BEYOND TOXICS

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Bethel Clean Energy Project Feasibility Study

Helping Low-Income Households in an Environmental Justice Community Access Community Resources to Lower Greenhouse Gas Emissions and Save Money.

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Acknowledgements

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Beyond Toxics wishes to express our gratitude to partners who helped make this project possible. We appreciate receiving the start-up grant funding provided by Vertuelab. Gratitude goes out to our local publicly-owned utility, the Eugene Water and Electric Board, for their assistance to create educational content and for providing Home Energy Scores for project participants. We sincerely appreciate the Active Bethel Active Community Neighborhood Association, our community partners for sharing event planning, community advocacy, and a common vision of a vibrant and healthy Bethel. Special thanks to DS Consulting for consultation and encouragement. Also, we look forward to growing our partnership with Seeds for the Sol as each of our nonprofits engage, educate and empower Oregonians living in impacted communities to obtain clean, renewable, electric systems for their homes without incurring a financial burden.

Members of the Beyond Toxics and VertueLab teams at the first community meeting.

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Executive Summary

A changing climate, aging home heating systems and appliances, and ongoing exposure to harmful industrial and wildfire air pollution is creating extreme stress for frontline communities and is putting their physical and mental health, resilience and financial stability at risk. An environmental justice neighborhood in West Eugene, Oregon, is facing a wide range of these threats as a result of historically poor land use planning and lack of infrastructure investments from the local government.

In early 2023, Beyond Toxics conceptualized a project to support a section of the Bethel neighborhood, a working class, low-income and diverse neighborhood in West Eugene. We formed a cohort of households and facilitated community conversations about what residents need to survive a changing climate and dangerous contamination from nearby industrial polluters. After receiving a small project start-up grant from VertueLab, we launched The Bethel Clean Energy Project in March 2023 as a new demonstration project to achieve climate equity, improved health and no/low-cost access to clean energy systems.

The primary activities of the project were to engage an impacted community in decision making about how they want to create their own climate resilience and environmental health. Our objective was to help households develop an individualized work plan to install electric heating and cooling technologies, weatherization and air filtration systems to achieve highly desired environmental, health and climate benefits. An overarching project goal was to help this community face these challenges by providing education and pathways to obtain efficient and sustainable energy technology. Investing in home improvement and energy upgrades elevates positivity in a neighborhood beset by increasing risks of extreme weather events and prolonged exposures to polluted air. A project output is this feasibility report, which describes how the Bethel Clean Energy Project can serve as an energy equity model for other communities to pursue.

Our key project elements were to use our long history of grassroots work in the Bethel community to conduct a survey in the impacted neighborhood, select 15 participants, hold three workshops on electrification systems and technology and help participants obtain a home energy score from the local utility to guide their implementation plans.

Ten of the 15 project participants, or 66%, qualify as low - income households making less than 80% Area Median Income. Fourteen families are homeowners, and one family rents their home. Most have aging electrical systems and six homes have baseboard or ceiling electric resistance heating. Almost all homes are poorly weatherized and need insulation and air gap repairs. No participants have a heat pump water heater. Beyond Toxics' analysis of household energy needs and available financial incentives found that most households could use multiple local, state and federal energy assistance programs like the Inflation Reduction Act and local utility incentives to "stack" financial incentives to obtain no-cost or very low-cost new, efficient and electric energy systems and appliances. We are seeking to make "pay-as-you-save" loans available to those who may not be able to afford even low-cost energy improvements.

During the workshops, we measured shifts in attitudes and desired outcomes as a result of the learning that was taking place. Detailed information on types of electric and efficient energy was presented and participants were guided through a detailed discussion of available financial incentives and cost savings available for households of various income levels. We partnered with the Eugene Water and Electric Board and they prepared a home energy score for each household with recommendations on how to achieve greater energy efficiency, savings on utilities bills, and increased climate and pollution risk mitigation and livability. We then partnered with Seeds for the Sol to select two households for a small pilot project to test how to move forward with accessing funding, choosing contractors and installing elements of the resident's clean energy goals. Participants responded to the project with a high level of satisfaction. A recurring theme we heard during the workshops and the exit interviews was a renewed sense of neighborly connections that some felt had been missing since the onset of the COVID-19 pandemic. Participants also described a sense of hope sparked by their ability to make, or at least plan to make, needed home improvements and create positive change in their lives.

