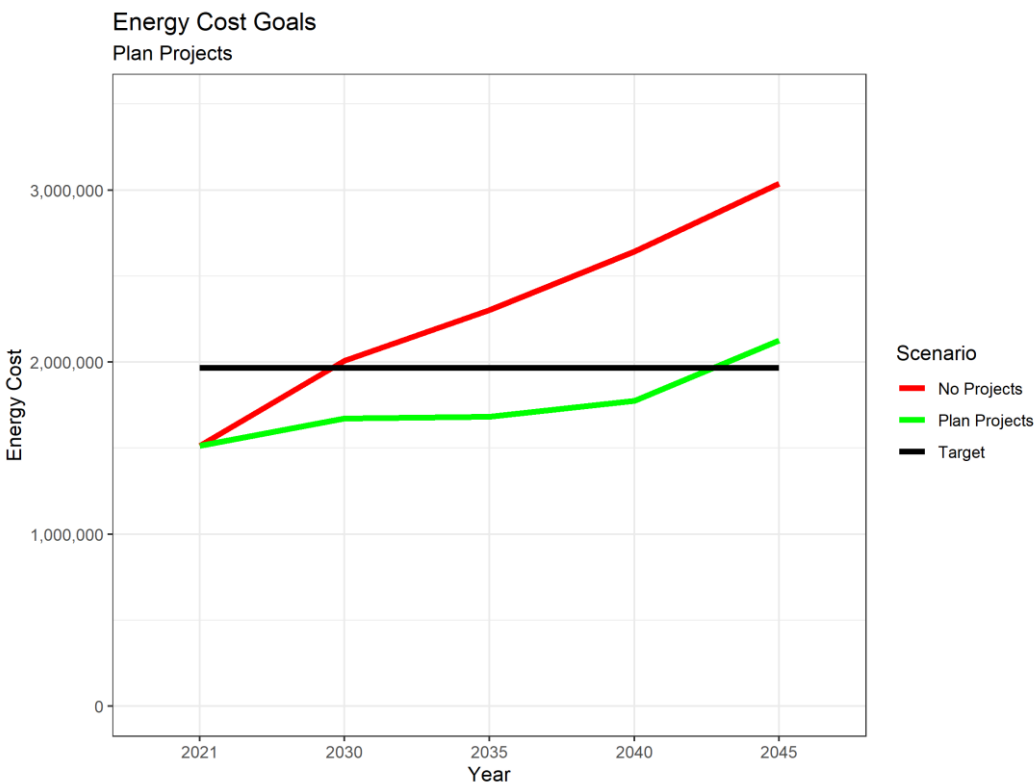
MODELING SCENARIOS: FUTURE PROJECTIONS BASELINE



MODELING SCENARIOS: WITH PLAN PROJECTS

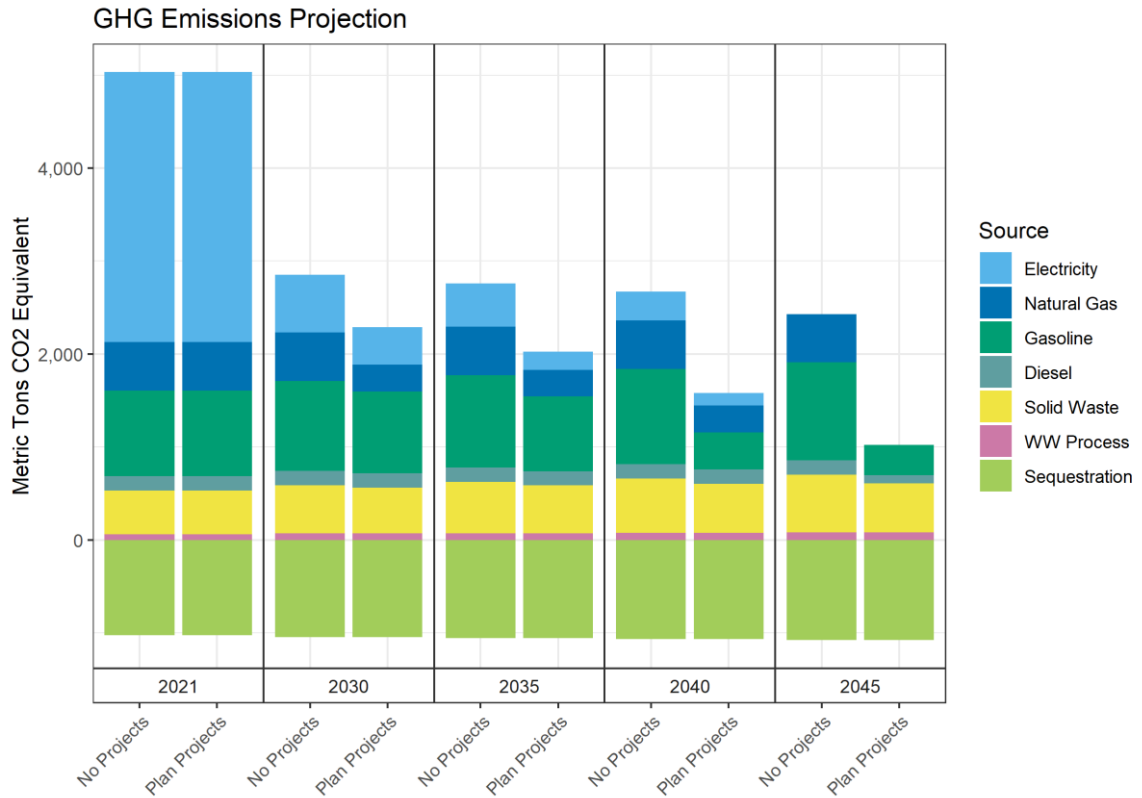


Annual estimated greenhouse gas emissions per milestone year. Emissions projected without impact of Plan projects are shown as bars. Emissions expected after reductions from Plan projects are shown as a line graph. Target emissions levels are shown as an additional line for comparison.

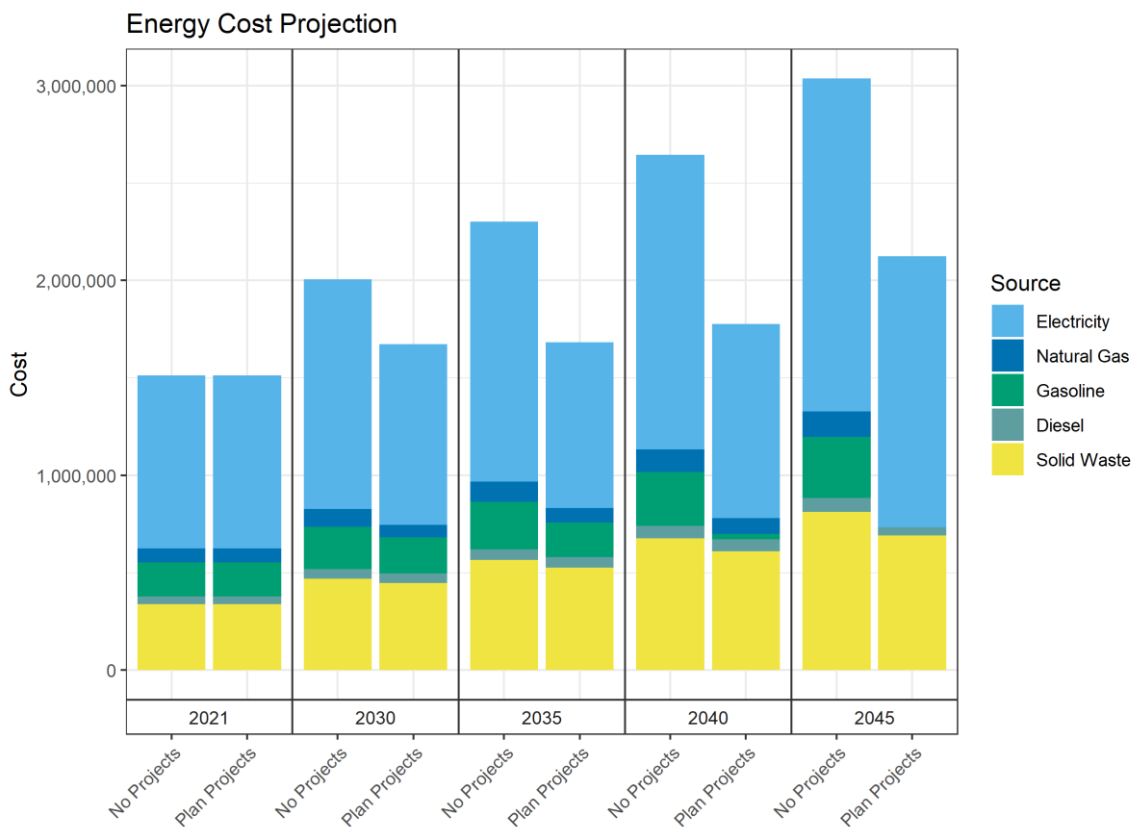


Comparison of energy costs between no projects (no action), target emissions based on goals, and the impact of projects within the Plan model.

APPENDIX II: FULL MUNICIPAL ENERGY USAGE REPORT: BASIC PLAN PROJECTS PROJECTIONS
GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN

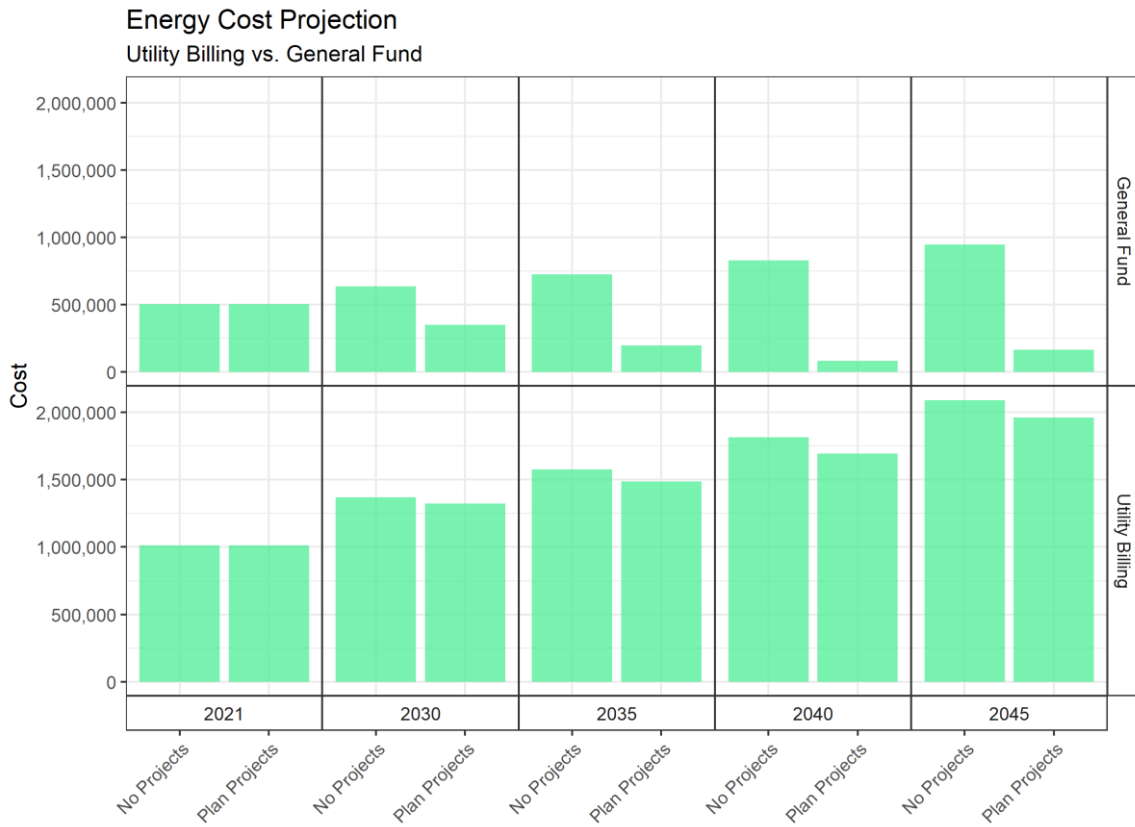


Projected emissions comparing plan project impact for selected milestone years using LGOP protocol. See Methodology section.

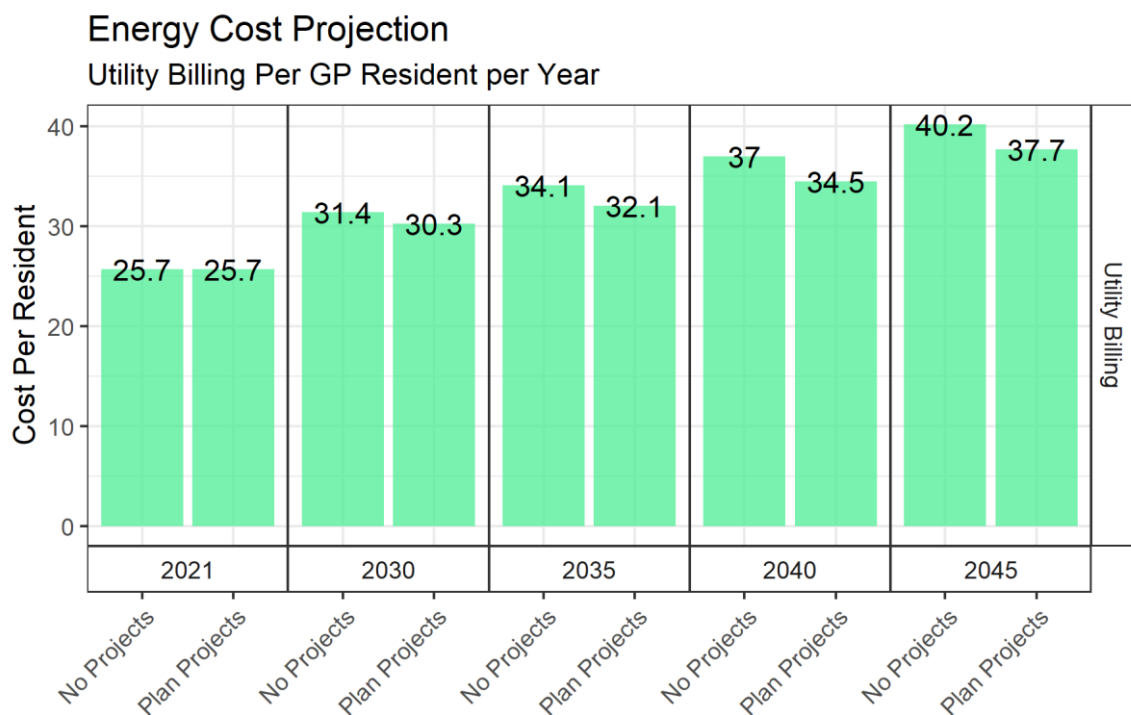


Projected energy costs showing the impact of Plan projects for each milestone period. Energy source is shown as color within each bar.

MODELING SCENARIOS: PLAN PROJECT SAVINGS IMPACT BREAKDOWN



Energy cost comparison showing the impact of Plan projects for each milestone period. General fund and utility billed operations (water restoration and water treatment) are separated.



Projected energy costs for utility billed operations for each milestone year represented as the cost per Grants Pass resident.

APPENDIX II: FULL MUNICIPAL ENERGY USAGE REPORT: BASIC PLAN PROJECTS PROJECTIONS

GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN

GHG Emissions Modeling by Source 2021-2045

SOURCE	2021		2030		2035		2040		2045	
	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects
Diesel	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	90.0
Electricity	2,903.4	2,903.4	618.8	405.7	464.1	192.8	309.4	134.6	-	-
Gasoline	925.3	925.3	969.4	882.9	996.5	805.4	1,025.2	401.9	1,055.5	322.4
Natural Gas	521.2	521.2	521.2	286.5	521.2	286.5	521.2	286.5	521.2	521.2
Sequestration	(1,026.7)	(1,026.7)	(1,026.7)	(1,047.2)	(1,026.7)	(1,057.5)	(1,026.7)	(1,067.8)	(1,026.7)	(1,078.0)
Solid Waste	469.0	469.0	520.1	494.1	551.5	512.9	584.8	526.4	620.0	527.0
WW Process	61.6	61.6	68.3	68.3	72.5	72.5	76.8	76.8	81.5	81.5
Grand Total	4,006.5	4,006.5	1,823.9	1,243.1	1,731.8	965.3	1,643.5	511.1	1,404.2	(57.1)
Reduction				69%		76%		87%		101%
Goal				65%		75%		90%		100%

Estimated greenhouse gas emissions comparing the impact of Plan projects against no projects (no action) for each source of emissions during each milestone period.

GHG Emissions Modeling by Operation 2021-2045

OPERATION	2021		2030		2035		2040		2045	
	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects
City Hall	179.6	179.6	73.6	73.4	67.3	66.9	60.9	60.4	48.0	5.0
Employee Commute	404.2	404.2	448.3	439.3	475.4	427.9	504.1	352.9	534.4	320.6
Fire	130.8	130.8	69.5	69.1	66.1	65.5	62.7	61.8	55.5	8.2
Merlin Landfill	6.0	6.0	1.2	1.2	0.9	0.9	0.6	0.6	-	-
Outdoor Lights	103.4	103.4	20.7	20.7	15.5	15.5	10.3	10.3	-	-
Parks	102.3	102.3	83.0	79.8	85.2	80.5	87.6	80.5	88.7	64.0
Police	99.3	99.3	46.9	46.7	43.8	43.5	40.7	40.3	34.4	4.0
Pool	78.3	78.3	60.7	60.7	59.7	59.6	58.7	58.5	56.5	1.2
Sewer Infrastructure	1.4	1.4	0.3	0.3	0.3	0.3	0.2	0.2	0.1	-
Solar Foothill				(200.0)		(150.0)		(100.0)		-
Solar Merlin						(97.5)		(65.0)		-
Solar PD				(15.9)		(11.9)		(8.0)		-
Solar Pump Station						(15.8)		(10.5)		-
Urban Forest	(1,026.7)	(1,026.7)	(1,026.7)	(1,047.2)	(1,026.7)	(1,057.5)	(1,026.7)	(1,067.8)	(1,026.7)	(1,078.0)
Vehicles	673.8	673.8	673.8	599.1	673.8	534.2	673.8	210.3	673.8	91.8
Water Infrastructure	427.2	427.2	86.0	86.0	64.7	64.7	43.4	43.4	0.8	-
Water Restoration	1,779.8	1,779.8	985.1	729.8	961.6	696.2	939.7	658.6	867.0	499.8
Water Treatment	969.8	969.8	246.1	245.5	189.5	188.7	132.9	131.7	19.2	10.7
Welcome Center	9.7	9.7	3.4	3.3	3.1	3.0	2.8	2.6	2.1	1.8
Yard	67.6	67.6	52.0	51.3	51.8	50.8	51.6	50.1	50.4	13.7
Grand Total	4,006.5	4,006.5	1,823.9	1,243.1	1,731.8	965.3	1,643.5	511.1	1,404.2	(57.1)

Estimated greenhouse gas emissions comparing the impact of Plan projects against no projects (no action) for each city operation during each milestone period.