Glossary of Terms

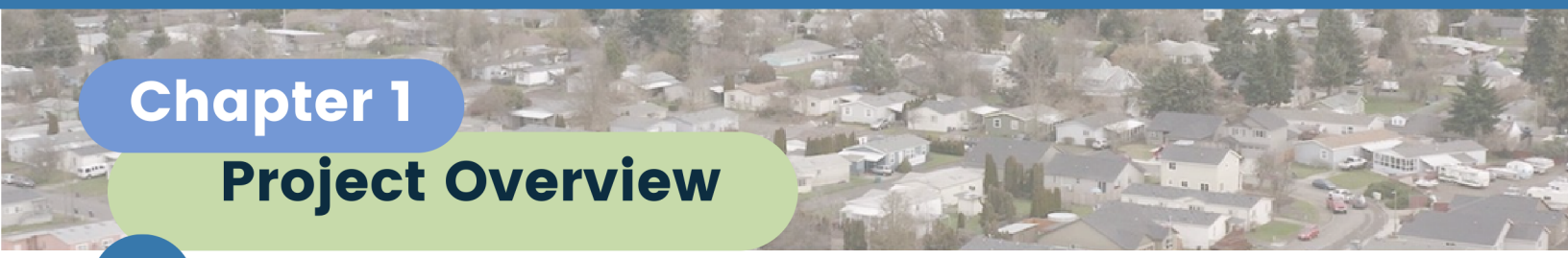
Area Median Income (AMI) - A measure for income level that varies based on location and is used to determine a households eligibility for certain programs.

Eugene Water & Electric Board (EWEB) - Local utility for Eugene, Oregon, and some of the surrounding area.

Federal Poverty Level (FPL) - A measure for income level that is the same nationwide and is used to determine a household's eligibility for certain programs.

Inflation Reduction Act (IRA) - Federal legislation that included incentives for weatherization projects and high efficiency electric appliances.

Oregon Department of Environmental Quality (ODEQ) - State of Oregon natural resources agency.



Chapter 1
Project Overview

1.1 What is the Bethel Clean Energy Project?

Beyond Toxics' Bethel Clean Energy Project (BCEP) is a collaborative effort with Business Oregon, Eugene Water and Electric Board (EWEB), Active Bethel Community (ABC) and VertueLab to help low-income residents learn about energy efficiency and clean energy technology to make self-informed decisions to pursue beneficial clean energy technology. This project was designed to support a cohort of vulnerable residents living in the Bethel neighborhood located in West Eugene. Participants are residents whose properties are in an area adjacent to the J.H. Baxter company, a creosote chemical manufacturer and wood preservative facility, now shut down. Due to decades of illegal activities at the J.H. Baxter site, this neighborhood is the victim of dioxin contamination. The US EPA and the Oregon Department of Environmental Quality (DEQ) recently tested residential soils for the presence of dioxin compounds and determined a number of properties have high dioxin levels and require extensive clean up.

The goal of the project is to support a low-income, pollution-burdened and climate-stressed community to become informed decision-makers empowered to take action to access renewable and electric energy systems. During three presentations, participants learned about home energy efficiency retrofits (insulation, new windows, etc), electric heat pumps and heat pump water heaters, solar power, and other technologies to reduce energy costs and protect the quality of indoor air for better health. Participants also learned about existing and soon to be available incentives from the State and Federal Government and local Utility Partner the Eugene Water and Electric Board. Each family received a $300 stipend to thank them for their participation.

Beyond Toxics did original research on the feasibility of providing households with low or zero cost solar panels, energy efficient appliances, and energy efficiency upgrades by utilizing incentives from the Inflation Reduction Act, the Eugene Water and Electric Board, and the State of Oregon. We shared the findings about the costs, benefits, and available incentives for different project types with program participants to assist them in their budgeting and timeline for projects and we are writing up the results of these findings as part of this report.

1.2 Bethel Clean Energy Project Partners

Beyond Toxics

Beyond Toxics is a statewide environmental justice organization working to ensure meaningful participation and grassroots leadership from Oregon's diverse and underserved communities. We are a multi-racial, multi-cultural, and inter-generational team dedicated to building a movement to advance the principles of environmental and social justice. Founded in 2001, Beyond Toxics' objective is to uplift the perspectives of Oregon communities disproportionately impacted by pollution and climate change to achieve fair, inclusive, and equitable access to clean air and water, and safe places for all to live and work in. We do this by collaborating with community-based groups, other nonprofits, educational institutions, and tribal organizations to build an inclusive process to achieving community health and well-being.

We engage frontline community stakeholders–early on and throughout project implementation by going door-to-door to speak with residents and reporting our findings back to the community–to create ongoing opportunities for dialogue and collaborations. Beyond Toxics' staff are from the communities we serve and have years of experience conducting listening sessions and leadership trainings, as well as collecting community narratives from those experiencing environmental and climate risks.

VertueLab

A $25,000 startup grant for BCEP was provided by VertueLab, a Pacific Northwest-based nonprofit fighting climate change. Their three guiding principles are: Unleash innovation by providing the critical funding for clean-tech startups where traditional investing fails to invest because of the high risk; Solve environmental challenges by providing holistic entrepreneurial support to clean-tech startups so they are more likely to reach commercial scale; Catalyze shared economic prosperity by dismantling barriers to prosperity for underserved communities. Through fifteen years of work, VertueLab focuses on accelerating climate solutions that are key to reversing the climate crisis by making direct, program-related investments in clean technology. VertueLab provided technical support and feedback to Beyond Toxics throughout the course of this 6-month project.

Eugene Water and Electric Board

The Eugene Water & Electric Board (EWEB) is a local public utility supplying residents of Eugene with electricity and drinking water services. Water is derived from the McKenzie River. Approximately 90% of EWEB's power comes from carbon-free sources, largely because of low-cost hydropower from dams on the McKenzie River and the Columbia River, and EWEB is committed to achieving a 95% carbon-free energy portfolio by 2030. As a BCEP project partner, EWEB contributed staffing resources to produce free Home Energy Scores to project participants. In addition, EWEB staff prepared a presentation on basic energy education, the results of the Home Energy Scores, and information about EWEB's Incentive Programs. EWEB's PowerPoint presentation is included in the report appendix and a synopsis of the Home Energy Scores is explained in Chapter 3.

Seeds for the Sol

Seeds for the Sol is a non-profit, grass-roots organization located in Corvallis, Oregon. This organization is taking action to remove the financial barriers to residential solar and electrification. Using a neighbor-to-neighbor funding model, they are providing immediate and tangible help so more people can put solar on their roofs. This help makes a difference for low-income households who are ready to access renewable, fossil-free energy systems but may not have the financial means to do so in the short term.

Seeds for the Sol seeks to repurpose the benefits reaped from a fossil fuel economy, passing them on to the next generation in the form of renewable energy. As a BCEP project partner, Seeds for the Sol is assisting Beyond Toxics kick off our mini-pilot project to work with two low-income households to get cost estimates and bids from local weatherization, plumbing and HVAC businesses so that they can become energy efficient as soon as possible without taking on any financial burdens.

1.3 Project Location

The Eugene Bethel Neighborhood

Because of a prevalent history of environmental racism, poor urban planning and industrial influence, the Bethel Community in West Eugene is disproportionately burdened by exposure to toxics and increased environmental and public health risks caused by climate change and industrial pollution. This community, comprising the Trainsong and Bethel neighborhoods, has been underserved by and underrepresented in Oregon's state and local decision-making processes. West Eugene is the 5th most populated zip code in the state of Oregon out of 413 zip codes. Yet, the area is only 6+ square miles. This area is an industrial corridor where 32 out of a total of 33 manufacturing companies in Eugene operate and encircle that residential area. An Envision Eugene report by the City of Eugene, confirms that more people of color live in the industrial corridor of West Eugene than all other areas of the city. While it is probable that census data doesn't capture Bethel's diverse population, recent US census data shows its population is approximately 18% Latinx residents, 2.4% Black residents and 1.5% Native American, compared to 7.4% Latinx, 1.6% Black and 0.9% Native American respectively for Eugene as a whole. Approximately 20% of the households live in poverty.