APPENDIX II: FULL MUNICIPAL ENERGY USAGE REPORT: BASIC PLAN PROJECTS PROJECTIONS

GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN

Energy Costs Modeling by Source 2021-2045

SOURCE	2021		2030		2035		2040		2045	
	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects
Diesel	\$ 39,516	\$ 39,516	\$ 49,350	\$ 49,350	\$ 55,835	\$ 55,835	\$ 63,172	\$ 63,172	\$ 71,473	\$ 42,049
Electricity	\$ 888,619	\$ 888,619	\$ 1,179,763	\$ 928,485	\$ 1,334,793	\$ 852,549	\$ 1,510,196	\$ 994,595	\$ 1,708,648	\$ 1,391,054
Gasoline	\$ 173,265	\$ 173,265	\$ 216,385	\$ 184,264	\$ 244,819	\$ 177,496	\$ 276,991	\$ 26,453	\$ 313,389	\$ 1,329
Natural Gas	\$ 72,769	\$ 72,769	\$ 90,879	\$ 64,081	\$ 102,821	\$ 72,502	\$ 116,332	\$ 82,029	\$ 131,620	
Sequestration	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Solid Waste	\$ 339,803	\$ 339,803	\$ 470,623	\$ 447,092	\$ 564,636	\$ 525,112	\$ 677,403	\$ 609,663	\$ 812,515	\$ 690,638
WW Process	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Grand Total	\$ 1,513,972	\$ 1,513,973	\$ 2,006,999	\$ 1,673,273	\$ 2,302,904	\$ 1,683,493	\$ 2,644,094	\$ 1,775,911	\$ 3,037,645	\$ 2,125,070
Annual Savings				\$ 333,726		\$ 619,412		\$ 868,183		\$ 912,576

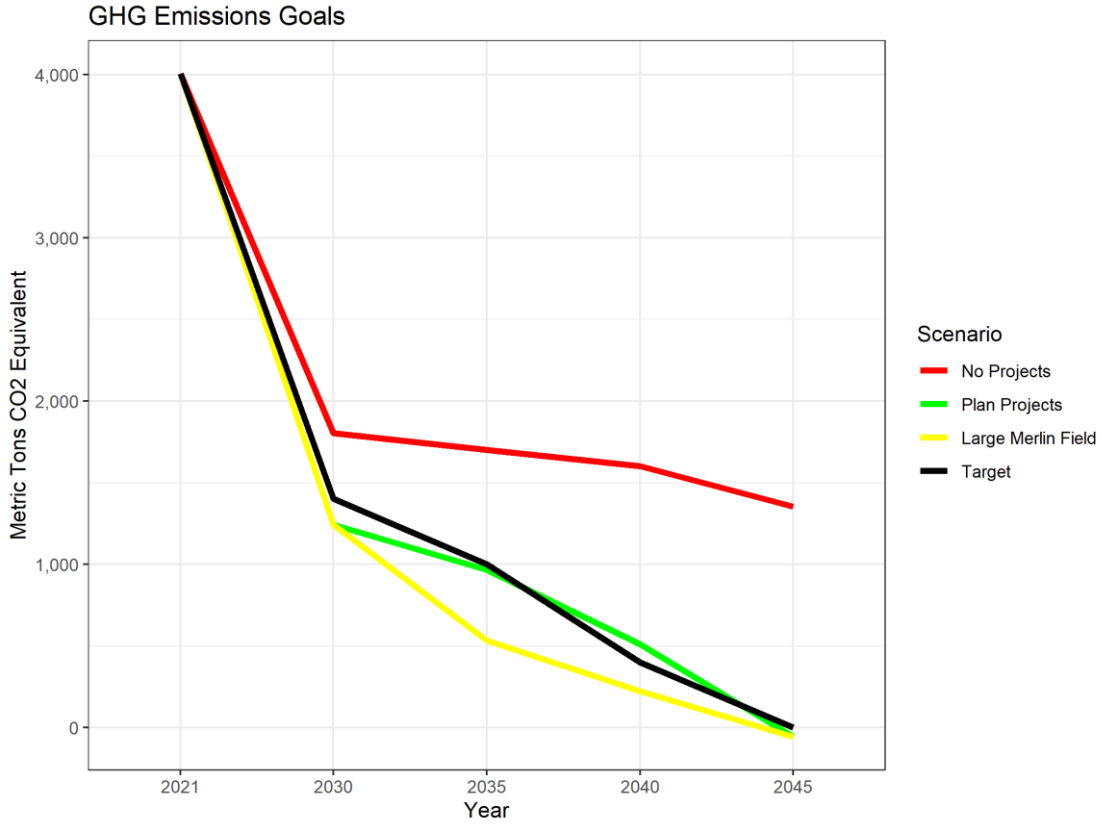
Estimated energy costs comparing the impact of Plan projects against no projects (no action) for each source of emissions during each milestone period.

Energy Costs Modeling by Operation 2021-2045

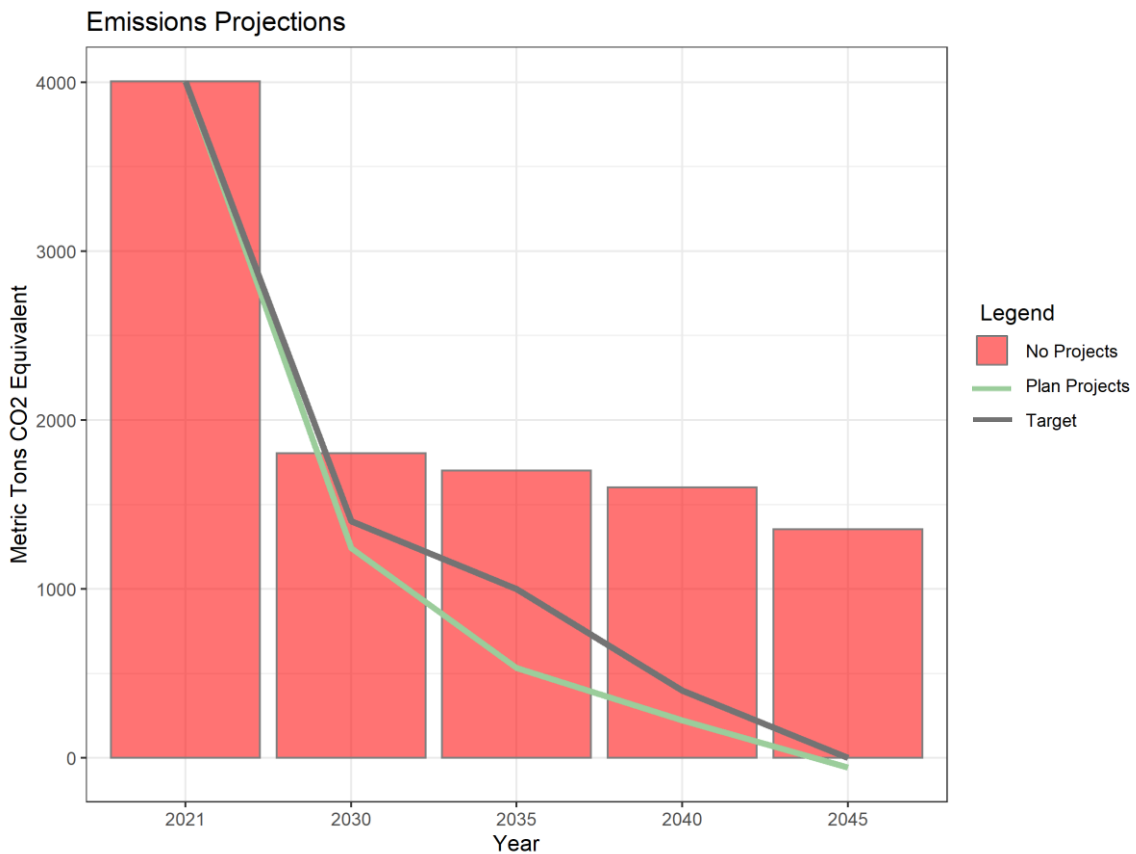
OPERATION	2021		2030		2035		2040		2045	
	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects	No Projects	Plan Projects
City Hall	\$ 50,588	\$ 50,588	\$ 63,618	\$ 63,394	\$ 72,284	\$ 71,908	\$ 82,150	\$ 81,505	\$ 93,384	\$ 115,280
Employee Commute	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Fire	\$ 40,314	\$ 40,314	\$ 51,069	\$ 50,702	\$ 58,283	\$ 57,665	\$ 66,544	\$ 65,486	\$ 76,009	\$ 99,073
Merlin Landfill	\$ 3,041	\$ 3,041	\$ 3,798	\$ 3,798	\$ 4,298	\$ 4,298	\$ 4,862	\$ 4,862	\$ 5,501	\$ 5,501
Outdoor Lights	\$ 60,053	\$ 60,053	\$ 74,998	\$ 74,998	\$ 84,854	\$ 84,854	\$ 96,004	\$ 96,004	\$ 108,620	\$ 108,620
Parks	\$ 59,950	\$ 59,950	\$ 80,487	\$ 77,629	\$ 94,970	\$ 90,170	\$ 112,133	\$ 103,907	\$ 132,467	\$ 124,173
Police	\$ 28,704	\$ 28,704	\$ 36,195	\$ 36,018	\$ 41,193	\$ 40,896	\$ 46,896	\$ 46,387	\$ 53,405	\$ 68,636
Pool	\$ 18,814	\$ 18,814	\$ 23,604	\$ 23,550	\$ 26,781	\$ 26,689	\$ 30,391	\$ 30,233	\$ 34,492	\$ 64,583
Sewer Infrastructure	\$ 1,013	\$ 1,013	\$ 1,265	\$ 1,265	\$ 1,432	\$ 1,432	\$ 1,620	\$ 1,620	\$ 1,833	\$ 1,497
Solar Foothill				\$ (237,929)		\$ (269,194)		\$ (304,569)		\$ (344,592)
Solar Merlin						\$ (174,945)		\$ (197,934)		\$ (223,945)
Solar PD				\$ (18,937)		\$ (21,425)		\$ (24,241)		\$ (27,426)
Solar Pump Station						\$ (28,334)		\$ (32,057)		\$ (36,270)
Urban Forest	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Vehicles	\$ 212,781	\$ 212,781	\$ 265,734	\$ 239,202	\$ 300,654	\$ 244,985	\$ 340,162	\$ 132,824	\$ 384,862	\$ 100,857
Water Infrastructure	\$ 163,327	\$ 163,327	\$ 203,973	\$ 203,973	\$ 230,777	\$ 230,777	\$ 261,103	\$ 261,103	\$ 295,414	\$ 294,332
Water Restoration	\$ 557,981	\$ 557,981	\$ 733,562	\$ 688,084	\$ 855,495	\$ 793,800	\$ 998,533	\$ 910,454	\$ 1,166,341	\$ 1,073,735
Water Treatment	\$ 288,569	\$ 288,569	\$ 431,321	\$ 430,844	\$ 488,653	\$ 487,851	\$ 553,649	\$ 552,274	\$ 627,339	\$ 628,241
Welcome Center	\$ 4,719	\$ 4,719	\$ 6,051	\$ 5,970	\$ 6,955	\$ 6,821	\$ 8,001	\$ 7,770	\$ 9,209	\$ 8,794
Yard	\$ 24,117	\$ 24,117	\$ 31,322	\$ 30,710	\$ 36,275	\$ 35,247	\$ 42,045	\$ 40,283	\$ 48,770	\$ 63,980
Grand Total	\$ 1,513,972	\$ 1,513,973	\$ 2,006,999	\$ 1,673,273	\$ 2,302,904	\$ 1,683,493	\$ 2,644,094	\$ 1,775,911	\$ 3,037,645	\$ 2,125,070

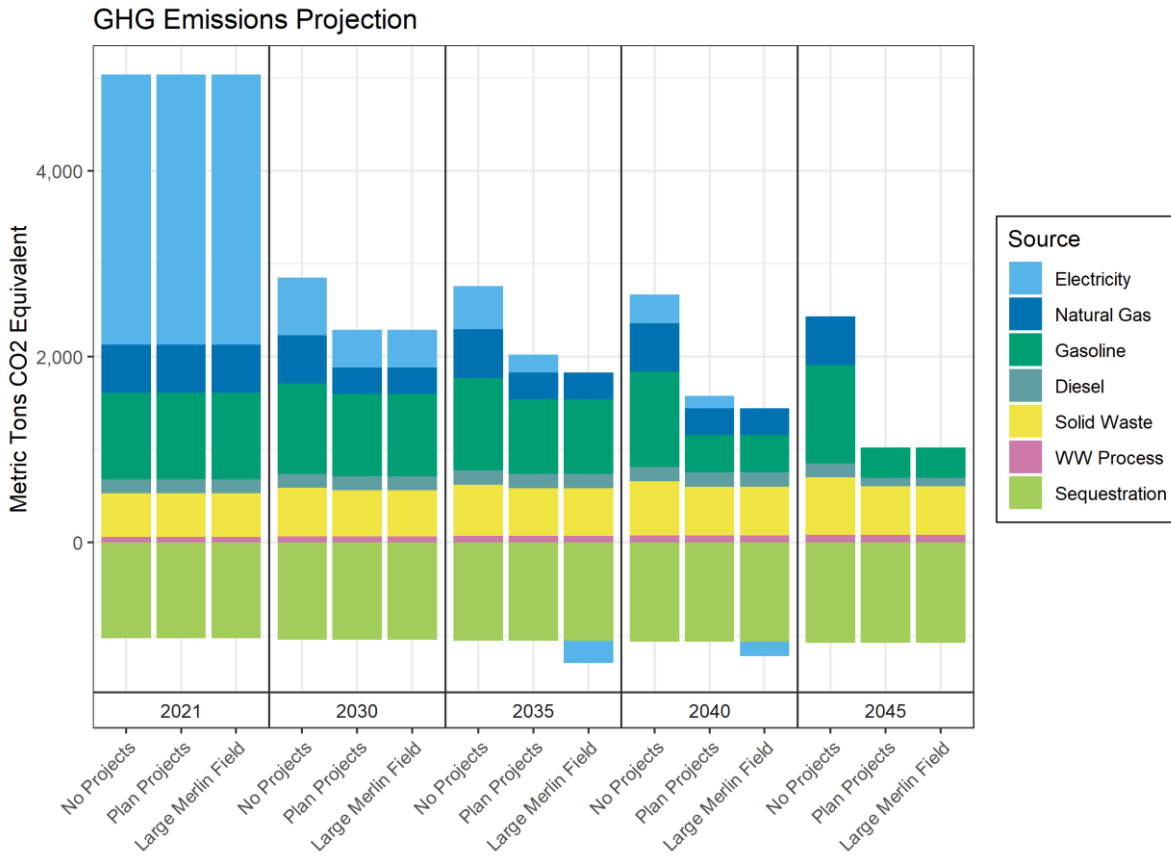
Estimated energy costs comparing the impact of Plan projects against no projects (no action) for each city operation during each milestone period.

PROJECTIONS WITH LARGER MERLIN FIELD

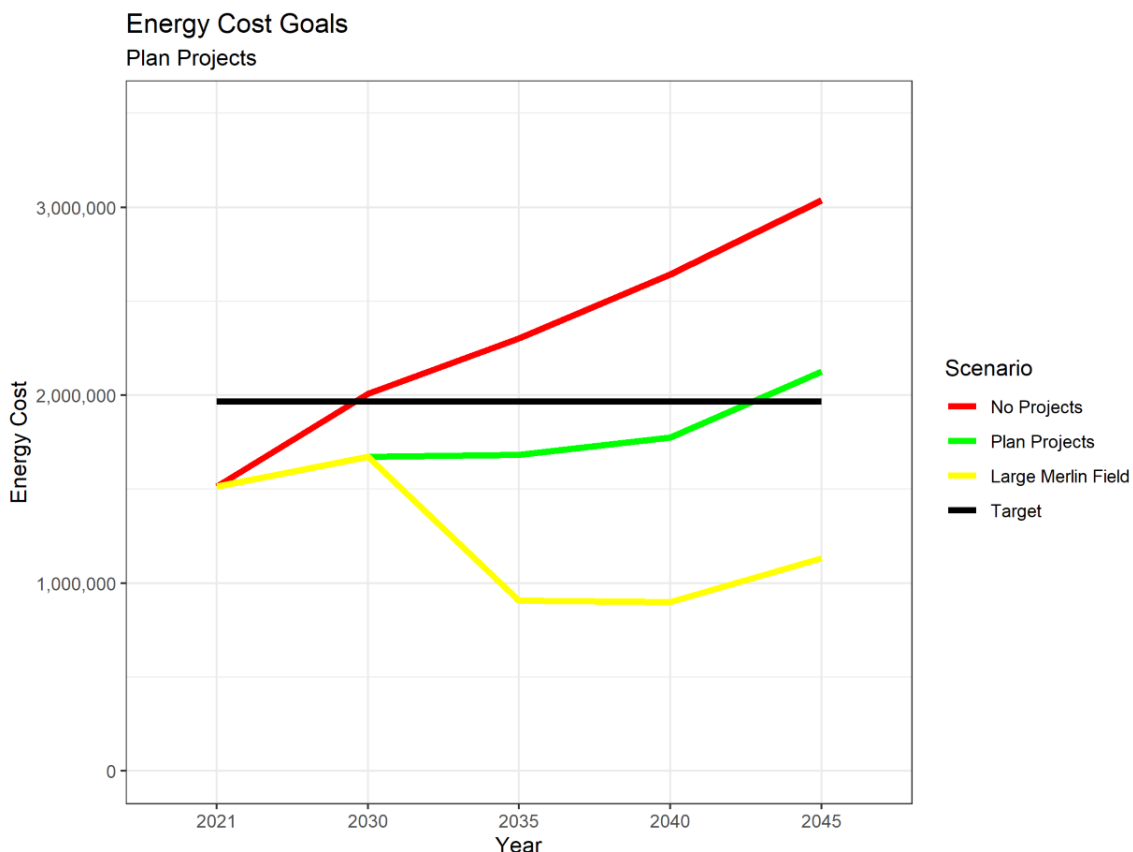


Comparison of greenhouse gas emissions between no projects (no action), target emissions based on goals, the impact of projects within the Plan, and following the implementation of the largest possible Merlin landfill solar field.



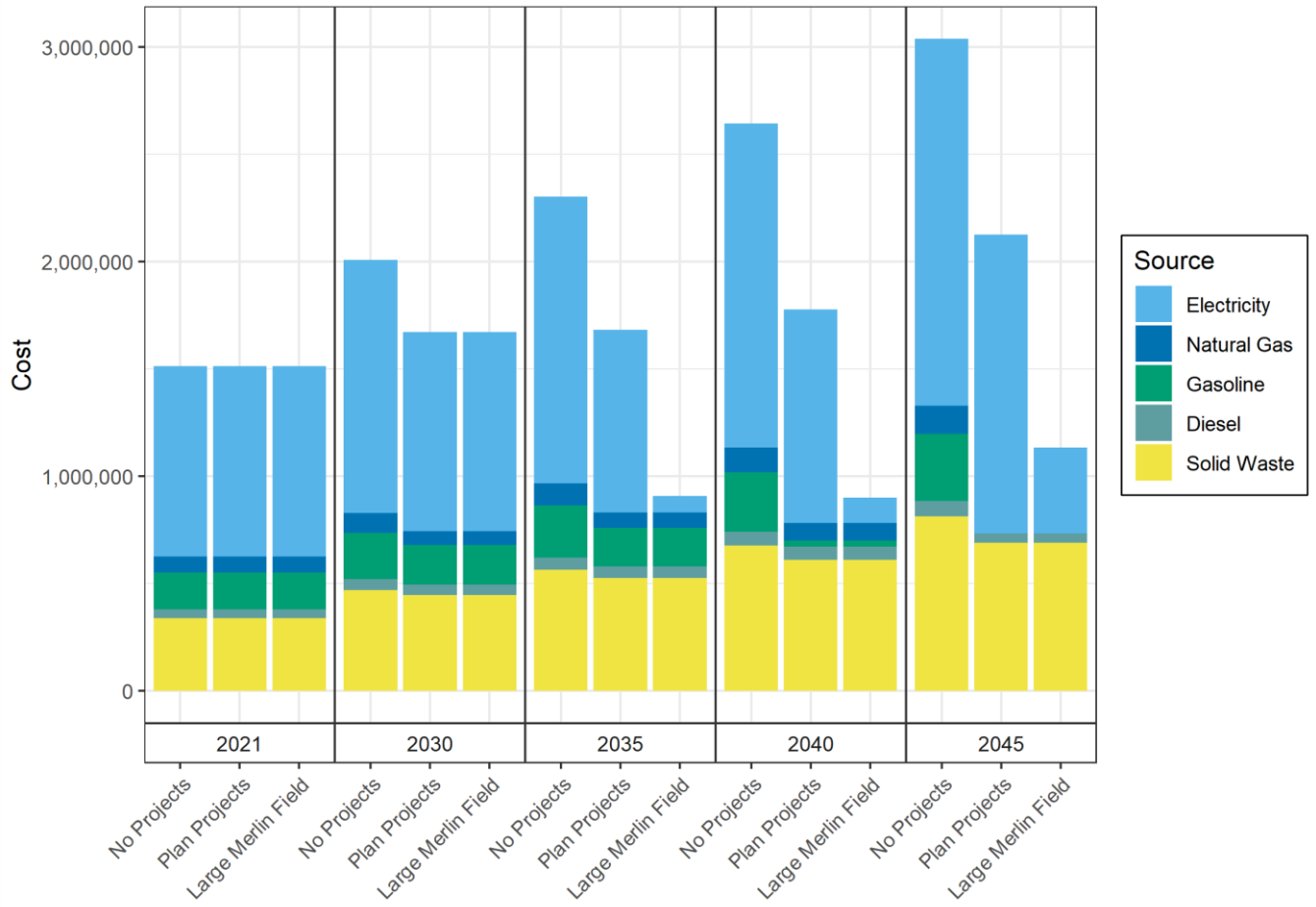


Comparison of net greenhouse gas emissions showing the impact of Plan projects and the largest possible Merlin solar field for each milestone period. The source of emissions is shown as color within each bar. For 2035 and 2040 the largest Merlin solar field more than offsets emissions from power obtained from the Pacific Power grid. In 2045 the Pacific Power grid is expected to have no emissions.



Comparison of energy costs between no projects (no action), target emissions based on goals, the impact of projects within the Plan, and following the implementation of the largest possible Merlin landfill solar field.