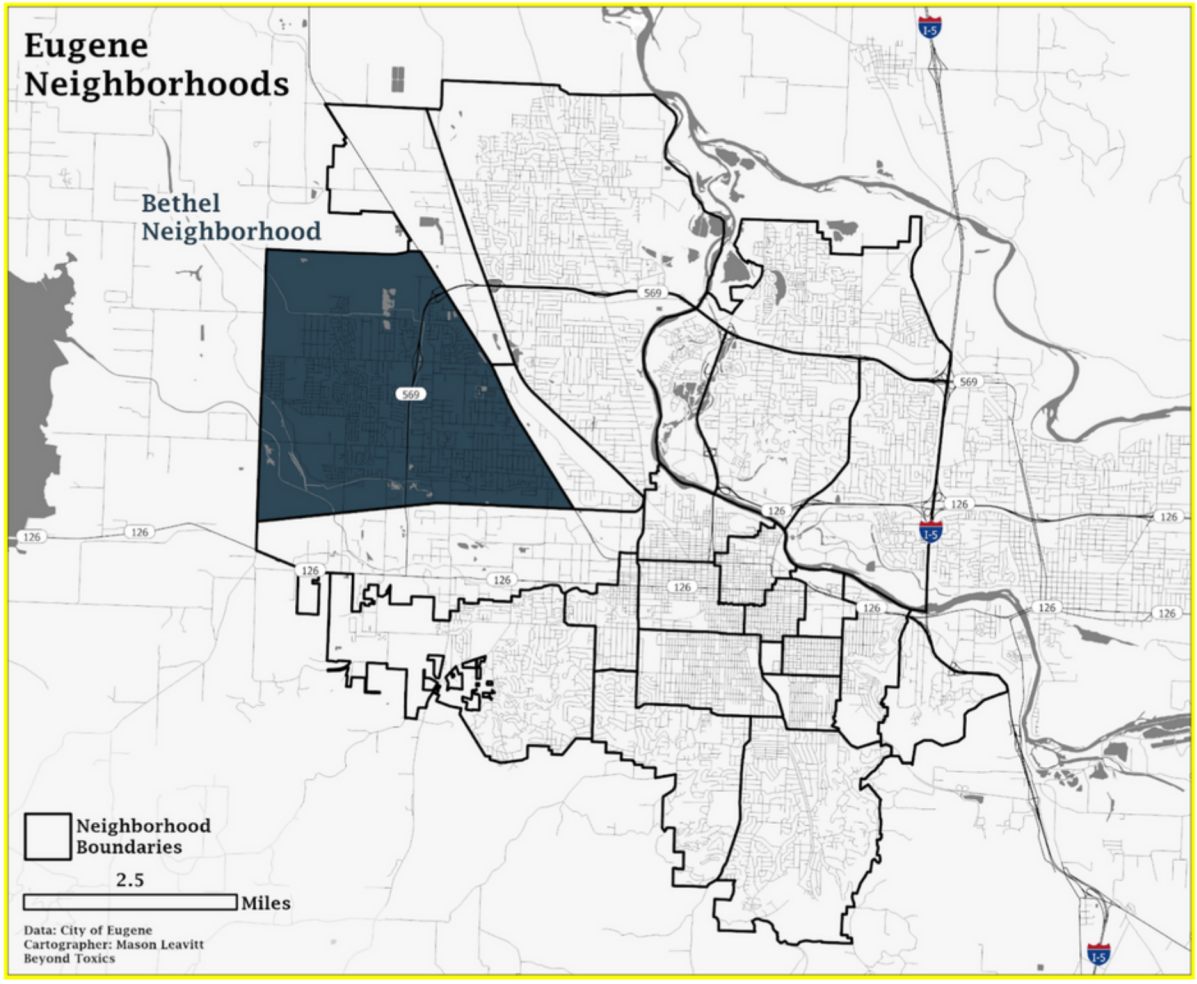


Figure 1. Vicinity map of the Bethel Neighborhood located in West Eugene. The area in dark shading shows the boundary of the Bethel Neighborhood in relation to other Eugene neighborhoods.

Bethel and Trainsong neighborhoods are exposed to over 96% of all air toxic emissions in the City of Eugene. Residents have filed thousands of complaints about foul smelling air and health impacts from toxic fumes. Socioeconomic data combined with environmental quality data provides a compelling understanding of West Eugene as an environmental justice community.

The Bethel Clean Energy Project is in the Justice40 Census Tract 41039004300 in the Bethel neighborhood in West Eugene, Oregon. This is a federally recognized lower-income area with disproportionate burdens of environmental health stressors. The residents in this Justice 40 Census Tract suffer from chronic and cumulative impacts of pollution including higher rates of coronary disease, cancer and asthma. The Oregon Health Authority analyzed records at the Oregon State Cancer Registry and found higher than expected cases of Hodgkin's Lymphoma and lung cancer. U.S. Census data ranks this neighborhood in the 81st percentile for lowest life expectancy. Residents in this part of Bethel are deeply concerned about the harms they face from living in an industrial corridor and at the intersection of major transportation infrastructure. Data from the United States Small-Area Life Expectancy Estimates Project shows that life expectancy for residents in these census tracts is 70.2 years, compared to 88 years for those in the city's more affluent neighborhoods located in Southeast Eugene near the University of Oregon. In other words, life expectancy is a full 18 years less in parts of West Eugene than the more affluent and predominantly white neighborhoods living in southeast Eugene.