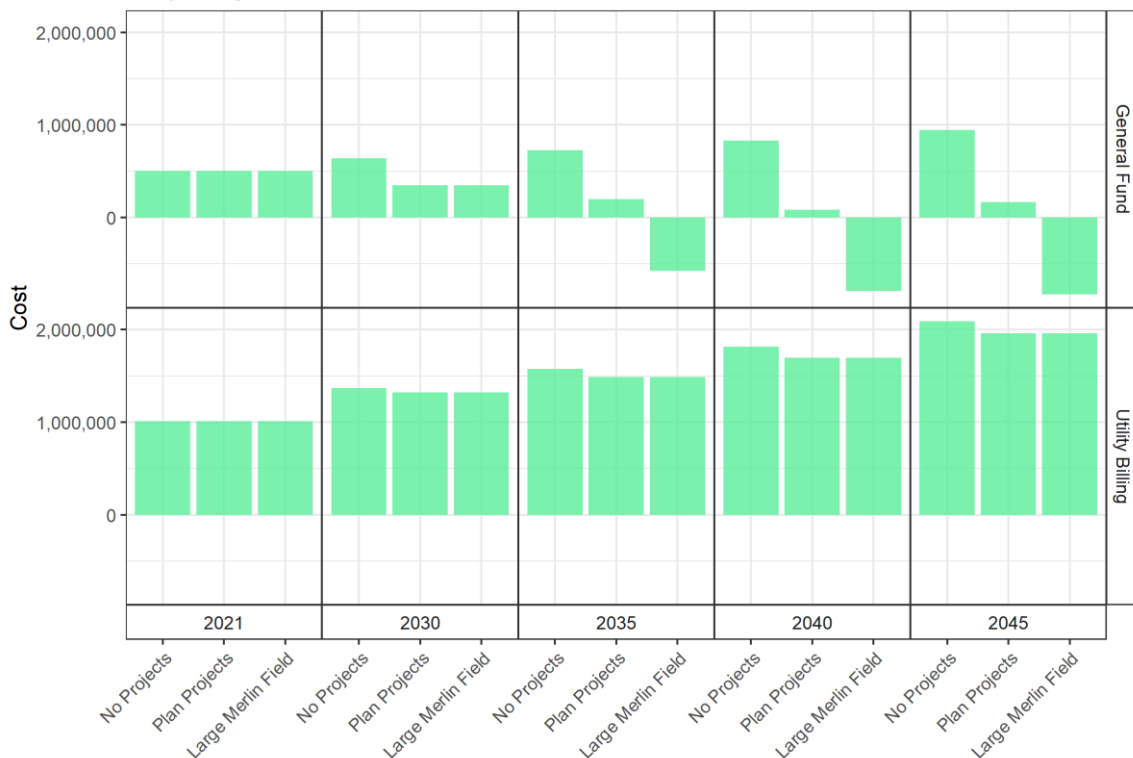
Energy Cost Projection



Estimated energy cost comparison showing the impact of Plan projects and the largest possible Merlin solar field for each milestone year. Energy source is shown as color on each bar.

Energy Cost Projection

Utility Billing vs. General Fund



Estimated energy cost separating general fund and utility billed operations showing the impact of Plan projects and the largest possible Merlin solar field.

APPENDIX II: FULL MUNICIPAL ENERGY USAGE REPORT: LARGER MERLIN FIELD PROJECTIONS

GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN

GHG Emissions Modeling Larger Merlin Field Impact by Source 2021-2045

Row Labels	2021			2030			2035			2040			2045		
	No Projects	Plan Projects	Large Merlin Field	No Projects	Plan Projects	Large Merlin Field	No Projects	Plan Projects	Large Merlin Field	No Projects	Plan Projects	Large Merlin Field	No Projects	Plan Projects	Large Merlin Field
Diesel	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	90.0	90.0
Electricity	2,903.4	2,903.4	2,903.4	618.8	405.7	405.7	464.1	192.8	(239.1)	309.4	134.6	(153.4)	-	-	-
Gasoline	925.3	925.3	925.3	969.4	882.9	882.9	996.5	805.4	805.4	1,025.2	401.9	401.9	1,055.5	322.4	322.4
Natural Gas	521.2	521.2	521.2	521.2	286.5	286.5	521.2	286.5	286.5	521.2	286.5	286.5	521.2		
Sequestration	(1,026.7)	(1,026.7)	(1,026.7)	(1,047.2)	(1,047.2)	(1,047.2)	(1,057.5)	(1,057.5)	(1,057.5)	(1,067.8)	(1,067.8)	(1,067.8)	(1,078.0)	(1,078.0)	(1,078.0)
Solid Waste	469.0	469.0	469.0	520.1	494.1	494.1	551.5	512.9	512.9	584.8	526.4	526.4	620.0	527.0	527.0
WW Process	61.6	61.6	61.6	68.3	68.3	68.3	72.5	72.5	72.5	76.8	76.8	76.8	81.5	81.5	81.5
Grand Total	4,006.5	4,006.5	4,006.5	1,803.3	1,243.1	1,243.1	1,701.0	965.3	533.4	1,602.4	511.1	223.1	1,352.8	(57.1)	(57.1)
Reduction				69%		76%		87%		101%					
Goal				65%		75%		90%		100%					

GHG Emissions Modeling Larger Merlin Field Impact by Operation 2021-2045

OPERATION	2021			2030			2035			2040			2045		
	No Projects	Plan Projects	Large Merlin Field	No Projects	Plan Projects	Large Merlin Field	No Projects	Plan Projects	Large Merlin Field	No Projects	Plan Projects	Large Merlin Field	No Projects	Plan Projects	Large Merlin Field
City Hall	179.6	179.6	179.6	73.6	73.4	73.4	67.3	66.9	66.9	60.9	60.4	60.4	48.0	5.0	5.0
Employee Commute	404.2	404.2	404.2	448.3	439.3	439.3	475.4	427.9	427.9	504.1	352.9	352.9	534.4	320.6	320.6
Fire	130.8	130.8	130.8	69.5	69.1	69.1	66.1	65.5	65.5	62.7	61.8	61.8	55.5	8.2	8.2
Merlin Landfill	6.0	6.0	6.0	1.2	1.2	1.2	0.9	0.9	0.9	0.6	0.6	0.6			
Outdoor Lights	103.4	103.4	103.4	20.7	20.7	20.7	15.5	15.5	15.5	10.3	10.3	10.3			
Parks	102.3	102.3	102.3	83.0	79.8	79.8	85.2	80.5	80.5	87.6	80.5	80.5	88.7	64.0	64.0
Police	99.3	99.3	99.3	46.9	46.7	46.7	43.8	43.5	43.5	40.7	40.3	40.3	34.4	4.0	4.0
Pool	78.3	78.3	78.3	60.7	60.7	60.7	59.7	59.6	59.6	58.7	58.5	58.5	56.5	1.2	1.2
Sewer Infrastructure	1.4	1.4	1.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	-	-
Solar Foothill					(200.0)	(200.0)		(150.0)	(150.0)		(100.0)	(100.0)			
Solar Merlin								(97.5)	(529.4)		(65.0)	(352.9)			
Solar PD					(15.9)	(15.9)		(11.9)	(11.9)		(8.0)	(8.0)			
Solar Pump Station								(15.8)	(15.8)		(10.5)	(10.5)			
Urban Forest	(1,026.7)	(1,026.7)	(1,026.7)	(1,047.2)	(1,047.2)	(1,047.2)	(1,057.5)	(1,057.5)	(1,057.5)	(1,067.8)	(1,067.8)	(1,067.8)	(1,078.0)	(1,078.0)	(1,078.0)
Vehicles	673.8	673.8	673.8	673.8	599.1	599.1	673.8	534.2	534.2	673.8	210.3	210.3	673.8	91.8	91.8
Water Infrastructure	427.2	427.2	427.2	86.0	86.0	86.0	64.7	64.7	64.7	43.4	43.4	43.4	0.8	-	-
Water Restoration	1,779.8	1,779.8	1,779.8	985.1	729.8	729.8	961.6	696.2	696.2	939.7	658.6	658.6	867.0	499.8	499.8
Water Treatment	969.8	969.8	969.8	246.1	245.5	245.5	189.5	188.7	188.7	132.9	131.7	131.7	19.2	10.7	10.7
Welcome Center	9.7	9.7	9.7	3.4	3.3	3.3	3.1	3.0	3.0	2.8	2.6	2.6	2.1	1.8	1.8
Yard	67.6	67.6	67.6	52.0	51.3	51.3	51.8	50.8	50.8	51.6	50.1	50.1	50.4	13.7	13.7
Grand Total	4,006.5	4,006.5	4,006.5	1,803.3	1,243.1	1,243.1	1,701.0	965.3	533.4	1,602.4	511.1	223.1	1,352.8	(57.1)	(57.1)

APPENDIX II: FULL MUNICIPAL ENERGY USAGE REPORT: LARGER MERLIN FIELD PROJECTIONS
GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN

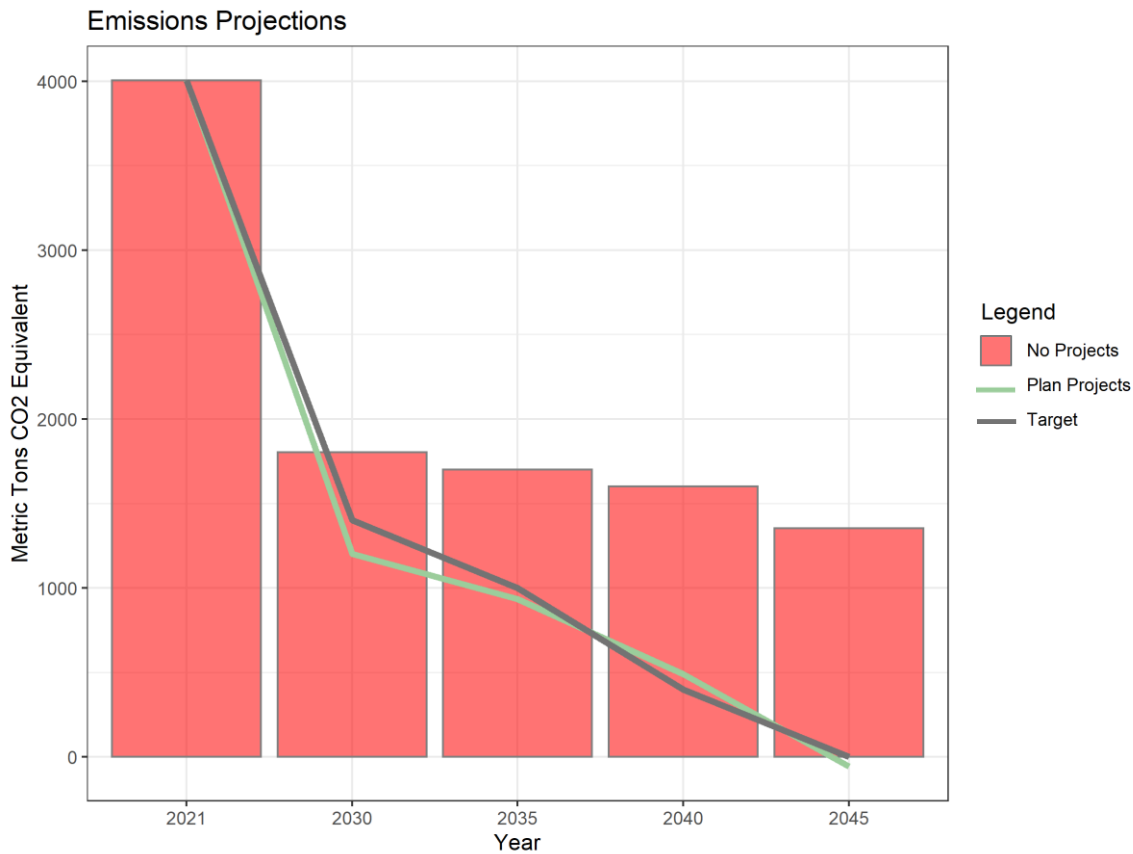
Energy Cost Modeling Larger Merlin Field Impact by Source 2021-2045

SOURCE	2021		2030		2035		2040		2045	
	No Projects	Large Merlin Field	No Projects	Large Merlin Field	No Projects	Large Merlin Field	No Projects	Large Merlin Field	No Projects	Large Merlin Field
Diesel	\$ 39,516	\$ 39,516	\$ 49,350	\$ 49,350	\$ 55,835	\$ 55,835	\$ 63,172	\$ 63,172	\$ 71,473	\$ 42,049
Electricity	\$ 888,619	\$ 888,619	\$ 1,179,763	\$ 928,485	\$ 1,334,793	\$ 77,595	\$ 1,510,196	\$ 117,806	\$ 1,708,648	\$ 399,047
Gasoline	\$ 173,265	\$ 173,265	\$ 216,385	\$ 184,264	\$ 244,819	\$ 177,496	\$ 276,991	\$26,453	\$ 313,389	\$ 1,329
Natural Gas	\$ 72,769	\$ 72,769	\$ 90,879	\$64,081	\$102,821	\$ 72,502	\$ 116,332	\$ 82,029	\$ 131,620	
Solid Waste	\$ 339,803	\$ 339,803	\$ 470,623	\$ 447,092	\$564,636	\$ 525,112	\$ 677,403	\$ 609,663	\$ 812,515	\$ 690,638
Grand Total	\$ 1,513,972	\$ 1,513,973	\$ 2,006,999	\$ 1,673,273	\$ 2,302,904	\$ 908,539	\$ 2,644,094	\$ 899,122	\$ 3,037,645	\$1,133,063

Energy Cost Modeling Larger Merlin Field Impact by Operation 2021-2045

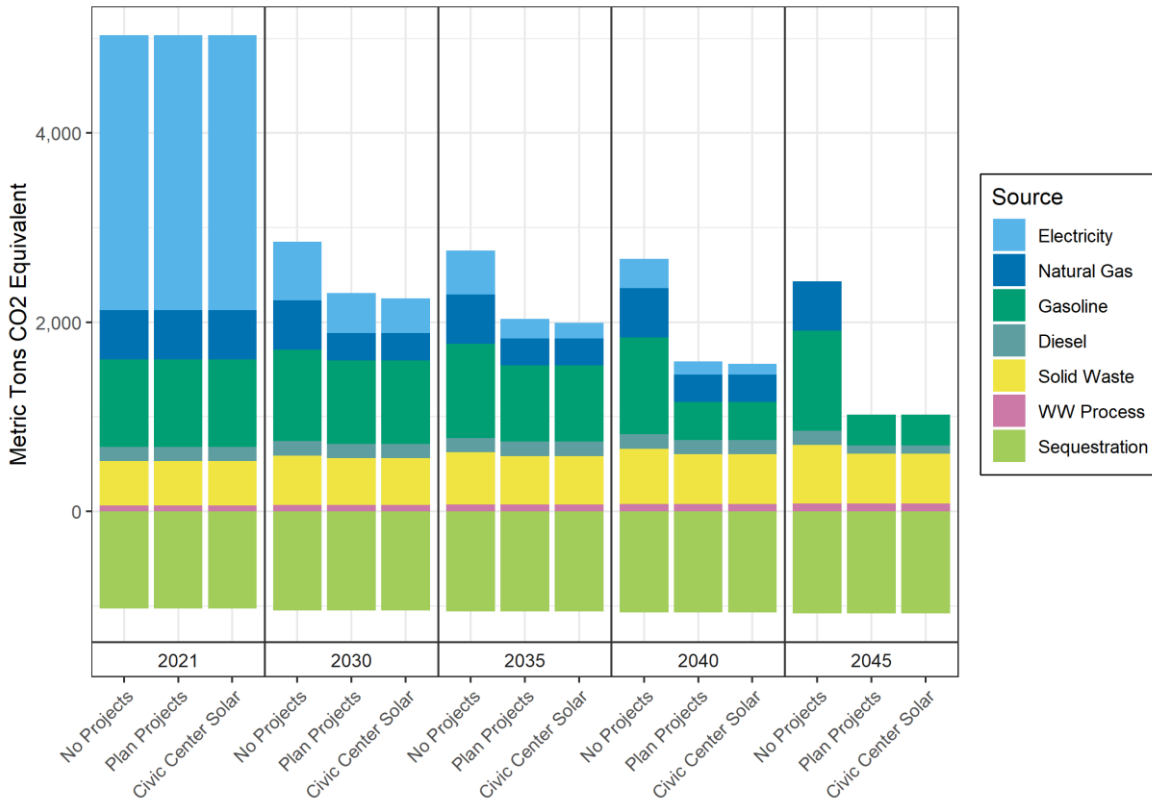
OPERATION	2021		2030		2035		2040		2045	
	No Projects	Large Merlin Field	No Projects	Large Merlin Field	No Projects	Large Merlin Field	No Projects	Large Merlin Field	No Projects	Large Merlin Field
City Hall	\$ 50,588	\$50,588	\$ 63,618	\$ 63,394	\$ 72,284	\$ 71,908	\$ 82,150	\$ 81,505	\$ 93,384	\$115,280
Fire	\$ 40,314	\$40,314	\$ 51,069	\$ 50,702	\$ 58,283	\$ 57,665	\$ 66,544	\$ 65,486	\$ 76,009	\$ 99,073
Merlin Landfill	\$ 3,041	\$ 3,041	\$ 3,798	\$ 3,798	\$ 4,298	\$ 4,298	\$ 4,862	\$ 4,862	\$ 5,501	\$ 5,501
Outdoor Lights	\$ 60,053	\$ 60,053	\$ 74,998	\$ 74,998	\$ 84,854	\$ 84,854	\$ 96,004	\$ 96,004	\$ 108,620	\$ 108,620
Parks	\$ 59,950	\$ 59,950	\$ 80,487	\$ 77,629	\$ 94,970	\$ 90,170	\$ 112,133	\$ 103,907	\$ 132,467	\$ 124,173
Police	\$ 28,704	\$ 28,704	\$ 36,195	\$ 36,018	\$ 41,193	\$ 40,896	\$ 46,896	\$ 46,387	\$ 53,405	\$ 68,636
Pool	\$18,814	\$ 18,814	\$ 23,604	\$ 23,550	\$ 26,781	\$ 26,689	\$ 30,391	\$ 30,233	\$ 34,492	\$ 64,583
Sewer Infrastructure	\$1,013	\$ 1,013	\$ 1,265	\$ 1,265	\$ 1,432	\$ 1,432	\$1,620	\$1,620	\$1,833	\$1,497
Solar Foothill				\$ (237,929)		\$ (269,194)		\$ (304,569)		\$ (344,592)
Solar Merlin						\$ (949,899)		\$ (1,074,724)		\$ (1,215,951)
Solar PD				\$ (18,937)		\$ (21,425)		\$ (24,241)		\$ (27,426)
Solar Pump Station						\$ (28,334)		\$ (32,057)		\$ (36,270)
Vehicles	\$ 212,781	\$ 212,781	\$ 265,734	\$ 239,202	\$ 300,654	\$ 244,985	\$ 340,162	\$132,824	\$ 384,862	\$ 100,857
Water Infrastructure	\$ 163,327	\$ 163,327	\$ 203,973	\$ 203,973	\$ 230,777	\$ 230,777	\$ 261,103	\$ 261,103	\$ 295,414	\$ 294,332
Water Restoration	\$557,981	\$ 557,981	\$ 733,562	\$ 688,084	\$ 855,495	\$ 793,800	\$998,533	\$ 910,454	\$1,166,341	\$ 1,073,735
Water Treatment	\$ 288,569	\$ 288,569	\$ 431,321	\$ 430,844	\$ 488,653	\$ 487,851	\$ 553,649	\$ 552,274	\$ 627,339	\$ 628,241
Welcome Center	\$4,719	\$4,719	\$ 6,051	\$ 5,970	\$6,955	\$6,821	\$ 8,001	\$ 7,770	\$9,209	\$ 8,794
Yard	\$ 24,117	\$ 24,117	\$ 31,322	\$ 30,710	\$ 36,275	\$35,247	\$42,045	\$ 40,283	\$48,770	\$63,980
Grand Total	\$1,513,972	\$ 1,513,973	\$2,006,999	\$ 1,673,273	\$ 2,302,904	\$ 908,539	\$ 2,644,094	\$ 899,122	\$ 3,037,645	\$ 1,133,063

PROJECTIONS WITH CIVIC CENTER MICROGRID



Estimated greenhouse gas emissions comparing the impact of the inclusion of a Civic Center solar field (Police Headquarters, City Hall parking lot, and south facing City Hall roof) against no projects (no action) and target emissions based on goals.