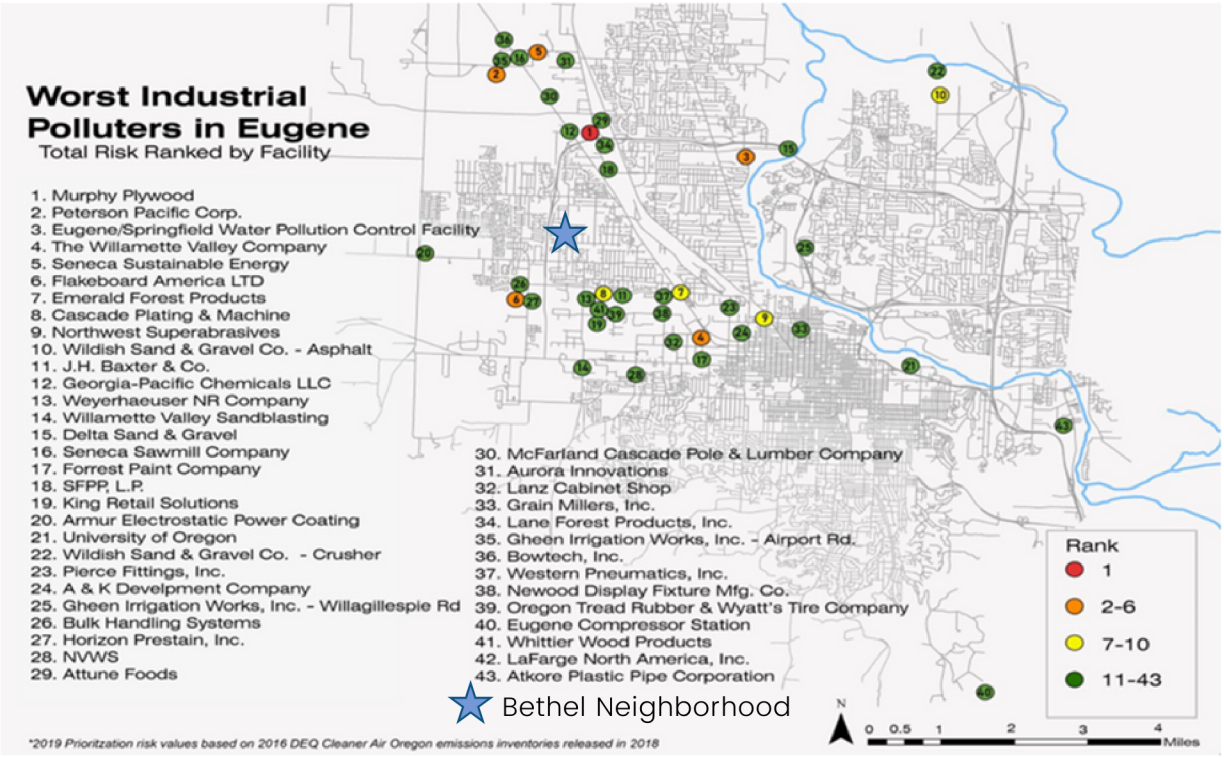


Figure 2. This map shows the location of manufactuing facilities that have air discharge permits with state regulatory agencies. The Cleaner Air Oregon program determines and ranks the public health risks of each facilitiy from highest risk (red) to lowest risk (green). The Bethel Neighborhood is situatioed between two industrial cooridors where manufacturers posing health risks are located. The blue star indicates the Bethel Neighborhood.

Beyond Toxics first raised awareness about excessive health and environmental risks from industrial polluters in 2012 when we organized an environmental justice bus tour and community-wide canvass. The 2012 bus tour had over 100 attendees, and we have organized more than 15 bus tours since 2012. Residents routinely report intense chemical odors from the J.H. Baxter creosote plant that prevent them from opening windows in the summer, holding family events outdoors, walking or biking.

People reported loss of breath, vomiting, coughing, sore throats, rashes and what appeared to be high rates of canine cancer. Property values are depressed and people are unable to sell their homes to leave the unhealthy air, water and soils. We've continued to organize in the community by holding focus groups, workshops, developing an ongoing Community Leadership Coalition and working with state regulatory agencies to monitor and hold polluters accountable.

In 2020, the Oregon Department of Environmental Quality (ODEQ) reached out to Beyond Toxics to help develop a soil sampling plan to evaluate potential dioxin contamination in this neighborhood. We formed a community coalition to ensure that the impacted community had a seat at the decision-making table. In December 2021, the ODEQ announced the results of soil testing: dioxin was measured at levels 20x over the clean-up benchmark in a number of residential yards and public parks in the vicinity of the J.H. Baxter wood preservative and chemical plant. The plant closed down a month later, and walked away from the necessary clean-up without any accountability. J.H. Baxter's owner left highly hazardous waste on the site – across the street from dozens of homes. Corporate malfeasance leaves this neighborhood living in fear of dioxin exposure, and leaves state agencies "holding the bag" to pay for the clean-up.

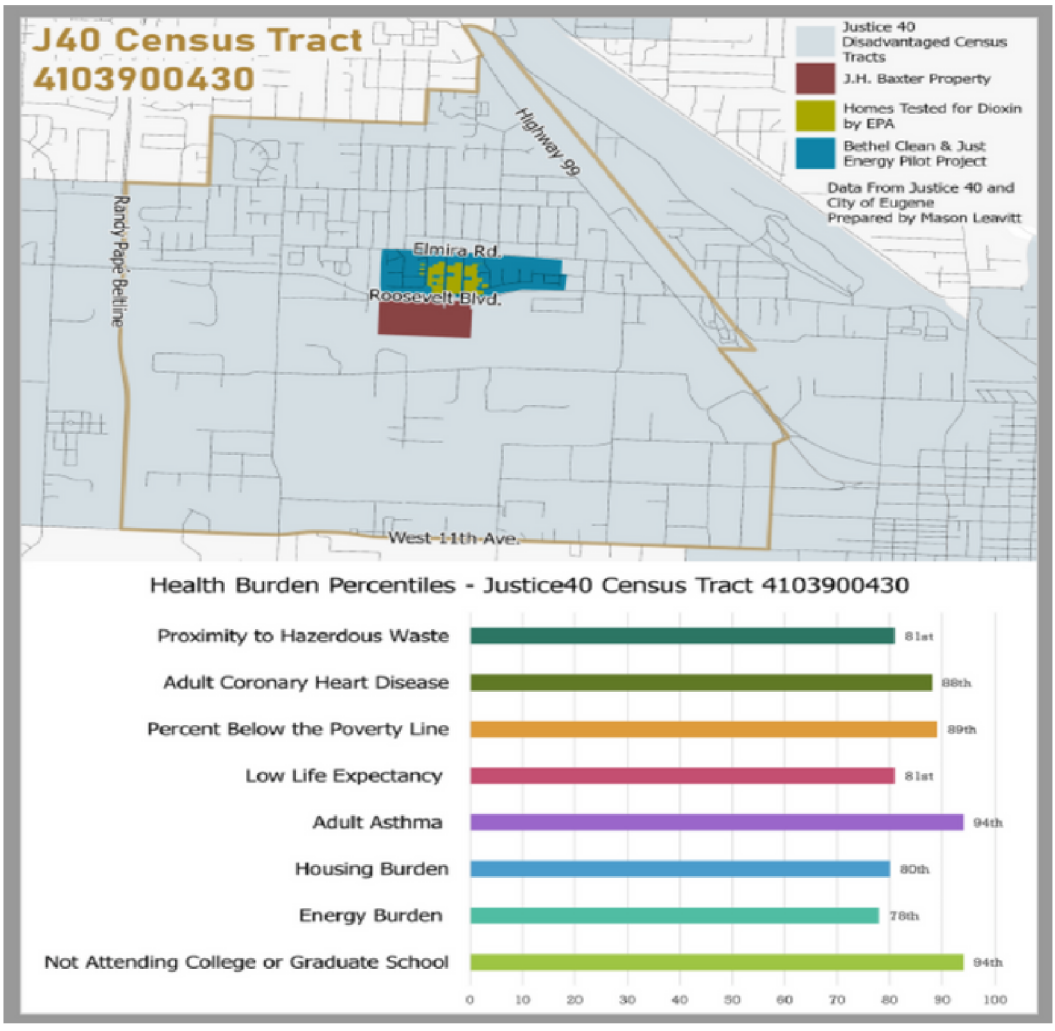


Figure 3. Health Burdens of Bethel J40 Census Tract.

In Figure 3, the larger area outlined and filled with gray shading marks the J40 Census Tract in Bethel. The smaller area filled in yellow indicates the streets and residential properties where the EPA and ODEQ conducted soil sampling to test for the presence of dioxin compounds in 2022 and 2023 (data current to 7/12/2023).

According to the Lane Regional Air Protection Agency, during the years 2002-2015, numerous complaints specifically focused on J.H. Baxter were called in, peaking to nearly 800 complaints in 2004. Over the years, J.H. Baxter has incurred multiple regulatory actions, civil penalties related to air quality, water quality and hazardous waste disposal, and most recently, mandated cleanup of soil and water contamination in and around the facility. In 2022, the DEQ levied civil penalties totaling $305,000, which J.H. Baxter has refused to pay.

The regulatory agencies have determined that the dioxin contamination is attributed to air toxic emissions and particle deposition from the adjacent J.H. Baxter wood treatment facility directly south of these homes, indicated as a red rectangle. Starting in 2022, federal and state agencies identified multiple residential properties containing dioxin levels exceeding health benchmarks that will require extensive removal of contaminated soil and replacement with clean soil. At this time, the EPA is continuing to expand their soil testing to additional properties to determine the full extent of the dioxin contamination. Beyond Toxics canvassed door-to-door throughout the streets indicated with blue shading to the north and northeast of the J.H. Baxter facility, and chose the Bethel Clean Energy Project cohort from this canvassing area.