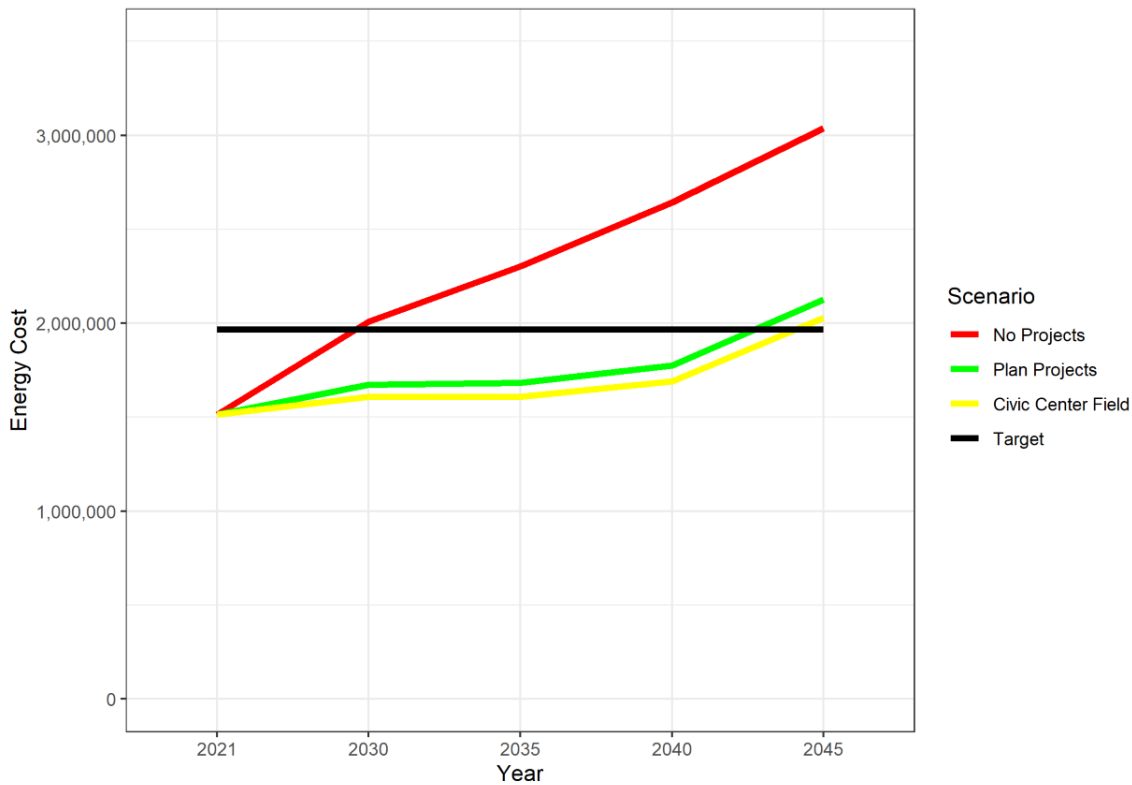
GHG Emissions Projection



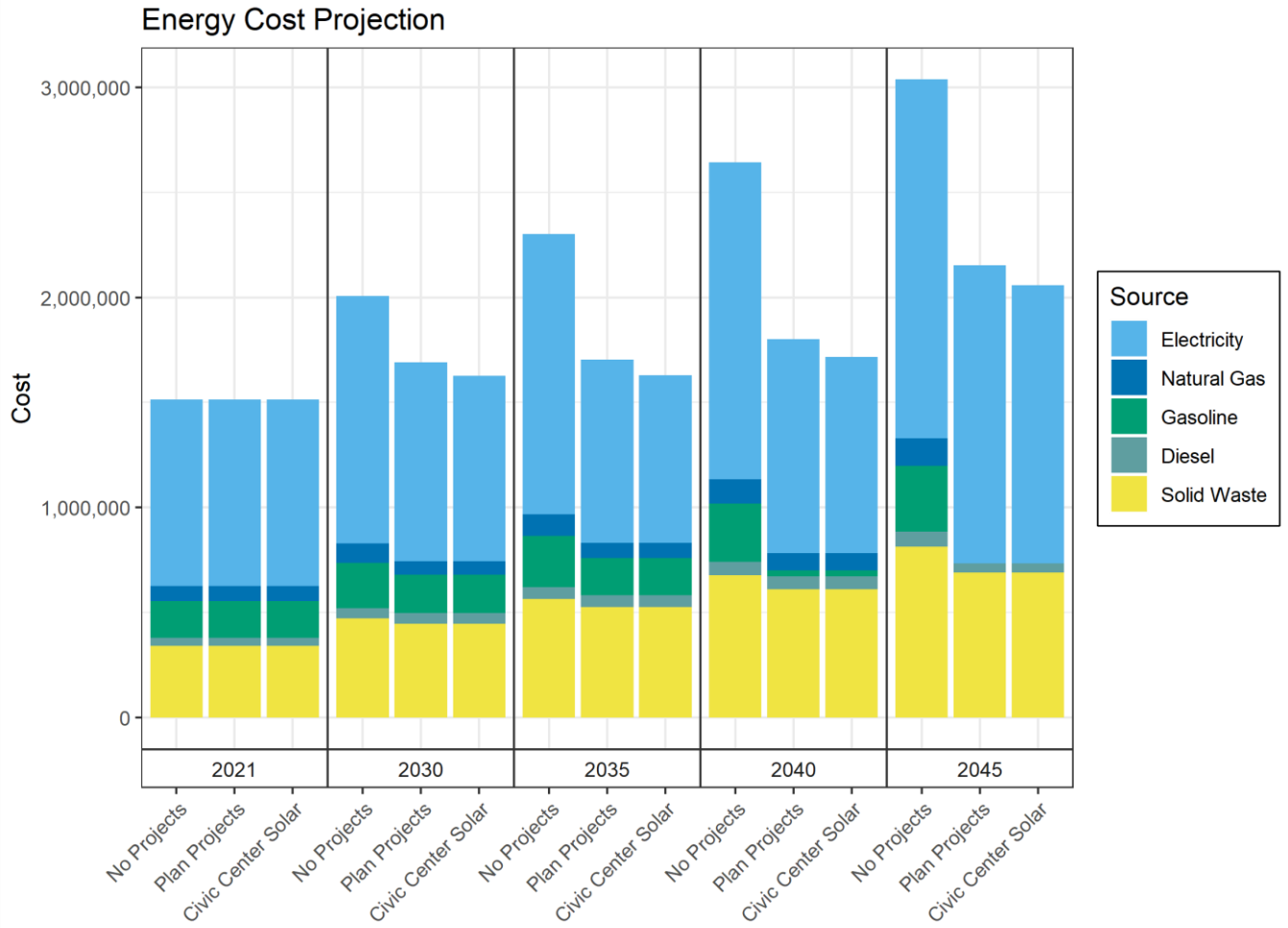
Comparison of net greenhouse gas emissions showing the impact of Plan projects and the Civic Center solar field for each milestone period. The source of emissions is shown as color within each bar.

Energy Cost Goals

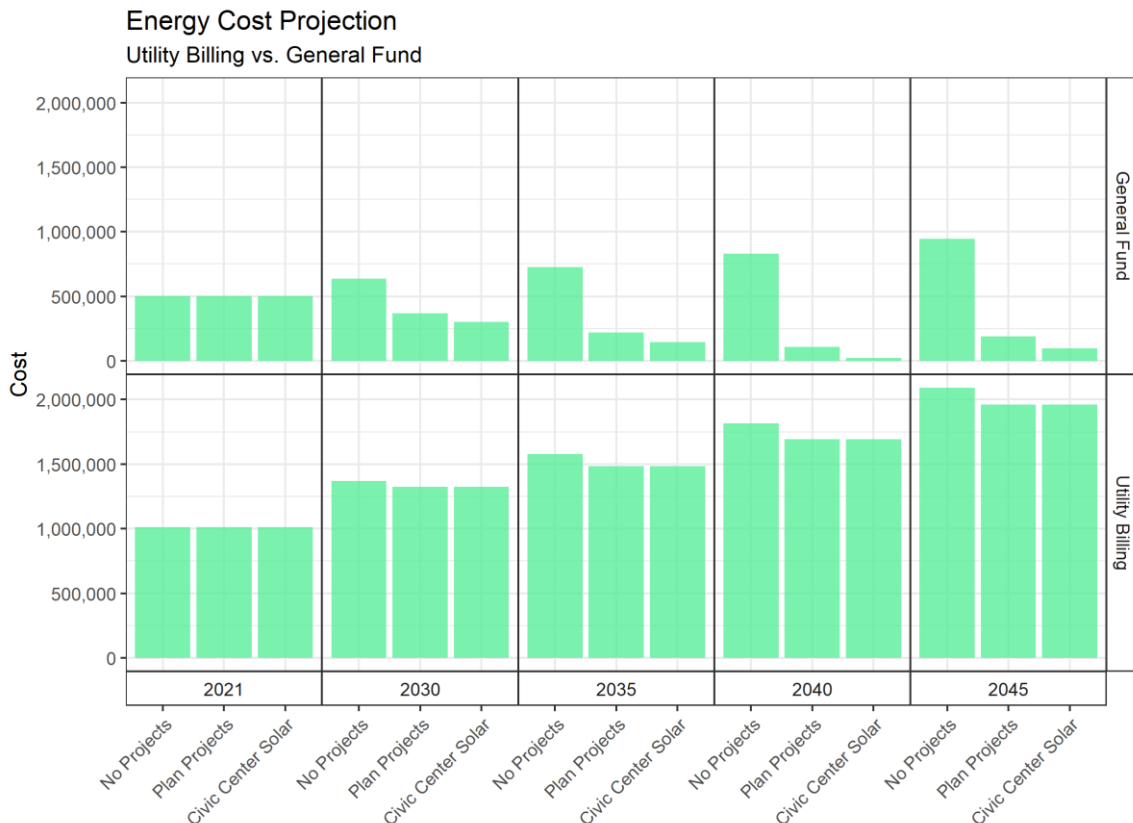
Plan Projects



Comparison of energy costs between no projects (no action), target emissions based on goals, the impact of projects within the Plan, and following the implementation of civic center microgrid.



Estimated energy cost comparison showing the impact of Plan projects and the Civic Center solar field for each milestone year. Energy source is shown as color on each bar.



Estimated energy cost separating general fund and utility billed operations showing the impact of Plan projects and the Civic Center solar field.

APPENDIX II: FULL MUNICIPAL ENERGY USAGE REPORT: CIVIC CENTER MICROGRID PROJECTIONS

GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN

GHG Emissions Modeling Civic Center Microgrid Impact by Source 2021-2045

SOURCE	2021			2030			2035			2040			2045		
	No Projects	Plan Projects	Civic Center Solar	No Projects	Plan Projects	Civic Center Solar	No Projects	Plan Projects	Civic Center Solar	No Projects	Plan Projects	Civic Center Solar	No Projects	Plan Projects	Civic Center Solar
Diesel	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	152.7	90.0	90.0
Electricity	2,903.4	2,903.4	2,903.4	618.8	421.7	366.4	464.1	204.8	163.4	309.4	142.5	114.9	-	-	-
Gasoline	925.3	925.3	925.3	969.4	882.9	882.9	996.5	805.4	805.4	1,025.2	401.9	401.9	1,055.5	322.4	322.4
Natural Gas	521.2	521.2	521.2	521.2	286.5	286.5	521.2	286.5	286.5	521.2	286.5	286.5	521.2		
Sequestration	(1,026.7)	(1,026.7)	(1,026.7)	(1,047.2)	(1,047.2)	(1,047.2)	(1,057.5)	(1,057.5)	(1,057.5)	(1,067.8)	(1,067.8)	(1,067.8)	(1,078.0)	(1,078.0)	(1,078.0)
Solid Waste	469.0	469.0	469.0	520.1	494.1	494.1	551.5	512.9	512.9	584.8	526.4	526.4	620.0	527.0	527.0
WW Process	61.6	61.6	61.6	68.3	68.3	68.3	72.5	72.5	72.5	76.8	76.8	76.8	81.5	81.5	81.5
Grand Total	4,006.5	4,006.5	4,006.5	1,803.3	1,259.0	1,203.8	1,701.0	977.3	935.9	1,602.4	519.0	491.4	1,352.8	(57.1)	(57.1)
Reduction Goal				69%		76%		87%		101%					
				65%		75%		90%		100%					

GHG Emissions Modeling Civic Center Microgrid Impact by Operation 2021-2045

OPERATION	2021			2030			2035			2040			2045		
	No Projects	Plan Projects	Civic Center Solar	No Projects	Plan Projects	Civic Center Solar	No Projects	Plan Projects	Civic Center Solar	No Projects	Plan Projects	Civic Center Solar	No Projects	Plan Projects	Civic Center Solar
City Hall	179.6	179.6	179.6	73.6	73.4	73.4	67.3	66.9	66.9	60.9	60.4	60.4	48.0	5.0	5.0
Employee Commute	404.2	404.2	404.2	448.3	439.3	439.3	475.4	427.9	427.9	504.1	352.9	352.9	534.4	320.6	320.6
Fire	130.8	130.8	130.8	69.5	69.1	69.1	66.1	65.5	65.5	62.7	61.8	61.8	55.5	8.2	8.2
Merlin Landfill	6.0	6.0	6.0	1.2	1.2	1.2	0.9	0.9	0.9	0.6	0.6	0.6	-	-	-
Outdoor Lights	103.4	103.4	103.4	20.7	20.7	20.7	15.5	15.5	15.5	10.3	10.3	10.3	-	-	-
Parks	102.3	102.3	102.3	83.0	79.8	79.8	85.2	80.5	80.5	87.6	80.5	80.5	88.7	64.0	64.0
Police	99.3	99.3	99.3	46.9	46.7	46.7	43.8	43.5	43.5	40.7	40.3	40.3	34.4	4.0	4.0
Pool	78.3	78.3	78.3	60.7	60.7	60.7	59.7	59.6	59.6	58.7	58.5	58.5	56.5	1.2	1.2
Sewer Infrastructure	1.4	1.4	1.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	-	-
Solar Civic Center						(55.2)			(41.4)			(27.6)			-
Solar Foothill					(200.0)	(200.0)		(150.0)	(150.0)		(100.0)	(100.0)		-	-
Solar Merlin								(97.5)	(97.5)		(65.0)	(65.0)		-	-
Solar Pump Station								(15.8)	(15.8)		(10.5)	(10.5)		-	-
Urban Forest	(1,026.7)	(1,026.7)	(1,026.7)	(1,047.2)	(1,047.2)	(1,047.2)	(1,057.5)	(1,057.5)	(1,057.5)	(1,067.8)	(1,067.8)	(1,067.8)	(1,078.0)	(1,078.0)	(1,078.0)
Vehicles	673.8	673.8	673.8	673.8	599.1	599.1	673.8	534.2	534.2	673.8	210.3	210.3	673.8	91.8	91.8
Water Infrastructure	427.2	427.2	427.2	86.0	86.0	86.0	64.7	64.7	64.7	43.4	43.4	43.4	0.8	-	-
Water Restoration	1,779.8	1,779.8	1,779.8	985.1	729.8	729.8	961.6	696.2	696.2	939.7	658.6	658.6	867.0	499.8	499.8
Water Treatment	969.8	969.8	969.8	246.1	245.5	245.5	189.5	188.7	188.7	132.9	131.7	131.7	19.2	10.7	10.7
Welcome Center	9.7	9.7	9.7	3.4	3.3	3.3	3.1	3.0	3.0	2.8	2.6	2.6	2.1	1.8	1.8
Yard	67.6	67.6	67.6	52.0	51.3	51.3	51.8	50.8	50.8	51.6	50.1	50.1	50.4	13.7	13.7
Grand Total	4,006.5	4,006.5	4,006.5	1,803.3	1,259.0	1,203.8	1,701.0	977.3	935.9	1,602.4	519.0	491.4	1,352.8	(57.1)	(57.1)

APPENDIX II: FULL MUNICIPAL ENERGY USAGE REPORT
GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN

Energy Cost Modeling Civic Center Microgrid Impact by Source 2021-2045

SOURCE	2021		2030		2035		2040		2045	
	No Projects	Civic Center Solar	No Projects	Civic Center Solar	No Projects	Civic Center Solar	No Projects	Civic Center Solar	No Projects	Civic Center Solar
Diesel	\$ 39,516	\$ 39,516	\$49,350	\$49,350	\$55,835	\$ 55,835	\$63,172	\$ 63,172	\$71,473	\$42,049
Electricity	\$ 888,619	\$ 888,619	\$ 1,179,763	\$881,747	\$ 1,334,793	\$799,669	\$1,510,196	\$934,766	\$1,708,648	\$1,323,363
Gasoline	\$173,265	\$173,265	\$216,385	\$184,264	\$244,819	\$177,496	\$276,991	\$ 26,453	\$313,389	\$1,329
Natural Gas	\$72,769	\$72,769	\$90,879	\$64,081	\$102,821	\$72,502	\$116,332	\$82,029	\$131,620	
Solid Waste	\$ 339,803	\$339,803	\$470,623	\$447,092	\$564,636	\$ 525,112	\$677,403	\$609,663	\$812,515	\$690,638
Grand Total	\$1,513,972	\$ 1,513,973	\$ 2,006,999	\$1,626,535	\$ 2,302,904	\$1,630,613	\$2,644,094	\$1,716,082	\$ 3,037,645	\$2,057,379

Energy Cost Modeling Civic Center Microgrid Impact by Operation 2021-2045

OPERATION	2021		2030		2035		2040		2045	
	No Projects	Civic Center Solar	No Projects	Civic Center Solar	No Projects	Civic Center Solar	No Projects	Civic Center Solar	No Projects	Civic Center Solar
City Hall	\$ 50,588	\$ 50,588	\$63,618	\$63,394	\$ 72,284	\$71,908	\$ 82,150	\$81,505	\$ 93,384	\$ 115,280
Fire	\$ 40,314	\$ 40,314	\$ 51,069	\$ 50,702	\$ 58,283	\$ 57,665	\$ 66,544	\$ 65,486	\$ 76,009	\$ 99,073
Merlin Landfill	\$ 3,041	\$ 3,041	\$ 3,798	\$ 3,798	\$ 4,298	\$ 4,298	\$ 4,862	\$4,862	\$ 5,501	\$ 5,501
Outdoor Lights	\$ 60,053	\$ 60,053	\$74,998	\$ 74,998	\$ 84,854	\$ 84,854	\$96,004	\$ 96,004	\$ 108,620	\$108,620
Parks	\$ 59,950	\$ 59,950	\$ 80,487	\$ 77,629	\$ 94,970	\$ 90,170	\$112,133	\$ 103,907	\$132,467	\$ 124,173
Police	\$ 28,704	\$ 28,704	\$36,195	\$ 36,018	\$41,193	\$ 40,896	\$46,896	\$ 46,387	\$ 53,405	\$ 68,636
Pool	\$ 18,814	\$18,814	\$ 23,604	\$ 23,550	\$ 26,781	\$ 26,689	\$ 30,391	\$ 30,233	\$ 34,492	\$ 64,583
Sewer Infrastructure	\$ 1,013	\$ 1,013	\$ 1,265	\$ 1,265	\$1,432	\$1,432	\$ 1,620	\$ 1,620	\$1,833	\$ 1,497
Solar Civic Center				\$(65,675)		\$(74,305)		\$(84,069)		\$(95,117)
Solar Foothill				\$(237,929)		\$(269,194)		\$(304,569)		\$(344,592)
Solar Merlin						\$(174,945)		\$(197,934)		\$(223,945)
Solar Pump Station						\$(28,334)		\$(32,057)		\$(36,270)
Vehicles	\$ 212,781	\$ 212,781	\$ 265,734	\$ 239,202	\$ 300,654	\$244,985	\$ 340,162	\$ 132,824	\$ 384,862	\$ 100,857
Water Infrastructure	\$ 163,327	\$ 163,327	\$ 203,973	\$ 203,973	\$ 230,777	\$ 230,777	\$ 261,103	\$ 261,103	\$ 295,414	\$ 294,332
Water Restoration	\$ 557,981	\$ 557,981	\$ 733,562	\$ 688,084	\$ 855,495	\$ 793,800	\$ 998,533	\$ 910,454	\$ 1,166,341	\$ 1,073,735
Water Treatment	\$ 288,569	\$ 288,569	\$ 431,321	\$ 430,844	\$ 488,653	\$ 487,851	\$ 553,649	\$ 552,274	\$627,339	\$ 628,241
Welcome Center	\$ 4,719	\$ 4,719	\$ 6,051	\$ 5,970	\$ 6,955	\$ 6,821	\$ 8,001	\$ 7,770	\$ 9,209	\$ 8,794
Yard	\$ 24,117	\$ 24,117	\$ 31,322	\$ 30,710	\$ 36,275	\$ 35,247	\$ 42,045	\$ 40,283	\$ 48,770	\$ 63,980
Grand Total	\$ 1,513,972	\$ 1,513,973	\$ 2,006,999	\$ 1,626,535	\$ 2,302,904	\$ 1,630,613	\$ 2,644,094	\$ 1,716,082	\$ 3,037,645	\$ 2,057,379

AVAILABLE FUNDING RESOURCES

The list below is the product of City Staff and the Taskforce's best attempt at creating a comprehensive list of all currently available funding for which the projects in this Plan or similar endeavors might be eligible for. The current abundance of such funding is a major driver of the urgency behind Plan recommendations.

Current availability of funding is largely due to programs created by the Inflation Reduction Act (**IRA**) and the Infrastructure Investment and Jobs Act (**IJJA**). The **IRA** provides for relevant funding through 2034, and the **IJJA** provides for funding opportunities through 2026. The amounts of money both pieces of legislation provide for are substantial, making for unprecedented resource availability. While many of this Plan's projects' ultimate impacts make them a sensible investment without such substantial funding, their ability to qualify for these funding opportunities right now makes them even more compelling and creates additional urgency.

The following list of funding sources includes **IRA**, **IJJA**, other federal funding programs, state funding sources, and non-governmental funding opportunities, and covers a wide variety of potential project topics, from renewable energy generation to recycling improvements. Among all these available resources, almost every project recommended in the body of this Plan is eligible for at least one funding source.

RENEWABLE ENERGY FUNDING

- ⚡ Pacific Power: Grant Matching Support
- ⚡ OR HB2021 Community Renewable Energy Grant Program
- ⚡ IJJA Grid Resilience and Innovation Partnerships (GRIP) (Part C):
Topic Area 3: Grid Innovation Program
- ⚡ Enhanced Geothermal Systems Pilot Demonstrations
- ⚡ Oregon Dept. of Energy Community Renewable Energy Grant Program

FUELING INFRASTRUCTURE FUNDING

- 🏠 IIJA US DOT Charging and Fueling Infrastructure Discretionary Grant Program (Part A Community Program and Part B Corridor Program)
- 🏠 Oregon Zero-Emission Fueling Infrastructure Capital Improvement Grant
- 🏠 Oregon Zero-Emission Fueling Infrastructure Technical Assistance Grant
- 🏠 Pacific Power Charging Station Technical Assistance
- 🏠 Pacific Power Charge at Work Rebates for Businesses
- 🏠 IRA Alternative Fuel Infrastructure Tax Credit

EMISSIONS REDUCTIONS FUNDING

- 🏠 ODOT Carbon Reduction Program
- 🏠 IRA Funding to Address Air Pollution through Community Air Pollution Monitoring Projects (Sec. 60105)1
- 🏠 IRA Environmental Justice Government-to Government (EJG2G) Program
- 🏠 IRA Clean Air Act Grants (IRA Sec. 60105(f))
- 🏠 IRA Greenhouse Gas Reduction Fund
- 🏠 IRA Climate Pollution Reduction Implementation Grants
- 🏠 IRA Urban and Community Forestry (IRA Sec. 23003)
- 🏠 TD Ready Challenge

ENERGY EFFICIENCY FUNDING

- ⚡ US DOE Energy Efficiency and Conservation Block Grant
- ⚡ Southface GoodUse Grants

WASTE AND MATERIALS FUNDING

- ♻️ PepsiCo Beverages North America Closed Loop Partners Local Recycling Fund
- ♻️ PET Recycling Coalition The Recycling Partnership Grant Program
- ♻️ U.S. DOE Bioenergy Technologies Office and the National Renewable Energy Laboratory Waste-to-Energy Technical Assistance for Local Governments
- ♻️ USDA Composting and Food Waste Reduction (CFWR) Pilot Project

ZEV PURCHASING FUNDING

- 🇺🇸 Federal Tax Credits
- 🇺🇸 State Tax Credits

EDUCATION/OUTREACH FUNDING

- 🗣️ Energy Trust Working Together Grants

METHODOLOGY

The Taskforce has made a concerted effort to make all information/data provided as accurate and useful as possible. What follows is a list of all assumptions, adjustments and methods that went into the generation of Taskforce data – whether a calculation of current or past numbers, or a projection of future ones.

POPULATION ASSUMPTIONS

Grants Pass population in 2021 was 39,364. Grants Pass population will grow above the 2021 base by the following percentages (determined using the Portland State University Population Research Center 2022 study growth projection for the Grants Pass Urban Growth Boundary, prorated for the portion within the City itself):

2030: 10.9%

2035: 17.6%

2040: 24.7%

2045: 32.2%

EMISSIONS FROM ENERGY USAGE AND FUEL CONSUMPTION

Emissions in Metric Tons of Carbon Dioxide Equivalent (**MTCO₂e**) were estimated for consumption of electricity, natural gas, gasoline, and diesel fuel for the base year 2021 using utility bills and the formulas specified in the Local Government Operations Protocol (**LGOP**) Version 1.1 (May 2010) adopted by the **EPA**.

Use of electricity, natural gas, gasoline, and diesel fuel were assumed to be constant through 2045. The exception is that electricity usage for the Water Treatment Plant is assumed to increase by 20% starting in 2030 due to the new water filtration methods applied in the new treatment plant.

Emissions per unit of energy were determined using the guidelines provided in the Local Government Operations Protocol (**LGOP**), using values from the latest available regionally applicable sources.

Electricity: 638.523 pounds of carbon dioxide equivalent per megawatt hour

Natural Gas: 0.05486 metric tons of carbon dioxide equivalent per 1,000 cubic feet

Gasoline: 8.78 kilograms of carbon dioxide equivalent per gallon

Diesel: 10.21 kilograms of carbon dioxide equivalent per gallon

Electricity consumed by unmetered streetlights owned and operated by Pacific Power but paid for by Grants Pass under agreement is not included in this Plan. These streetlights have already been largely converted to low power **LED** lights and there are no reasonable changes envisioned for the way in which these lights are operated.

Emissions for electricity obtained from the Pacific Power grid are assumed to be reduced in a manner consistent with the established Oregon Department of Environmental Quality's adopted regulations and confirmed by Pacific Power's published Resource Plan. These reductions are:

2030: 80%

2035: 85%

2040: 90%

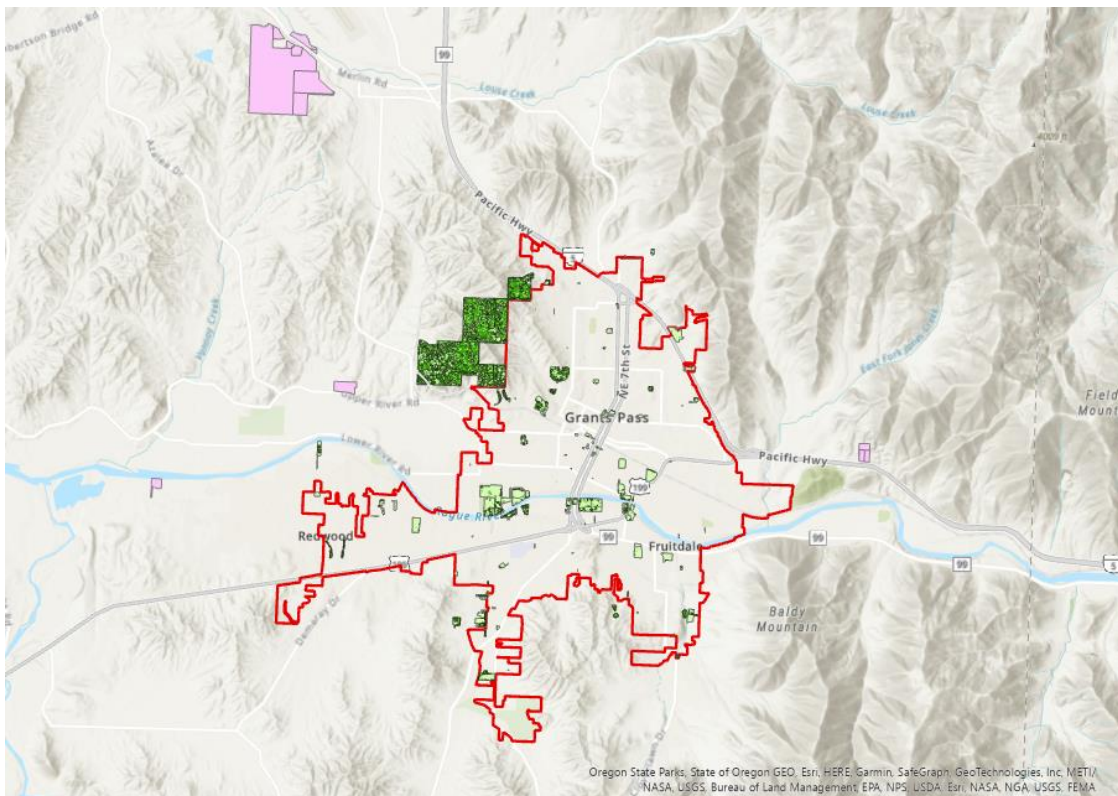
2045: 100%

EMISSIONS FROM ENERGY USAGE AND FUEL CONSUMPTION (continued)

Emissions related to solid waste were calculated using the **EPA WARM** Calculator Tool based on 2021 base year volumes of waste disposal using disposal company bills. For the base year, this was calculated to be 469 Metric Tons of Carbon Dioxide Equivalent. This amount was distributed to city operations based on the amount each operation was billed for disposal services. The solid waste amount is assumed to increase with population.

Emissions from the water restoration treatment process were calculated using the method described in the **LGOP**. Based upon expert consultation, it was determined that only Equation 10.1 of that method applies to Grants Pass operations (flaring of methane gas produced by the primary digester). Water restoration emissions are assumed to increase with population.

The emissions sequestered (removed) by urban forest within land owned by Grants Pass (primarily parks) was determined using the methods described in the **LGOP** using values measured directly from City **GIS** mapping tools. The total City-owned land area was measured to be 4.926 square kilometers, of which 25.49% was determined to be forested.



Emissions due to employee commute were calculated using an employee count of 221 for the base year and applying the guidelines described in the **LGOP**. Values for number of trips per day, and miles per trip, were extrapolated from an employee survey conducted in March 2023; 130 employees responded. Employee counts were assumed to increase with population.

221 employee vehicles running 2.4 trips per employee per day
 7.5 miles per trip
 250 workdays per year
 21.6 miles per gallon for employee vehicles

PROJECT IMPACTS

Emissions estimates were refined using the expected impact of individual projects. To do this, updated electricity or fuel usage values were used in place of those obtained from actual bills for the same facility or vehicle for the relevant period. In some cases, this involves replacing emissions from one source with emissions from another. For example, a traditional gas burning vehicle replaced by an electric vehicle would decrease gasoline usage but increase electrical usage. These factors were taken into account for each project.

BE-2-1: The wastewater treatment plant methane digester heating project is assumed to be operational starting in 2030. This project is expected to result in an 80% reduction in the natural gas consumed by the plant. Further, the remaining natural gas usage is assumed to be replaced by electricity-based heating when needed by 2045 using the same approach as explained in the section for natural gas heating for buildings below.

T-1: The City's vehicle fleet conversion project expects to replace vehicles currently powered by fossil fuels with zero-emission vehicles (such as electric vehicles) over time. This project initially focuses on general purpose vehicles, but in the later years of the Plan includes more specialized vehicles such as police patrol. Large firefighting equipment such as pumpers are assumed not to be replaced. Projections of the impact of these conversions were based on fleet vehicles as of October 2022. Details of this project are described in the Transportation section.

BE-1-3: Natural gas for heating buildings and the public swimming pool is assumed to be replaced with electricity-based solutions, such as heat pumps, between 2040 and 2045. Each therm of natural gas would be replaced by 29.3 kilowatt hours of electricity, which is the direct energy conversion factor. Electricity costs are estimated using the average utility grid costs of \$0.09 per kilowatt hour adjusted for inflation over the period of the Plan. It should be noted that this will almost certainly result in overestimating costs since electric heat pumps are much more efficient in energy usage than traditional natural gas furnaces, however a more accurate estimate would require detailed information that was not feasible to obtain at the time of preparing this model for the Plan.

T-3: Employee commute emissions are assumed to be gradually reduced over time in accordance with project initiatives described in the Plan (ride sharing, commute alternatives, and employee adoption of zero-emission vehicles). These reductions are:

2030: 2%

2035: 10%

2040: 30%

2045: 40%

CM-2, CM-3: Solid waste emissions are assumed to be gradually reduced over time in accordance with project initiatives described in the Plan (reduction in waste, improved drying of solid waste generated by the wastewater treatment plant, more local options for disposal locations, technology improvements). These reductions are:

2030: 5%

2035: 7%

2040: 10%

2045: 15%

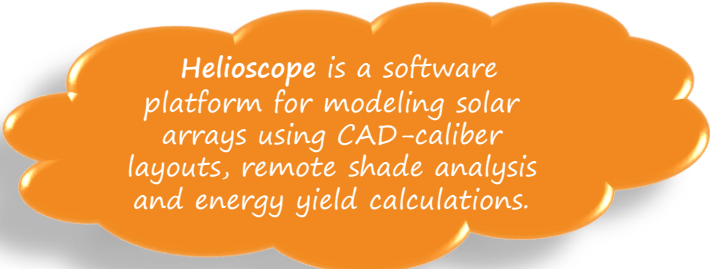
PROJECT IMPACTS (continued)

BE-6-1, BE-6-2, BE-6-3: Two brownfield solar panel projects are assumed to be operational on the Foothill Landfill starting in 2030 and Merlin Landfill starting in 2035. The Foothill Landfill project is assumed to produce 3,453 megawatt-hours of electricity annually, and the Merlin Landfill project is assumed to produce 2,244 megawatt-hours of electricity annually. An additional solar field at one of the water restoration pump stations producing 363 megawatt-hours is also assumed to be operational by 2035. The annual cost of operations is assumed to average \$0.035 per kilowatt hour over 20 years of operation, largely due to panel cleaning and inverter replacement. The production from these facilities is assumed to offset average utility grid costs of \$0.09 per kilowatt hour adjusted for inflation over the period of the Plan, and to offset greenhouse gas emissions that would otherwise occur from utility grid produced electricity in each milestone period.

BE-2-3: The solar panels at the Police Department headquarters are assumed to be expanded to include the remaining space on the current overhead enclosure, the suitable area of the building roof, and on new overhead structures covering the parking lot. The total annual production of the expanded solar generation at the facility is calculated to be 275,000 kilowatt hours and would be completed by 2030. The cost of operation is assumed to average \$0.035 per kilowatt hour, the same as the brownfield solar facilities.

NS-1: Carbon sequestration from the city’s portion of the urban forest was projected to have a modest increase over the milestone years due to net addition of trees and increased maturity of existing young trees.

- 2030: 2%
- 2035: 3%
- 2040: 4%
- 2045: 5%



ADDITIONAL PROJECT SCENARIOS

BE-6-5: Two additional project scenarios were not part of the basic Plan goal calculations but are mentioned in the Plan. The assumptions associated with these scenarios are described here.

The first additional scenario assumes the Merlin brownfield solar field is expanded to fill all the available 300 acres with solar panels. According to **HelioScope** results, this would result in the generation of 12,185 megawatt hours of electricity per year starting in 2035 instead of 2,244 megawatt hours (the previous limit being based on the current capacity of the relevant substation to accept power).

The second scenario expands the Police Department solar panels to also include available space in other nearby City-owned property, including the City parking lot across from City Hall as well as south facing rooftop area on City Hall itself. The **HelioScope** study shows that this could generate 953,194 kilowatt hours annually instead of 275,000 kilowatt hours per year. This scenario is labeled “Civic Center Solar”.

MODEL ROLLING STOCK CONVERSION SCHEDULE

The following information is a model plan for the transitioning of rolling stock broken down vehicle by vehicle using the City’s current rolling stock as of October 2022. Vehicles fall into either Category E (first priority), Category E2 (second priority) or Category E3 (last stage of conversion).

Vehicle ID	Department	Model Year	Vehicle Description	Category	Purpose	ZEV Transition Priority
16A1-1	Detectives	2016	Kia Sorento	Passenger Car	General	E
09A1-5	Police	2009	Toyota Camry-Hybrid	Passenger Car	General	E
09A1-4	016010-PS Support-1601	2009	Toyota High Hyb	Light Truck	General	E
09A1-3	Detectives	2009	Toyota Highlander	Passenger Car	General	E
12U1-1	Police - Code Enforcement	2012	Chevy Hybrid	Light Truck	General	E
13A1-1	Police	2013	Ford Taurus	Passenger Car	General	E
14A1-4	Detectives	2014	Dodge Journey	Passenger Car	General	E
07U2-1	Fire Dept	2007	Dodge RAM	Light Truck	General	E
00V7-1	Engineering	2000	Dodge Grand Caravan	Light Truck	General	E
10A1-6	Police	2010	Chevrolet Traverse	Light Truck	Special	E
07U5-1	Parks Department	2007	Chevrolet Silverado	Light Truck	General	E
11A8-1	Motor Pool Vehicles	2011	Ford Escape-Hybrid	Passenger Car	General	E
07U4-1	Police - Code Enforcement	2007	Chevrolet Silverado	Light Truck	General	E
15A1-1	Detectives	2015	Kia Sorento	Passenger Car	General	E
12A1-3	Detectives	2012	Dodge Journey	Passenger Car	General	E
09A2-1	Fire Dept	2009	Toy Highlander Hyb	Passenger Car	General	E
00U6-1	Sewer Maint	2000	Nissan Frontier	Light Truck	General	E
01U8-1	Fleet Shop	2001	Ford Ranger	Light Truck	General	E
00U5-1	Parks Department	2000	Nissan Frontier	Light Truck	General	E
15U1-1	Police - Code Enforcement	2015	Ford F150	Light Truck	General	E
16A1-2	Police	2016	Dodge Journey	Passenger Car	General	E
19A1-1	Police	2019	Chevrolet Traverse	Passenger Car	General	E
07U7-2	Engineering	2007	Chevrolet Colorado	Light Truck	General	E
07U7-1	Engineering	2007	Chevrolet Colorado	Light Truck	General	E
16U1-1	Police - Code Enforcement	2016	Ford F-150	Light Truck	General	E
02A8-2	Fleet Shop	2002	Toyota Prius-Hybrid	Passenger Car	General	E
12A1-2	Detectives	2012	Dodge Journey	Passenger Car	General	E
13U2-1	Fire Dept	2013	Ford F-150 4x4	Light Truck	General	E
18A1-1	Detectives	2018	Chevrolet Equinox	Light Truck	General	E

APPENDIX V: MODEL ROLLING STOCK CONVERSION SCHEDULE

GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN

Vehicle ID	Department	Model Year	Vehicle Description	Category	Purpose	ZEV Transition Priority
16S1-8	Detectives	2016	Chevrolet Tahoe	Light Truck	General	E
93V1-1	Police	1993	Ford E150	Light Truck	General	E
17A7-1	Engineering	2017	Ford Escape	Passenger Car	General	E
17A1-1	Police - Traffic	2017	Ford Explorer	Light Truck	General	E
97D4-1	Parks Department	1997	Chevrolet 3500	Light Truck	General	E
09A3-1	Water Treatment	2009	Ford Escape-Hybrid	Passenger Car	General	E
09A5-1	Motor Pool Vehicles	2009	Toyota Prius-Hybrid	Passenger Car	General	E
18A2-1	Fire Dept	2018	Ford Explorer	Passenger Car	General	E
19A8-1	Motor Pool Vehicles	2019	Chevrolet Equinox	Passenger Car	General	E
20V6-1	Sewer Collection	2020	Ford Transit Van	Light Truck	General	E
20A1-1	Police	2020	Ford Explorer	Passenger Car	General	E
14A1-2	Police	2014	Dodge Charger	Passenger Car	General	E
18A3-1	Water Distribution	2018	Ford Escape	Passenger Car	General	E
21U5-1	Parks Department	2021	Chevy Colorado	Light Truck	General	E
20U5-1	Parks Department	2020	Chevy Colorado	Light Truck	General	E
21V0-1	Information Technology	2021	Ford Transit Van	Light Truck	General	E
08A1-3	Detectives	2008	Ford Escape	Passenger Car	General	E
03U2-1	016010-PS Support-1601	2003	Dodge RAM	Light Truck	General	E
97V5-1	831510-Property Managemen	1997	Ford E250	Light Truck	General	E
03V1-2	Detectives	2003	Chevrolet	Passenger Car	General	E
11A7-1	016010-PS Support-1601	2011	Ford Escape-Hybrid	Light Truck	General	E
20A7-2	Building and Safety	2020	Chevrolet Equinox	Light Truck	General	E
20A7-1	Building and Safety	2020	Chevrolet Equinox	Light Truck	General	E

APPENDIX V: MODEL ROLLING STOCK CONVERSION SCHEDULE
GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN

Vehicle ID	Department	Model		Category	Purpose	ZEV
		Year	Vehicle Description			Transition Priority
12U3-2	Water Distribution	2012	Ford F150 Ext Cab	Light Truck	General	E2
15S1-3	Police	2015	Chevrolet Tahoe	Light Truck	Special	E2
15S1-2	Police	2015	Chevrolet Tahoe	Light Truck	Special	E2
16S1-1	Police	2016	Chevrolet Tahoe	Light Truck	Special	E2
03U3-1	Water Distribution	2003	Ford F150	Light Truck	General	E2
14S1-2	Police	2014	Chevrolet Tahoe	Light Truck	Special	E2
16S1-2	Police	2016	Chevrolet Tahoe	Light Truck	Special	E2
15S1-1	Police	2015	Chevrolet Tahoe	Light Truck	Special	E2
16S1-7	Police	2016	Chevrolet Tahoe	Light Truck	Special	E2
06U3-1	Water Distribution	2006	Chevrolet Silverado	Light Truck	General	E2
16S1-4	Police	2016	Chevrolet Tahoe	Light Truck	Special	E2
16S1-9	Police	2016	Chevrolet Tahoe	Light Truck	Special	E2
16S1-6	Police	2016	Chevrolet Tahoe	Light Truck	Special	E2
14S1-1	Police	2014	Chevrolet Tahoe	Light Truck	Special	E2
16S1-5	Police	2016	Chevrolet Tahoe	Light Truck	Special	E2
04U4-1	Fleet Shop	2004	Ford F250	Light Truck	Special	E2
19S1-1	Police	2019	Chevrolet Tahoe	Light Truck	Special	E2
19S1-2	Police	2019	Chevrolet Tahoe	Light Truck	Special	E2
20S1-1	Police	2020	Chevrolet Tahoe	Light Truck	Special	E2
16S1-10	Police	2016	Chevrolet Tahoe	Light Truck	Special	E2
07U6-1	Sewer Collection	2007	Chevy Silverado	Light Truck	General	E2
16S1-3	Police	2016	Chevrolet Tahoe	Light Truck	Special	E2
12U3-3	Water Distribution	2012	Ford F150 Ext Cab	Light Truck	General	E2
12U3-1	Water Treatment	2012	Chevy Silverado Hyb	Light Truck	General	E2
04U5-2	Parks Department	2004	Chevrolet Silverado	Light Truck	General	E2
06U3-2	Sewer Collection	2006	Chevy	Light Truck	General	E2
13U6-1	Sewer Maint	2013	Ford F150 Longbed	Light Truck	General	E2