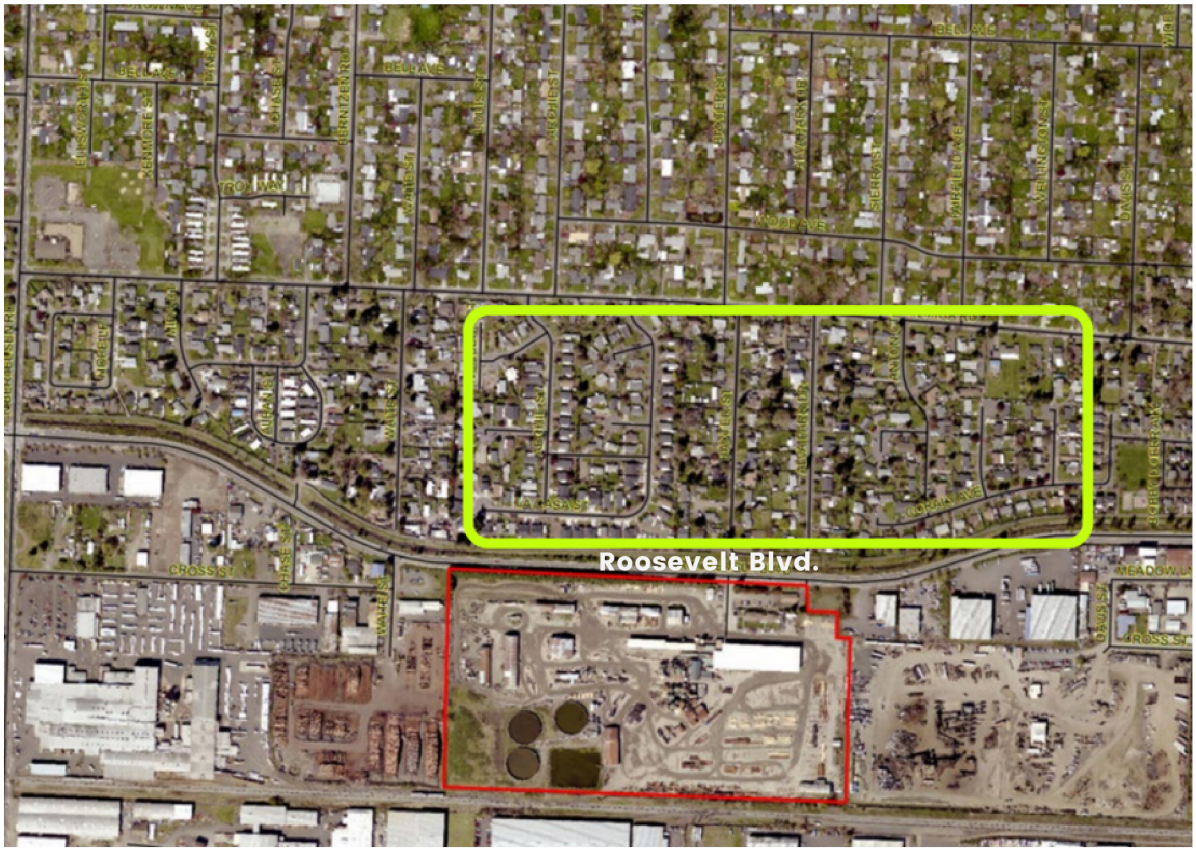


Figure 4: The location of the Bethel Clean Energy Project within the Bethel Neighborhood in West Eugene, situated northland northeast of the J.H. Baxter wood treatment facility. The streets outlined in yellow show the location north of Roosevelt Blvd. canvassed by Beyond Toxics for the Bethel Clean Energy Project. The location of J.H. Baxter is south of Roosevelt Blvd., indicated with a red border.

Figure 5. The ~40 acre J.H. Baxter Company - Aerial View (left) and Street View (right)

The round holding ponds in the bottom corner of the left photograph contain contaminated waste water. The tall tanks in the photograph on the right store chemicals such as pentachlorophenol, Ammoniacal Copper Zinc Arsenate (ACZA), 50-50 Oil, creosote, and Alkaline Copper Quarternary (ACQ).

In January 2022, J.H. Baxter abruptly shuttered its operations shortly after the dioxin contaminated soils and PCP groundwater were found. J.H. Baxter has refused to take responsibility for the necessary cleanup of the dioxin-contaminated soils on the site. In addition, J.H. Baxter has left over 600,000 gallons of highly hazardous waste on the property – across the street from dozens of homes. Corporate malfeasance leaves this neighborhood living in fear of dioxin exposure, and leaves state agencies "holding the bag" to pay for the cleanup by using public funds.

Beyond Toxics designed the Bethel Clean Energy Project to create opportunities for positive outcomes for a neighborhood shocked to learn that regulatory agencies have discovered dioxin contamination throughout the J.H. Baxter industrial site and in the yards of the homes north of the facility. The residents are also devastated to learn that the Oregon Health Authority determined that young children in the neighborhood have higher risks of cancer and reproductive organ damage from contact with dioxin-contaminated dirt. The EPA has announced the agency will seek funding from the federal Superfund Program to undertake the cleanup of the J.H. Baxter industrial site and the nearby residential neighborhood. Both the EPA and the Oregon DEQ will undertake the massive soil cleanup project requiring hundreds of tons of contaminated dirt to be removed from private residential properties and replaced by clean dirt.

1.4 Creating Climate Equity in Bethel

For a number of reasons, the Bethel community is the first and hardest hit community to experience the impacts of the climate crisis in the Eugene city limits. For example, the area lacks adequate tree canopy and public parks. In addition, three high-traffic state highways dissect and border the area, which creates excessive air pollution. The main rail line for West Coast passenger and freight trains also runs through the middle of Bethel and Trainsong neighborhoods. Highways, railroads and additional business thoroughfares, plus a plethora of industrial sites and "big box stores," create large swaths of paved surfaces. All of these factors create the conditions for a heat island effect with higher temperatures and more intense air pollution than any other neighborhood in Eugene.

Residents of Bethel who live closest to the industrial corridor predominantly live in older homes and mobile home parks. Many of these homes are equipped with baseboard heaters and no air conditioning. Low-income homes and mobile homes also lack adequate insulation from heat and cold.

The Bethel Clean Energy Project will help support residents impacted by the scar of pollution left by J.H. Baxter by providing no-cost or low-cost electric heating and cooling, air conditioning, water heating, home weatherization and, in the future, community solar. Beyond Toxics will partner with EWEB, clean energy contractors and no-cost lenders as we help these families navigate the complex decision making and documentation it will take to implement each household's Clean Energy Work Plan. The clean energy solutions these families choose can serve to improve property values, improve indoor air quality overall and, during periods of poor air quality from wildfire smoke, provide air conditioning during what is anticipated to be increasing common periods of intense heat due to climate change, and lower utility costs.

Bethel residents gathered in Lark Park for a community meeting with City Councilor Claire Syrett, Mayor Lucy Vinis and Beyond Toxics West Eugene Community Organizer Arjorie Arberry-Baribeault to discuss J.H. Baxter.