APPENDIX V: MODEL ROLLING STOCK CONVERSION SCHEDULE
GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN

Vehicle ID	Department	Model Year	Vehicle Description	Category	Purpose	ZEV Transition Priority
02H6-1	Streets - Storm	2002	Sterling H-Vac LT9500	Construction Equipm	Special	E3
00P2-2	Fire Dept	2000	Pierce Pumper	Heavy Duty Vehicle	Fire Apparatus	E3
01BT4-1	Streets	2001	Ford Bucket Truck	Heavy Duty Vehicle	Special	E3
08P2-3	Fire Dept	2008	Pierce Pumper	Heavy Duty Vehicle	Fire Apparatus	E3
08P2-1	Fire Dept	2008	Pierce Pumper	Heavy Duty Vehicle	Fire Apparatus	E3
05U3-2	Water Distribution	2005	Ford F250	Light Truck	Special	E3
02U6-1	Parks Department	2002	Ford F250	Light Truck	General	E3
11T2-1	Fire Dept	2011	Pierce Aerial	Heavy Duty Vehicle	Fire Apparatus	E3
54A1-1*	Police	1954	Ford Cruiser	Light Truck	Special	E3
07U9-1	831510-Property Managemen	2007	GMC W4500	Light Truck	General	E3
05U5-1	Parks Department	2005	Toyota Tundra	Light Truck	General	E3
08U6-1	Sewer Treatment	2008	Chevy Silverado	Light Truck	General	E3
03U4-1	Police	2003	Ford F250	Light Truck	Special	E3
00P2-1	Fire Dept	2000	Ford F350	Light Truck	General	E3
94D4-1	Streets	1994	Ford F700	Light Truck	Special	E3
92D4-2	Streets	1992	Dump Truck	Heavy Duty Vehicle	Special	E3
05U3-1	Water Treatment-Pump	2005	Ford F250	Light Truck	Special	E3
98D3-1	Water Distribution	1998	GMC Dump Truck	Heavy Duty Vehicle	Special	E3
16H6-1	Sewer Collection	2016	Freightliner	Heavy Duty Vehicle	Special	E3
10U4-1	Streets	2010	Ford F250	Light Truck	Special	E3
12U5-1	Parks Department	2012	Chevy Silverado Hyb	Light Truck	General	E3
08P2-2	Fire Dept	2008	Pierce Pumper	Heavy Duty Vehicle	Fire Apparatus	E3
17U5-2	Parks Department	2017	GMC Sierra	Light Truck	General	E3
19P2-1	Fire Dept	2019	Pierce Pumper	Heavy Duty Vehicle	Fire Apparatus	E3
06MC1-1	Police - Traffic	2006	Honda ST1300PA6	Motorcycle	Special	E3
14U4-1	Sewer Treatment	2014	Ford F350 4x4	Light Truck	Special	E3
17U5-1	Parks Department	2017	GMC Sierra	Light Truck	General	E3
13MC1-1	Police - Traffic	2013	Honda Motorcycle	Motorcycle	Special	E3
18U4-1	Streets	2018	GMC Sierra	Light Truck	General	E3
17U4-1	Streets - Storm	2017	Ford F-250	Light Truck	Special	E3
17U4-2	Streets	2017	GMC Sierra	Light Truck	General	E3
17V3-1*	Streets - Storm	2017	Ram Promaster	Light Truck	General	E3
13TK1-1	Police	2013	Bae MRAP	Heavy Duty Vehicle	Special	E3
20A2-1	Fire Dept	2020	Ford Interceptor	Light Truck	General	E3
17U9-1	Community Development	2017	Ford F250	Light Truck	General	E3
16P2-2	Fire Dept	2016	Dodge Ram 5500	Light Truck	Special	E3
20U9-1	831510-Property Managemen	2020	Chevrolet Colorado	Light Truck	General	E3
20MC1-1	Police	2020	BMW R1250	Motorcycle	Special	E3
06IC2-1	Police	2006	Winnebago	Heavy Duty Vehicle	Special	E3
21TV4-1	Streets - Storm	2021	Ford E-450 SD	Light Truck	Special	E3
19U4-1	Streets	2019	GMC Canyon	Light Truck	General	E3
17D6-1	Water Distribution	2017	GMC Sierra	Light Truck	General	E3
22TV6-1	Sewer Collection	2022	Ford TV Van	Light Truck	Special	E3
21U3-1	Water Distribution	2021	Ford F550 Ext Cab	Light Truck	Special	E3
10TK1-1	Police	2010	Bae Systems	Heavy Duty Vehicle	Special	E3
20P2-1	Fire Dept	2020	Dodge Ram 5500	Light Truck	Fire Apparatus	E3
22A1-1	Detectives	2022	Chevy Traverse	Passenger Car	General	E3
19D4-1	Streets	2019	GMC Sierra	Light Truck	General	E3
22A1-2	Detectives	2022	Chevy Traverse	Passenger Car	General	E3
10T5-1	831510-Property Managemen	2010	Bobcat CT230	Construction Equipm	Special	E3
02B4-1	Sewer Treatment	2002	Case 580SM Backhoe	Construction Equipm	Special	E3
02L4-1	Streets	2002	Caterpillar Loader	Construction Equipm	Special	E3
17K4-1	Streets	2017	Crafco Melter	Construction Equipm	Special	E3
16C4-1	Streets - Storm	2016	Generator	Construction Equipm	Special	E3
04C3-1	Water Distribution	2004	Air Compressor	Construction Equipm	Special	E3
17X3-1	Water Distribution	2017	Bobcat Excavator	Construction Equipm	Special	E3
98B3-1	Water Distribution	1998	JD Backhoe	Construction Equipm	Special	E3
00P2-1 PUMP	Fire Dept	2000	Honda Pump	Construction Equipm	Special	E3
16C4-2	Streets	2016	Doosan generator	Construction Equipm	Special	E3
00FL31	Water Distribution	2000	Hyster Forklift	Heavy Duty Vehicle	Special	E3
16HP31	Water Distribution-Pump	2016	PW-16HP Pump	Construction Equipm	Special	E3

CHARGING INFRASTRUCTURE INSTALLATION DETAILS

The following appendix provides additional information on the installation of charging infrastructure based on City vehicles as of 2022 and City operations both current and anticipated.

CHARGING LOCATIONS

In order to achieve the goal of a 30% **ZEV** fleet by 2030, a significant portion of the municipal fleet will need to be 100% battery electric (**BEV**). However, acquisition of electric vehicles is contingent on the installation of a municipal charging network. Several charging locations should be distributed among City facilities to support the transition to alternative fuels in municipal operations.

There are 11 City-owned facilities where vehicles are parked. Each location should have two or more level 2 or 3 chargers. (Level 2 is a 220 amp circuit, and Level 3 is a **DC** fast charger).

Appropriate locations include:

- City Hall
- Parks maintenance buildings
- A Street parking lot
- City Yard
- Water Restoration Plant
- New Water Treatment Plant
- Police Department
- Fire stations

The priorities for charging infrastructure installations should be based on potential adoption of **BEV's** and projected use of the charger at each location.

EV CHARGING STATION COSTS

The cost of installing **EV** charging stations will vary based on numerous issues, beginning with the proximity of the proposed location to a service panel or point of connection to the grid. Future Energy, a professional design and installation firm, prepared the following analysis as a close approximation of potential costs.

- Infrastructure includes wiring and circuit upgrades, panel upgrades, installation of meters, possible installation of a transformer, and the services of a licensed electrician. These costs can vary widely, depending on the specific circumstances of the installation.
- Equipment includes the specific charging system selected. A 120 volt Level 1 charger will range from \$600 to \$1,000, a 240 volt Level 2 charger will be \$2,500 to \$5,500, and a Level 3 fast charger would be about \$40,000.
- Soft costs include any needed signage, bollards, striping, parking blocks, etc. These costs are likely to be \$1500 or more.
- Software, licensing, and grid connection fees may include on-going subscription and billing fees, but the initial costs are perhaps \$2,000.

The range of the total costs estimated by this approach suggests a total of approximately \$20,000 for a dual plug Level 2 charger, to about \$55,000 for a Level 3 **DC** Fast Charger. Assuming a target of 22 charging stations distributed among locations where City vehicles will be parked, the total cost of the project is likely to be \$400,000.

POTENTIAL CHARGING INFRASTRUCTURE FUNDING

There are numerous grant opportunities available from the Oregon Department of Transportation (ODOT), Pacific Power and other entities for municipalities seeking to build an **EV** charging infrastructure network. With the adoption of this Plan, and the commitment to creating a **ZEV** fleet, the City will be well-positioned to take advantage of these opportunities. The new federal Infrastructure Investment and Jobs Act (IIJA) will also provide funds to the state for charging infrastructure development. Below is a brief discussion of the types of support available for developing charging infrastructure. For a more complete listing of funding opportunities, see *List of Available Funding Resources*, Appendix III.

The **ODOT** Climate Office, in partnership with **ODOT**, recently completed a Transportation Electrification Infrastructure Needs Analysis to identify the charging needs and gaps across Oregon and propose solutions to help accelerate widespread transportation electrification in Oregon. <https://www.oregon.gov/odot/Programs/Pages/TEINA.aspx>
ODOT has stated a goal of tripling the number of **EVs** on the road by 2023, and expanding statewide public **EV** charging infrastructure by a minimum of 10% by 2025. They aim to achieve these targets through education, outreach and through funding, including using state and federal funding to bolster public **EV** charging infrastructure and leveraging partnerships with private industry. <https://www.oregon.gov/odot/climate/pages/transportation%20electrification.aspx#:~:text=ODOT's%20role%20is%20to%20make,meets%20rural%20and%20urban%20needs>.

The nonprofit Forth provides an overview of **ODOT's** multi-million dollar *Plugging in Oregon* Community Charging Rebates program to encourage businesses, government and tribal entities to purchase, install and maintain Level 2 **EV** charging infrastructure at publicly accessible parking lots. Seventy percent of the funds are reserved for rural areas such as Grants Pass. <https://forthmobility.org/Community%20Charging%20Rebate>

Pacific Power offers rebates for the installation of up to six **EV** charging stations by non-residential customers. <https://www.pacificpower.net/savings-energy-choices/electric-vehicles/business-charger-rebates.html>

Corporate support for infrastructure will also assist with the transition to **EVs**. For example, General Motors is collaborating with charging station providers to install, operate and maintain charging stations in order to accelerate the widespread adoption of **EVs** and increase access to charging. <https://www.gm.com/stories/leading-the-ev-infrastructure-charge>

Partnerships between the City, the County, **ODOT**, and possibly School District 7, could bring about efficiencies and cost savings through a master design and installation Plan for local public agency fleet electrification.

2022 MENG FACILITY CONDITION ASSESSMENT ENERGY INEFFICIENCY FINDINGS

In 2021, the City of Grants Pass engaged MENG Analysis to complete a comprehensive Facility Condition Assessment (**FCA**) in order to assist City staff in prioritizing maintenance needs and supporting proactive facility management. The surveyed facilities include 95 structures on 62 sites. The report identifies \$7.2 million in total observed deficiencies to be addressed in the years 2022-2027, and \$19.5 million in long-term needs to be addressed in the years 2028-2041. About 20% of the observed deficiencies (\$1.4 million) relate to energy efficiency.

The following information is an overview of the deficiencies in City facilities found in the 2022 Facility Condition Assessment that were related to energy efficiency.

City Hall - \$156,672 – p. 51 in FCA

- **Deficiency:** Water cooling performed by well system heat exchanger and underground storage tank, corroded and leaking.
- **Remedial Action:** Demo current system. Replace system with chemical treated, closed-loop closed-circuit-cooler (able to run as dry cooler and indirect evaporator) and add buffer volume to heat pump system loop (buffer for heating and cooling), tank in mechanical room.

City Hall - \$352,512 – p. 53 in FCA

- **Deficiency:** Water-source heat pumps nearing end of useful life and contains phased out **R-22** refrigerant.
- **Remedial Action:** Replace water-source heat pumps.

City Hall - \$352,512 – p. 54 in FCA

- **Deficiency:** Non-uniform and inadequate means of control and monitoring systems.
- **Remedial Action:** Install full building automation system with graphics user interface and network connectivity (assume 300 control points).

Parkway Fire Station - \$117,504 – p. 208 in FCA

- **Deficiency:** Lack of heat exchanging in geothermal ground loop.
- **Remedial Action:** Review system size and capacity; add supplemental heat and cooling or increase geothermal loops.

Redwood Fire Station - \$27,418 – p. 218 in FCA

- **Deficiency**: Aging air conditioning units with phased out refrigerant R-22.
- **Remedial Action**: Replace air conditioning units.

Water Restoration Plant (Admin/Lab Building) - \$391,680 – p. 537 in FCA

- **Deficiency**: Pneumatic controls in need of modernization.
- **Remedial Action**: Upgrade to direct digital controls; assume 200 points at \$1000 per point.



POLICE DEPARTMENT MICROGRID HELIOSCOPE

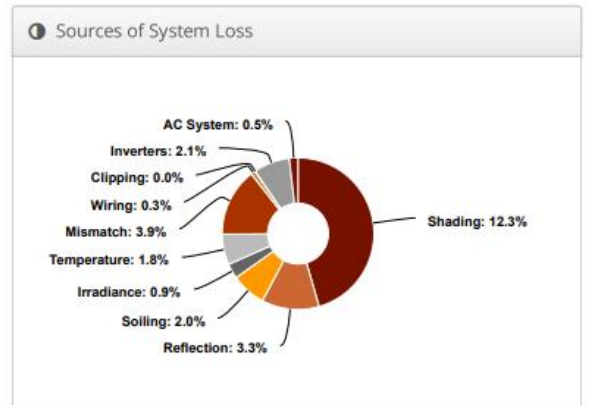
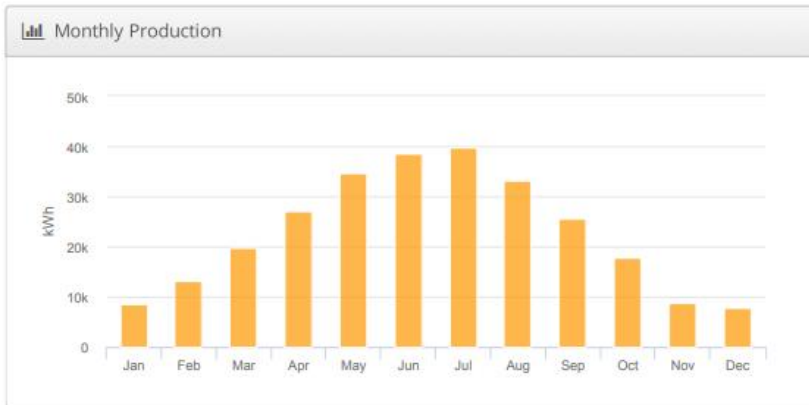
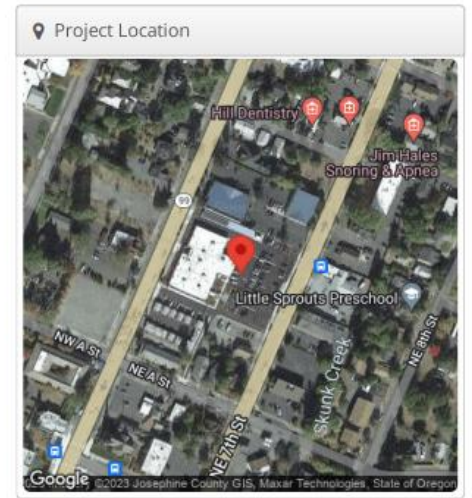


Annual Production Report produced by Robert Allen

Design 1 (copy 3) Grants Pass Police Department, 726 NE Seventh Street, Grants Pass, Oregon

Report	
Project Name	Grants Pass Police Department
Project Description	Roof Solar & Carports Solar
Project Address	726 NE Seventh Street, Grants Pass, Oregon
Prepared By	Robert Allen ballen@halfmoonpower.com

System Metrics	
Design	Design 1 (copy 3)
Module DC Nameplate	210.6 kW
Inverter AC Nameplate	192.5 kW Load Ratio: 1.09
Annual Production	274.8 MWh
Performance Ratio	75.6%
kWh/kWp	1,305.3
Weather Dataset	TMY, 10km Grid (42.45,-123.35), NREL (prospector)
Simulator Version	b1dce4194e-ba151ad9c0-015a4ce7eb-4b0a270180



APPENDIX VIII: POLICE DEPARTMENT MICROGRID HELIOSCOPE

GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN



Annual Production Report produced by Robert Allen

Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,611.5	
	POA Irradiance	1,726.7	7.1%
	Shaded Irradiance	1,514.3	-12.3%
	Irradiance after Reflection	1,464.2	-3.3%
	Irradiance after Soiling	1,434.9	-2.0%
	Total Collector Irradiance	1,434.9	0.0%
Energy (kWh)	Nameplate	302,317.2	
	Output at Irradiance Levels	299,699.2	-0.9%
	Output at Cell Temperature Derate	294,437.3	-1.8%
	Output After Mismatch	282,865.4	-3.9%
	Optimal DC Output	282,101.4	-0.3%
	Constrained DC Output	282,100.9	0.0%
	Inverter Output	276,225.5	-2.1%
	Energy to Grid	274,844.4	-0.5%
Temperature Metrics			
	Avg. Operating Ambient Temp		12.2 °C
	Avg. Operating Cell Temp		20.1 °C
Simulation Metrics			
	Operating Hours		4684
	Solved Hours		4684

Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid (42.45,-123.35), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
	East-West	-3.56	-0.075	3°C								
	Carport	-3.56	-0.075	3°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Uploaded By	Characterization									
	TSM-PD14 320 (May16) (Trina Solar)	HelloScope	Spec Sheet Characterization, PAN									
Component Characterizations	Device	Uploaded By	Characterization									
	Sunny Tripower 24000TL-US (SMA)	HelloScope	Modified CEC									

Components		
Component	Name	Count
Inverters	Sunny Tripower 24000TL-US (SMA)	8 (192.5 kW)
Strings	10 AWG (Copper)	40 (5,183.4 ft)
Module	Trina Solar, TSM-PD14 320 (May16) (320W)	658 (210.6 kW)

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	5-19	Along Racking

Field Segments									
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	70	70	22.4 kW
Field Segment 2	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	40	40	12.8 kW
Field Segment 3	Fixed Tilt	Landscape (Horizontal)	10°	202.3597°	0.0 ft	1x1	50	50	16.0 kW
Field Segment 4	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	76	76	24.3 kW
Field Segment 5	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	71	71	22.7 kW
Field Segment 6	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	184	184	58.9 kW
Field Segment 7	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	56	56	17.9 kW
Field Segment 8	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	63	63	20.2 kW
Field Segment 9	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	48	48	15.4 kW



Annual Production Report produced by Robert Allen

Detailed Layout

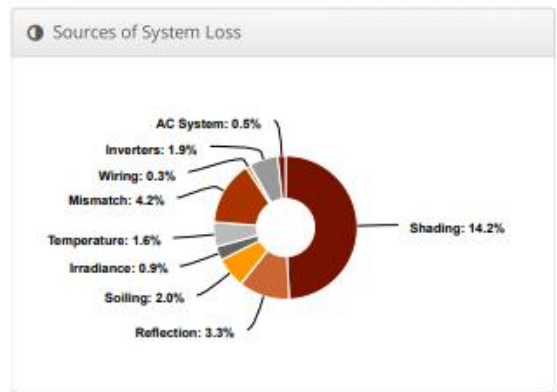
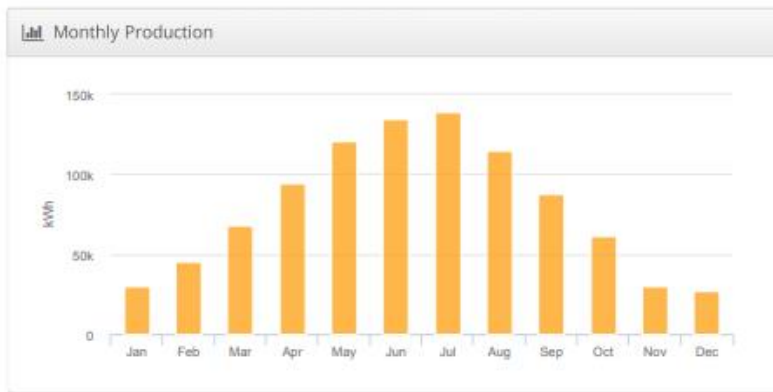
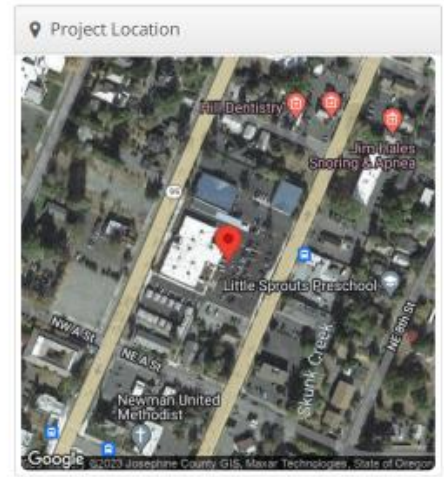


CIVIC CENTER MICROGRID HELIOSCOPE

Design 1 (copy 3) Grants Pass Police Department, 726 NE Seventh Street, Grants Pass, Oregon

Report	
Project Name	Grants Pass Police Department
Project Description	Roof Solar & Carports Solar
Project Address	726 NE Seventh Street, Grants Pass, Oregon
Prepared By	Robert Allen ballen@halfmoonpower.com

System Metrics	
Design	Design 1 (copy 3)
Module DC Nameplate	745.6 kW
Inverter AC Nameplate	601.5 kW Load Ratio: 1.24
Annual Production	953.2 MWh
Performance Ratio	74.0%
kWh/kWp	1,278.4
Weather Dataset	TMY, 10km Grid (42.45,-123.35), NREL (prospector)
Simulator Version	0d27a6099b-50519a2d82-0789180870-6b85b19541



Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,611.5	
	POA Irradiance	1,727.2	7.2%
	Shaded Irradiance	1,482.2	-14.2%
	Irradiance after Reflection	1,433.3	-3.3%
	Irradiance after Soiling	1,404.6	-2.0%
	Total Collector Irradiance	1,404.7	0.0%
Energy (kWh)	Nameplate	1,047,905.5	
	Output at Irradiance Levels	1,038,462.9	-0.9%
	Output at Cell Temperature Derate	1,021,936.4	-1.6%
	Output After Mismatch	979,087.9	-4.2%
	Optimal DC Output	976,465.9	-0.3%
	Constrained DC Output	976,221.6	0.0%
	Inverter Output	957,984.1	-1.9%
	Energy to Grid	953,194.2	-0.5%
Temperature Metrics			
	Avg. Operating Ambient Temp		12.2 °C
	Avg. Operating Cell Temp		20.0 °C
Simulation Metrics			
	Operating Hours		4684
	Solved Hours		4684

Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid (42.45,-123.35), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b									
	Fixed Tilt	-3.56	-0.075									
	Flush Mount	-2.81	-0.0455									
	East-West	-3.56	-0.075									
	Carport	-3.56	-0.075									
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Uploaded By	Characterization									
	TSM-PD14 320 (May16) (Trina Solar)	HelioScope	Spec Sheet Characterization, PAN									
Component Characterizations	Device	Uploaded By	Characterization									
	Sunny Tripower 24000TL-US (SMA)	HelioScope	Modified CEC									

Components		
Component	Name	Count
Inverters	Sunny Tripower 24000TL-US (SMA)	25 (601.5 kW)
Strings	10 AWG (Copper)	130 (21,732.9 ft)
Module	Trina Solar, TSM-PD14 320 (May16) (320W)	2,330 (745.6 kW)

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	5-19	Along Racking

Field Segments									
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	70	70	22.4 kW
Field Segment 2	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	40	40	12.8 kW
Field Segment 3	Fixed Tilt	Landscape (Horizontal)	10°	202.3597°	0.0 ft	1x1	50	50	16.0 kW
Field Segment 4	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	76	76	24.3 kW
Field Segment 5	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	71	71	22.7 kW
Field Segment 6	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	184	184	58.9 kW
Field Segment 7	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	56	56	17.9 kW
Field Segment 8	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	63	63	20.2 kW
Field Segment 9	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	48	48	15.4 kW
Field Segment 10	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	203	203	65.0 kW
Field Segment 11	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	15	15	4.80 kW
Field Segment 12	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	65	65	20.8 kW
Field Segment 13	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	98	98	31.4 kW
Field Segment 15	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	77	77	24.6 kW
Field Segment 16	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	16	16	5.12 kW
Field Segment 17	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	288	288	92.2 kW
Field Segment 18	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	489	489	156.5 kW
Field Segment 19	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	300	300	96.0 kW
Field Segment 19	Fixed Tilt	Landscape (Horizontal)	10°	180°	0.0 ft	1x1	121	121	38.7 kW

APPENDIX IX: CIVIC CENTER MICROGRID HELIOSCOPE
GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN

Detailed Layout



WASTEWATER PUMP STATION HELIOSCOPE

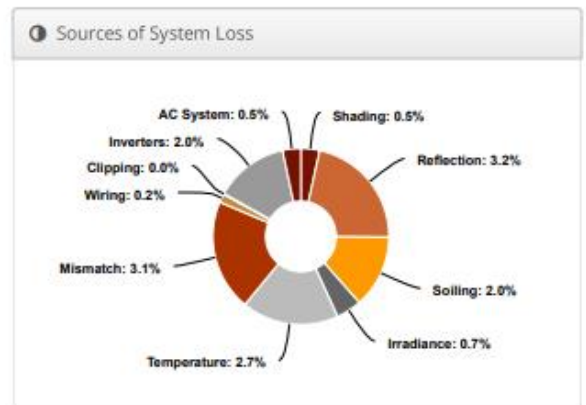
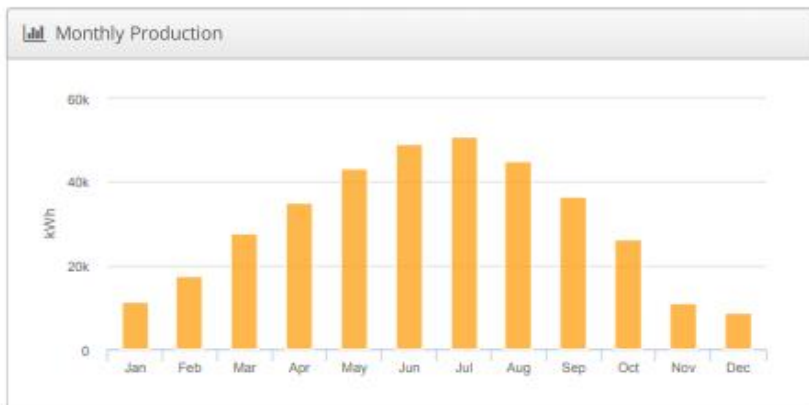


Annual Production Report produced by Robert Allen

Design 1 (copy 1) Grants Pass WWTP Pump Station, 4960 Leonard Rd. Grants Pass, Oregon

Report	
Project Name	Grants Pass WWTP Pump Station
Project Description	Ground Solar
Project Address	4960 Leonard Rd. Grants Pass, Oregon
Prepared By	Robert Allen ballen@halfmoonpower.com

System Metrics	
Design	Design 1 (copy 1)
Module DC Nameplate	248.3 kW
Inverter AC Nameplate	216.5 kW Load Ratio: 1.15
Annual Production	363.5 MWh
Performance Ratio	86.0%
kWh/kWp	1,463.7
Weather Dataset	TMY, 10km Grid (42.45,-123.45), NREL (prospector)
Simulator Version	ade84a1b0c-97738c1935-a600485f1c-687e5d0f8e



APPENDIX X: WASTEWATER PUMP STATION HELIOSCOPE

GRANTS PASS SUSTAINABILITY AND ENERGY ACTION PLAN



Annual Production Report produced by Robert Allen

Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,590.0	
	POA Irradiance	1,702.3	7.1%
	Shaded Irradiance	1,693.6	-0.5%
	Irradiance after Reflection	1,638.6	-3.2%
	Irradiance after Soiling	1,605.8	-2.0%
	Total Collector Irradiance	1,605.8	0.0%
Energy (kWh)	Nameplate	398,960.1	
	Output at Irradiance Levels	396,168.7	-0.7%
	Output at Cell Temperature Derate	385,609.1	-2.7%
	Output After Mismatch	373,815.5	-3.1%
	Optimal DC Output	372,944.0	-0.2%
	Constrained DC Output	372,849.2	0.0%
	Inverter Output	365,298.0	-2.0%
	Energy to Grid	363,471.5	-0.5%
Temperature Metrics			
	Avg. Operating Ambient Temp		12.1 °C
	Avg. Operating Cell Temp		21.0 °C
Simulation Metrics			
	Operating Hours		4691
	Solved Hours		4691

Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid (42.45,-123.45), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
	East-West	-3.56	-0.075	3°C								
	Carport	-3.56	-0.075	3°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Uploaded By					Characterization					
	TSM-PD14 320 (May16) (Trina Solar)	HelloScope					Spec Sheet Characterization, PAN					
Component Characterizations	Device	Uploaded By					Characterization					
	Sunny Tripower 24000TL-US (SMA)	HelloScope					Modified CEC					

Components		
Component	Name	Count
Inverters	Sunny Tripower 24000TL-US (SMA)	9 (216.5 kW)
Strings	10 AWG (Copper)	45 (3,333.4 ft)
Module	Trina Solar, TSM-PD14 320 (May16) (320W)	776 (248.3 kW)

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	5-19	Along Racking

Field Segments									
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	375	375	120.0 kW
Field Segment 2	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	401	401	128.3 kW

Detailed Layout



FOOTHILL LANDFILL SOLAR CALCULATIONS

The City of Grants Pass owns two former landfill sites which provide an opportunity for development of two solar power stations. The oldest of the two is the former Foothill site, at 3284 Foothill Boulevard, consisting of three tax lots totaling 15.97 acres. (See tax lots 200, 201, 202 on the map below). There are currently no monitoring requirements for any potential environmental contaminants at this site. However, the property cannot be developed for residential or commercial use, and the City must retain ownership in perpetuity. The property adjoins BLM land to the north, which has a Pacific Power easement, running west/east for a high voltage transmission line. There are also power lines along Foothill Boulevard, at the south end of the property. There is a substation less than 1/2 mile away from the property, a key consideration for suitability as a site for a Solar Power Station.

Recently Pacific Power conducted a preliminary analysis of both the Foothill site and the Merlin Landfill site and reported the following:

3284 Foothills looks like it could fit a little more solar without large problems. Daytime minimum load 3.0 MW existing generation 160 KW or enough room for 2.6 MW of generation or so..

Source: L Alan Meyer | Pacific Power | Desk (541) 955-7946 | Cell (541) 507-7739 | Office 1420 Williams Hwy. Grants Pass, Oregon 97527

As a rule of thumb, 5 acres are required to produce 1 **MW** of electricity from a solar photovoltaic array, assuming that every kilowatt of solar electricity production will require about 100 square feet of space. At 15.97 acres, the potential at the Foothill site is 3.5 **MW**. Thus the full load limit, as determined by Pacific Power, of 2.6 **MW** for the nearby substation could be realized.





The cost to install 1 **MW** of solar power generation capacity in a ground mount solar power station ranges from \$.89 to \$1.01 per installed watt, using national average costs. The 2.6 **MW** potential (a **MW** is a million watts) at the Foothill site would thus cost an estimated \$2,314,000 to \$2,626,000. Using the National Renewable Energy Lab modeling tool, the production potential of a 2.6 **MW** Solar Energy Station at the Foothill site is 3,453,258 **kWh** per year, assuming 4.87 peak hours of solar radiation per day. The value of the electricity to be produced at the Foothill site, at \$.11 per **kWh**, is thus \$379,858 per year. This amount could offset electricity use at City facilities and reduce operating costs. The rate of return and payback period for this investment is very attractive.

NOTE: All data subject to revision, based on local assessment by solar and electrical professionals. The analysis here is intended to show feasibility based on estimates and preliminary assessments. There are also significant positive externalities resulting from this investment in clean renewable energy. The project will help the City to achieve its adopted goals regarding Sustainability. In addition, local energy for local use creates resilience against grid failure, if configured for separate use and with battery storage. The City's brand and image as a destination can be enhanced by targeted marketing of the investment. A partnership between the City, Pacific Power, **Energy Trust**, the Oregon Department of Energy, and others could make these two projects a reality within the next few years.

MERLIN LANDFILL SOLAR CALCULATIONS

The City of Grants Pass owns two former landfill sites which provide an opportunity for development of two solar power stations. The Merlin Landfill site is much larger, but the grid is more limited. The total area under City ownership at the Merlin landfill site is more than 300 acres. Recently Pacific Power conducted a preliminary analysis of both the Foothill site and the Merlin Landfill site and reported the following:

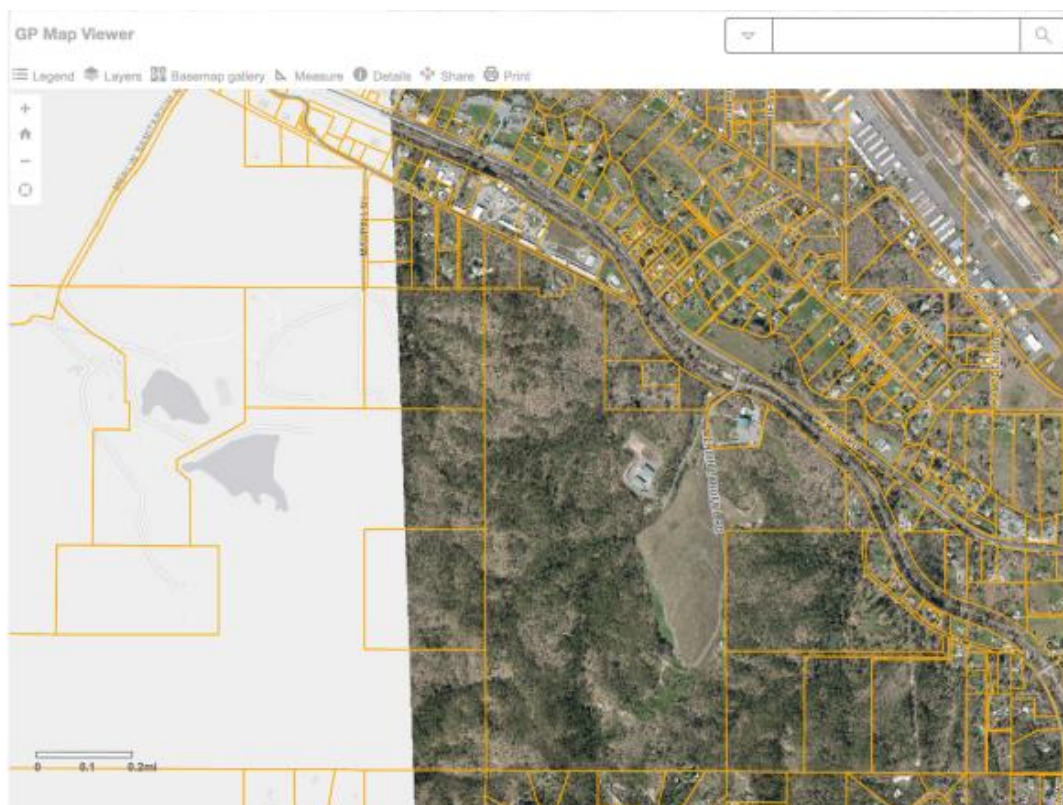
2020 Merlin also looks pretty good but the daytime minimum load is lower at 2.1 MW so the solar system would probably need to be under about 1.7 MW to most likely avoid upgrades.

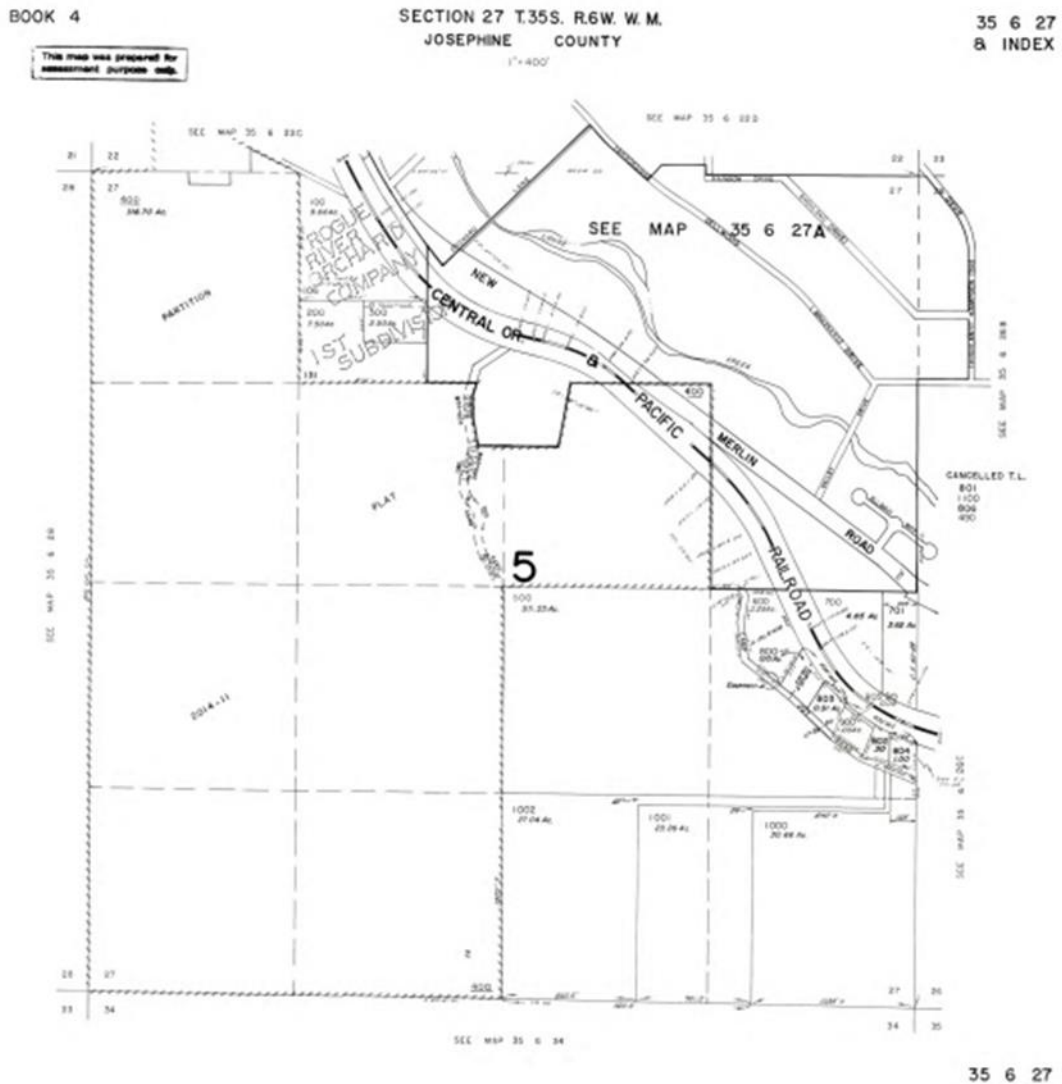
Source: L Alan Meyer | Pacific Power | Desk (541) 955-7946 | Cell (541) 507-7739 | Office 1420 Williams Hwy. Grants Pass, Oregon 97527

Because the load limit for the grid at this site is 1.7 **MW**, this large size could not be fully utilized without investing in grid upgrades. Without such upgrades, the maximum amount for this location to produce would be about 1.7 **MW**.

As a rule of thumb, 5 acres are required to produce 1 **MW** of electricity from a solar photovoltaic array, assuming that every kilowatt of solar electricity production will require about 100 square feet of space.

Therefore, the size of a 1.7 **MW** solar installation would require only 8-10 acres.





The cost to install 1 **MW** of solar power generation capacity in a ground mount solar power station ranges from \$.89 to \$1.01 per installed watt, using national average costs.

This means such a solar field at Merlin would have an approximate cost of \$1,615,000. Annual production would be 2,244,218 **kWh**, generating a credit offset or revenue of \$246,864. The return on investment and the payback period are once again very attractive.

NOTE: All data subject to revision, based on local assessment by solar and electrical professionals. The analysis here is intended to show feasibility based on estimates and preliminary assessments. There are also significant positive externalities resulting from this investment in clean renewable energy. The project will help the City to achieve its adopted goals regarding Sustainability. In addition, local energy for local use creates resilience against grid failure, if configured for separate use and with battery storage. The City's brand and image as a destination can be enhanced by targeted marketing of the investment. A partnership between the City, Pacific Power, **Energy Trust**, the Oregon Department of Energy, and others, could make these two projects a reality within the next few years.

LARGER MERLIN LANDFILL HELIOSCOPE

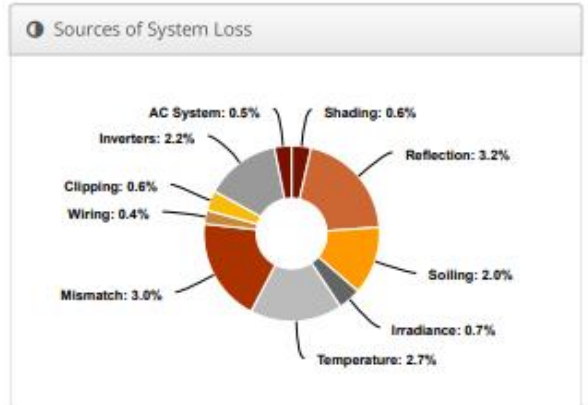
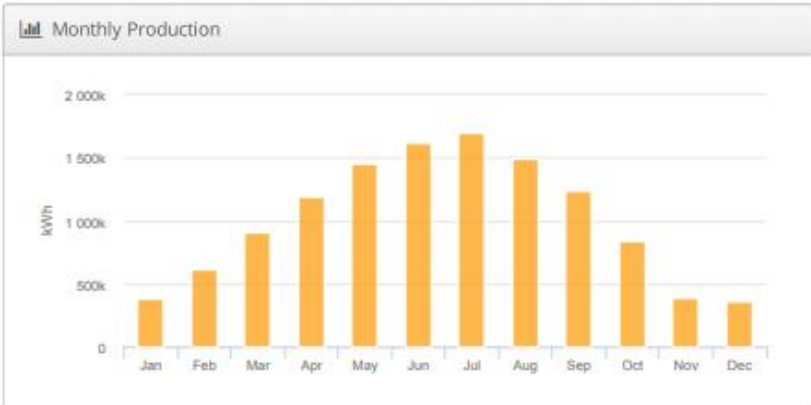
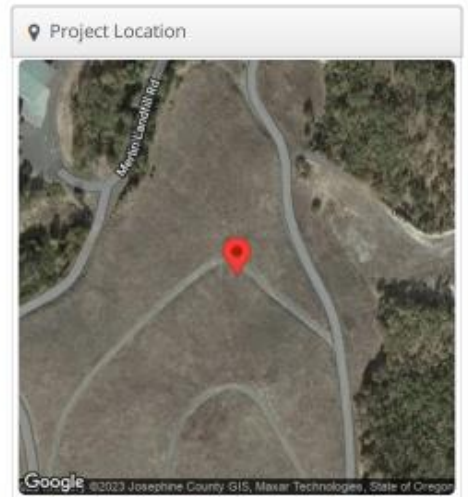


Annual Production Report produced by Robert Allen

Landfill Design Merlin Landfill Site, Merlin Landfill Road

Report	
Project Name	Merlin Landfill Site
Project Description	Ground Solar
Project Address	Merlin Landfill Road
Prepared By	Robert Allen ballen@halfmoonpower.com

System Metrics	
Design	Landfill Design
Module DC Nameplate	8.28 MW
Inverter AC Nameplate	6.64 MW Load Ratio: 1.25
Annual Production	12.19 GWh
Performance Ratio	85.2%
kWh/kWp	1,471.3
Weather Dataset	TMY, 10km Grid (42.45,-123.35), NREL (prospector)
Simulator Version	3be6805f30-2bd0b278bb-87e3d752bb-2174047595





Annual Production Report produced by Robert Allen

Annual Production			
	Description	Output	% Delta
Irradiance (kWh/m ²)	Annual Global Horizontal Irradiance	1,611.5	
	POA Irradiance	1,727.4	7.2%
	Shaded Irradiance	1,717.6	-0.6%
	Irradiance after Reflection	1,662.2	-3.2%
	Irradiance after Soiling	1,629.0	-2.0%
	Total Collector Irradiance	1,629.0	0.0%
Energy (kWh)	Nameplate	13,498,228.5	
	Output at Irradiance Levels	13,407,445.0	-0.7%
	Output at Cell Temperature Derate	13,044,482.0	-2.7%
	Output After Mismatch	12,647,470.1	-3.0%
	Optimal DC Output	12,596,696.2	-0.4%
	Constrained DC Output	12,522,541.7	-0.6%
	Inverter Output	12,246,650.0	-2.2%
Energy to Grid	12,185,417.0	-0.5%	
Temperature Metrics			
	Avg. Operating Ambient Temp		12.2 °C
	Avg. Operating Cell Temp		21.2 °C
Simulation Metrics			
	Operating Hours	4684	
	Solved Hours	4684	

Condition Set												
Description	Condition Set 1											
Weather Dataset	TMY, 10km Grid (42.45,-123.35), NREL (prospector)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
	East-West	-3.56	-0.075	3°C								
	Carport	-3.56	-0.075	3°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Uploaded By	Characterization									
	TSM-PD14 320 (May16) (Trina Solar)	HelloScope	Spec Sheet Characterization, PAN									
Component Characterizations	Device	Uploaded By	Characterization									
	Sunny Tripower 24000TL-US (SMA)	HelloScope	Modified CEC									

Components		
Component	Name	Count
Inverters	Sunny Tripower 24000TL-US (SMA)	276 (6.64 MW)
Strings	10 AWG (Copper)	1,593 (382,877.8 ft)
Module	Trina Solar, TSM-PD14 320 (May16) (320W)	25,881 (8.28 MW)

Wiring Zones			
Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	-	5-19	Along Racking

Field Segments									
Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	5,938	5,938	1.90 MW
Field Segment 2	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	7,157	7,157	2.29 MW
Field Segment 3	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	9,497	9,497	3.04 MW
Field Segment 4	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	1,967	1,967	629.4 kW
Field Segment 5	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	1,205	1,205	385.6 kW
Field Segment 6	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	48	48	15.4 kW
Field Segment 7	Fixed Tilt	Landscape (Horizontal)	10°	180°	2.0 ft	1x1	69	69	22.1 kW

Detailed Layout



SUSTAINABLE ECOSYSTEM MANAGEMENT SUGGESTIONS

The following recommendations relate to a larger picture of sustainability beyond that which falls under this Taskforce's core responsibilities to address, but may have minor positive impacts on emissions and energy costs by benefiting natural systems and thereby increasing ecosystem services benefits.

Sustainable Pesticide Use

Pesticides have practical uses, and will remain a tool for most pest control professionals indefinitely. Increasingly though, pest operators are turning to "least toxic controls" as the first line(s) of defense, and saving chemical pesticides for the most retractable problems. Individuals and organizations are making this choice to better protect the long-term health of the pest control applicator, the public, and the environment. Many pesticides and fertilizers are petroleum based, and thus have greenhouse gas implications, but the more important considerations are the environmental and human health impacts. For example, after 40 years of routine use, glyphosate, or Roundup, was found in 80% of samples drawn from a group of Americans intended to be representative of the US population in a [study](#) reported last year. Commonly used pesticides have polluted streams and rivers across the country ([EPA impaired waters list](#)), damaging or destroying fish habitat and ecosystems. Bee colony collapse has been tied to the allowed usage of a class of pesticides called **neonicitoids**. These and many other examples illustrate the need for a careful approach to pest management beyond the status quo of following label instructions.

Pesticides are a class of chemicals used to control insects, rodents, plants/weeds, fungus, mold, and bacteria.



Adopting a least toxic pest management approach is a common element of city-wide sustainability plans. In this approach, pesticides may be used, but other approaches are employed first to eliminate pest habitat, food sources, or entryways, for example. When chemicals are used, the least toxic formulations are employed first (such as boric acid), and toxic formulations are used sparingly. A least toxic pest control policy can be adopted in phases. For example, Parks Department staff could commit to following least toxic weed and pest controls at one or more City parks for two years and record results, including labor and materials costs. Staff could be consulted for other roll out approaches.

Reliable resources to guide the development of a Grants Pass Least Toxic Pest Control Policy are plentiful. Many cities have adopted such policies and their templates can be adapted to best suit Grants Pass. Technical resources are also plentiful. One, [Our Water Our World](#), was formed by a consortium of West Coast cities and counties in 1999 with the goal of reducing pesticides in stormwater runoff and wastewater discharges. This resource lists least toxic pesticides and practices that are protective of water quality. It also keeps updated lists of least toxic pesticides by brand, by pest, and by active ingredient.

Other resources focus on a science-based approach referred to as **Integrated Pest Management (IPM)**, which is a process for solving pest problems while minimizing risks to people and the environment. IPM focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation,



modification of cultural practices, and use of resistant varieties. Pesticides are used after monitoring indicates they are needed, and treatments are made with the goal of removing only the target organism. Pest control materials are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

IPM generally employs the following tools to control unwanted pests:

- Biological control – the use of natural enemies like owls and ladybugs to control pests.
- Cultural controls – practices that reduce pests getting established, reproducing, or surviving. For example, changing irrigation practices can reduce pest problems, since too much water can increase root disease and weeds. Improving kitchen cleanliness can eliminate food sources.
- Mechanical and physical controls – practices that kill, trap or block a pest. Traps for rodents are examples of mechanical control. Physical controls include mulches for weed management, mulching or mowing for weed control, or screens to keep birds or insects out.
- Chemical controls – the use of pesticides. In IPM, pesticides are used in combination with approaches above; the pesticide that will do the job and be the safest for other organisms and for air, soil, and water quality is selected; and pesticides are used in bait stations rather than sprays, or spot-spray a few weeds instead of an entire area.

Another useful resource is the IPM Practitioner's often-cited [2015 Directory of IPM List of Least-Toxic Pest Control Products](#), a 48-page list of chemical, physical, and mechanical methods for controlling a wide variety of common West Coast pests.

In Oregon, the National Pesticide Information Center ([NPIC](#)), housed at Oregon State University, provides objective, science-based information about pesticides and pesticide-related topics to enable people to make informed decisions.

Pollinator Hosting Program

A healthy ecosystem promotes the sequestration of carbon, and maintaining pollinator habitat is one way to promote a healthy ecosystem. The City could opt to allow or invite interested groups or individuals to set up small pollinator habitats on appropriate lands, such as corners of parks. This would also add to biodiversity, creating additional sustainability benefits beyond sequestration.



Best-Fit Irrigation Practices

Water irrigation systems should be evaluated with not only efficiency but impact in mind. In riparian locations where flood irrigation could benefit the ecosystem, perhaps it could be employed.





GLOSSARY

GLOSSARY

Adaptation

Adaptation is the act of adjusting to a change, such as the warming of the planet. In the context of this Plan, adaptation measures seek ways to live well in a warmer climate.

Biochar

Biochar is the lightweight, porous black residue that remains after burning plant matter and/or animal manure under low-oxygen conditions. As a soil amendment, biochar sequesters carbon from the atmosphere for centuries or longer, it retains moisture efficiently which can reduce irrigation demands, and it provides habitat for beneficial microorganisms. In the context of this Plan, biochar is recommended as a possible reuse for downed City trees. All wood that is deposited at the Merlin Transfer Station gets processed into biochar.

Brownfields

Brownfields are pieces of land that are or are perceived to be contaminated due to their past uses. This status makes redevelopment of them eligible for additional funding.

Cascadia Subduction Zone

Grants Pass is on the Cascadia Subduction Zone. State geologists estimate an earthquake with a 9.0+ magnitude could hit the region within the next 50 years.

Community Solar

Community solar systems provide opportunities for citizens to use solar energy to power their home even if they do not have a suitable space for panels to be installed at their address.

Digester

A digester is a container in which sewage is broken down by microbes and produces biogas, primarily methane (CH₄), carbon dioxide (CO₂), and hydrogen sulfide (H₂S).

Ecosystem

An ecosystem is a natural system consisting of all plants, animals, and microorganisms in an area functioning together with all the non-living physical factors of the environment. Although artificial ecosystems can be created, they are not self-sustaining, and the word *ecosystem* typically refers to a natural ecosystem.

Ecosystem Services

An ecosystem service is any positive benefit that a natural system provides to people. There are four interrelated categories of ecosystem services. *Provisioning* services include air to breathe, food to eat, water to drink, and materials to use. *Regulating* services include pollination, air and water purification, waste decomposition, erosion and flood control, temperature moderation during heat waves, and climate regulation. *Cultural* services include

knowledge, ideas, inspiration, creativity, recreation, and spirituality. *Supporting services* include fundamental processes that sustain life such as photosynthesis, nutrient cycling, soil creation, and the water cycle. In the context of this Plan, ecosystem services are considered when making recommendations about City trees.

Electrical Grid Flux

Electrical Grid Flux refers to ongoing changes in the electrical grid due to changing demand, weather conditions, and other factors.

EPA

The EPA is the U.S. [Environmental Protection Agency](#), an independent executive agency of the federal government since 1970.

Energy Trust

Energy Trust is dedicated to helping 2 million utility customers in Oregon and 86,000 utility customers in Southwest Washington save energy and benefit from renewable power, today and in the future.

EUI

Energy Use Intensity (EUI) is calculated by dividing the total energy consumed by a building in a given time period by the total floor area of the building. EUI is measured in units of energy per area per time, such as Btu/ft²/yr. It can be thought of as the energy inefficiency of the building. The lower the EUI value, the more energy efficient the building.

GHG

GHG stands for greenhouse gas, which is a gas that absorbs and emits infrared light more efficiently than it does visible light. As a result, it allows incoming (visible) light from the sun to pass through Earth's atmosphere, but it absorbs and re-emits outgoing (infrared) light from Earth back toward the ground and contributes to global warming. Examples of greenhouse gases are carbon dioxide (CO₂), methane (CH₄), ozone (O₃), nitrous oxide (N₂O), and water (H₂O).

HelioScope

HelioScope is a software platform for modeling solar arrays using CAD-caliber layouts, remote shade analysis and energy yield calculations.

Hügelkultur

Hügelkultur is a horticultural technique in which a mound of logs, branches, leaves, and other biomass is covered with soil and used as a garden bed. The buried wood decays slowly, sequestering carbon in the soil and retaining moisture. In the context of this Plan, hügelkultur is recommended as a possible use for downed City trees. Black walnut, black locust, and old-growth redwood should not be used in hügelkultur. Some examples of trees that work well include alder, apple, aspen, birch, cottonwood, maple, oak, and poplar.

HVAC

HVAC is shorthand for heating, ventilation, and cooling systems.

Integrated Pest Management (IPM)

Integrated Pest Management (IPM) is a process for solving pest problems while minimizing risks to people and the environment. IPM focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat manipulation, modification of cultural practices, and use of resistant varieties.

International Association of Fire Fighters (IAFF)

The International Association of Fire Fighters (IAFF) represents more than 334,000 professional fire fighters and paramedics across the United States and Canada.

LED

A light-emitting diode (LED) is a semiconductor device that emits light when electrical current flows through it. Compared to incandescent light bulbs, LEDs are smaller, sturdier, longer-lasting, and more energy-efficient.

LEED

[Leadership in Energy and Environmental Design](#) is a green building certification program used worldwide. Points are assigned to new buildings or renovations in categories such as energy, water, waste, materials, and health. Buildings can achieve Certified, Silver, Gold, or Platinum levels of certification.

LGO Protocol

The [Local Government Operations Protocol](#) for the quantification and reporting of greenhouse gas emissions inventories is a 237-page document published in 2010 that assists local governments in measuring and reporting a faithful, true, and fair account of their **GHG** emissions.

Microgrids

Microgrids are customized, small-scale, localized energy systems composed of an energy generation system and the facilities using the electricity for operations.

Micro hydroelectric

Micro hydroelectric power refers to small-scale hydroelectric systems. These can, for example, capture the energy of water flowing through a pipe.

Mitigation

Mitigation is the act of reducing or stabilizing a change, such as the warming of the planet. In the context of this Plan, mitigation measures seek ways to reduce levels of greenhouse gases in the atmosphere.

MTCO₂e

The unit “metric tons of CO₂ equivalent” (MTCO₂e) expresses the atmospheric impact of any greenhouse gas in terms of an equivalent quantity of carbon dioxide.

Natural System(s)

A natural system is a self-sustaining set of regularly interacting and interdependent components of air, water, land, and biological resources. It is essentially an ecosystem, although artificial ecosystems are possible, such as in a fish tank or terrarium. Artificial ecosystems are not self-sustaining and could collapse without human input. In the context of this Plan, natural systems are considered when carbon sequestration by City trees is included in the analysis of net greenhouse gas production by the City.

Neonicotinoid

Neonicotinoids are a class of water soluble insecticides which, like nicotine, act on certain kinds of receptors in the nerve synapse. Although initially praised for their low-toxicity to many beneficial insects, including bees, more recent research shows that even low levels of contamination impact bees' ability to forage for nectar, recall the location of flowers and possibly find their way back to the nest or hive, killing them indirectly.

Outreach

Outreach is an effort by individuals in an organization or group to connect its ideas or practices to the efforts of other organizations, groups, specific audiences or the general public. In the context of this Plan, outreach may include maintenance of a dashboard to inform the public of progress, offering educational programs in the community, and/or collaboration with organizations and groups that have similar sustainability goals. The purpose of outreach is to broaden the impact of efforts throughout the community.

Pesticides

Pesticides are a class of chemicals used to control insects, rodents, plants/weeds, fungus, mold, and bacteria.

R-22

R-22 refers to chlorodifluoromethane, a type of freon refrigerant phased out as of 2020 under the 1987 Montreal Protocol due to its ozone depletion potential and high global warming potential.

Resource Assistance for Rural Environments (RARE)

The mission of the Resource Assistance for Rural Environments (RARE) Program is to increase the capacity of rural communities to improve their economic, social, and environmental conditions, through the assistance of trained graduate-level members who live and work in communities for 11 months.

Renewable Energy

Renewable energy is energy from sources that are naturally replenished on a human timescale. According to the **EPA**, sources of renewable energy include wind power, solar power, geothermal technologies, landfill gas, biomass power, and low-impact small hydropower.

Renewable Hydrogen

Renewable Hydrogen is a liquid fuel alternative that shows promise, particularly when **EVs** may not be practical, such as for buses and long haul trucking.

Resilience

Resilience is the ability to bounce back from hardship. In the context of this Plan, this means being prepared to meet the needs of the community, both on the individual and the municipal level, in the face of natural disasters such as drought, wildfire, or earthquake.

RMA

The Recycling Modernization Act (RMA) is a 2021 State Senate Bill measure (OR SB 582) to expand access to recycling services and upgrade recycling facilities.

Sequestration

In general, sequestration refers to the taking or isolating of substances or assets. In the context of this Plan, carbon sequestration refers to removing carbon from the atmosphere and storing it in a stable form such as in plants or soil or rock.

Southern Oregon Climate Action Now (SOCAN)

Southern Oregon Climate Action Now (SOCAN) is an all-volunteer grassroots non-profit organization whose mission is to promote awareness and understanding about the science, causes, and consequences of climate change. SOCAN works with individuals and organizations in Southern Oregon, statewide, nationally, and internationally to advocate for both personal and governmental actions that reduce the emissions and atmospheric concentration of greenhouse gases.

Strategic Energy Management (SEM) Program

Strategic Energy Management (SEM) is an **Energy Trust** offering that provides businesses with tools and education to save energy. Participants learn how their business uses energy and identify where waste is happening.

Sustainability

Sustainability is the ability to persist and to thrive. In the context of this Plan, this means using resources in a way that does not diminish the ability of future generations to live well, or in economic terms, living off our interest rather than our principal.

Vanpooling

Vanpooling is similar to carpooling, but it involves a group of typically 7 to 15 people commuting together with an unpaid driver. Vehicles may be owned by an individual or provided by an employer.

Waste Reduction Model (WARM)

WARM is a tool developed by the **EPA** to provide high-level estimates of potential **GHG** emissions reductions, energy savings, and economic impacts from several different waste management practices. WARM estimates these impacts from baseline and alternative waste management practices—source reduction, recycling, anaerobic digestion, combustion, composting and landfilling.

List of Acronyms and Chemical Compounds

BE – Buildings and Energy

BEV – battery electric vehicle

CH₄ – methane

CM – Consumption and Materials

CO₂ – carbon dioxide

CSV – comma separated values (data file)

DC – direct current

EPA – Environmental Protection Agency

Energy Trust – Energy Trust of Oregon

EUI – energy use intensity

EV – electric vehicle

FCA – Facility Condition Assessment, performed by **MENG** Analysis

GHG – greenhouse gas

GIS – geographic information system

HR – Human Resources

HVAC – heating, ventilation, and cooling

ICLEI – International Council for Local Environmental Initiatives

IJA – Infrastructure Investment and Jobs Act

IRA – Inflation Reduction Act

kWh – kilowatt-hours

LED – light-emitting diode

LEED – Leadership in Energy and Environmental Design

LGO – Local Government Operations

LGOP – Local Government Operations Protocol



MENG – MENG Analysis is a business that provides independent quality and cost performance services for the built environment

MTCO_{2e} – metric tons of CO₂ equivalent

MW – megawatts

NS – Natural Systems

ODOT – Oregon Department of Transportation

PD – Police Department

PTO – paid time off

R – an open-source programming language for data analysis

R-22 – chlorodifluoromethane, a type of freon refrigerant phased out as of 2020 under the 1987 Montreal Protocol

RARE – Resource Assistance for Rural Environments

RCC – Rogue Community College

RE – renewable energy

RMA – Recycling Modernization Act

ROI – return on investment

SEAP – Sustainability and Energy Action Plan

SEAT – Sustainability and Energy Action Taskforce

SEM – Strategic Energy Management, an **Energy Trust** program

SOCAN – Southern Oregon Climate Action Now

T – Transportation

US DOE – United States Department of Energy

US DOT – United States Department of Transportation

WARM – Waste Reduction Model

WRP – Water Restoration Plant

ZE – zero emission

ZEV – zero emission vehicle







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Endnotes

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54. Appendix II (List of Available Funding Resources)
55. Appendix XII (Merlin Landfill Solar Calculations); Appendix XIII (Larger Merlin Landfill Helioscope)
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94. City data, see Appendix II (Base Project Projections)
95. Appendix IV (Methodology) (population growth estimates)
96. Appendix III (List of Available Funding Resources)
97. Calculations derived using PAC power plan
98. City data, see Appendix II (Base Project Projections)
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101. Appendix III (List of Available Funding Resources)
102. Funding assistance available through PAC sharing costs, according to consultation with Alan Meyer of Pacific Power
103. City data, see Appendix II (Larger Merlin Field Projections); Appendix XIII (Larger Merlin Landfill Helioscope)
104. Appendix XIII (Larger Merlin Solar Field Helioscope)
105. City data, see Appendix II (Large Merlin Field Projections); Appendix XII (Larger Merlin Landfill Helioscope)
106. City data, see Appendix II (Larger Merlin Field Projections)
107. City data, see Appendix II (Larger Merlin Field Projections)
108. Calculations derived using PAC power plan ref
109. City data, see Appendix II (Base Project Projections)
110. City data, see Appendix II (Larger Merlin Field Projections)
111. City data, see Appendix II (Civic Center Projections); Appendix IX (Civic Center Microgrid Helioscope)
112. Calculations derived using PAC power plan ref
113. City data, see Appendix II (Base Project Projections)
114. City data, see Appendix II (Base Project Projections)
115. LGO Protocol Ref
116. Info on R coding language
117. City data, see Appendix II (List of Available Funding Resources)
118. EPA GHG Calculator Tool
119. EPA equivalencies calculator ref
120. Plan Recommendations Priority Matrix, see *Implementation: Prioritizing Projects*, p. 81; City data, see Appendix II (Base Project Projections); City data, see Appendix II (Larger Merlin Field Projections); City data, see Appendix II (Civic Center Projections)
121. Appendix III (List of Available Funding Resources)

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DATA

Pacific Power
 Avista
 Republic Services
 Southern Oregon Sanitation
 Oregon Department of Energy
 US Census
 Portland University Population data

TOOLS

ARC GIS
 EPA GHG Calculator
 EPA WARM Calculator
 Google Maps
 HelioScope
 National Renewable Energy Lab

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