1.5 Project Goals and Outcomes

Our goal is to build climate resilience and improve the health of the environment and the people of Bethel, a low-income and working class environmental justice community in West Eugene. We anticipate achieving seven specific outcomes:

Empower People

Empower 15 residents by building their knowledge of climate solutions including solar technologies, heat pump and heat pump water heater technologies, home weatherizations and retrofits, and incentives available for installing efficient electrical appliances.

Engage Local Communities

Engage an impacted community in decision making about how they want to create their own climate resilience and environmental health.

Help Households Regulate Temperature

Help households install electric heating and cooling technologies, weatherization and air filtration systems to experience environmental, health and climate benefits, and to mitigate the decades of human health harm caused by air pollution from the former wood preservatives company and other heavy industries.

Build Partnerships

Partner with our local utility, local contractors and lenders to ensure that participants receive a home energy score and are assisted to develop an individualized work plan to access clean energy technology.

Set Stronger Standards

Create documentation of this demonstration project to serve as an energy equity model for other communities to pursue.

Incentivize Energy Efficiency

Study, report and take action based on the economic feasibility of providing energy efficiency and clean energy upgrades at no cost for low-income households living in an environmental justice community in Eugene using new incentives from the Inflation Reduction Act, State of Oregon, and local utility the Eugene Water and Electric Board, resulting in lower energy costs and more comfort for 15 low-income households.

Grow Community Solar Projects

Plan for a future community solar energy project in the heart of the Bethel neighborhood on the former J.H. Baxter industrial site, a repeat violator of environmental laws, the source of the newly discovered dioxin in soils and Pentachlorophenol (PCP) in groundwater, and now a federal clean-up site.

1.6 Methodology

The Bethel Clean Energy Project kicked off with door-to-door canvassing throughout the month of March 2023. We targeted the same geographic area identified by the Oregon Department of Environmental Quality for soil testing. The boundaries of the selected neighborhood are Roosevelt Avenue to the south, Elmira Road to the north, La Casa Street to the west and Anton Court to the east.

Beyond Toxics staff spoke to forty-six residents living within the boundaries of these four streets about their interest in participating in a clean energy project. All residents were informed of the following project details:

- Required to attend three in-person 90 minute meetings during May.
- Agree to allow EWEB to contact them to arrange to do a Home Energy Assessment and provide them with their Home Energy Score.
- Required to give permission to Beyond Toxics to have access to their Home Energy Score and documentation.
- Required to give an exit interview by phone or Zoom video conference.
- Required to give permission to use information about their Home Energy Score, survey responses, exit interview comments for the BCEP Feasibility Report with the understanding that all information is non-identifiable and is aggregated.
- Required to give permission to use photographs taken at the meetings.
- Participants who attended all three meetings and participated in the exit interview would receive a $300 stipend.
- A light dinner would be provided at the meetings.
- Spanish interpretation would be provided if requested (one family needed Spanish interpretation; a professional interpreter was provided for all three meetings)

Out of the forty-six contacted, eighteen households agreed to participate in the project. Fifteen households completed the pilot project. Each participating individual or family provided the necessary permissions and waivers.

Clean energy worshops were held on Thursdays, May 11, 18 and 25 from 6:00-7:30 PM. Each meeting had a theme. At each meeting participants were asked to fill out a survey with questions for which they ranked their level of knowledge about energy efficiency and prioritized their preferences for the type of clean energy upgrade they would likely choose to install. The survey was designed to help project organizers understand how attendees responded to the information shared during the three meetings and to provide a way to gauge the participants' changing attitudes and increased knowledge about energy efficiency for their home.

Each meeting was planned to build basic knowledge about energy efficiency, upfront costs, cost benefits, financial incentives and implementation strategies.

Community Meetings

The meeting agendas and flow of information was set forth as follows:

- May 11, 2023: Introductions of attendees; Discussion of Project Goals; What is Clean Energy in Residential Settings?; What Projects might be Possible and Affordable? (See Appendix B for links to the presentation materials)
  - Speakers: Beyond Toxics, VertueLab
- May 18, 2023: What does EWEB offer as your publicly owned utility?; What are the Federal, State and Local Incentives and Financing Opportunities? (See Appendix B for links to the presentation materials)
  - Speakers: EWEB, Beyond Toxics
- May 25, 2023: Review of Individual Energy Audits; What Implementation is Feasible/Desirable? Community Conversation about a Community Vision? Next Steps towards Implementation. (See Appendix B for links to the presentation materials)
  - Speakers: Beyond Toxics, EWEB

- Invited Guests: The Eugene Sustainability Commission, the Eugene City Council and the EWEB Board
- See Appendix B for links to the presentation materials

1.7 Bethel Clean Energy Community Education and Energy Preferences

The Households in the Cohort

One of the goals of the Bethel Clean Energy Project was to provide education on climate, energy and public health to participating households. Participants were also invited to learn about incentive programs that may be available to help them install energy efficient electric appliances and weatherization upgrades. VertueLab, Beyond Toxics, and the Eugene Water and Electric Board gave presentations during the three community meetings.

VertueLab gave an introduction to types of clean energy and energy efficiency appliances. EWEB provided basic energy education about where EWEB's power comes from, information about typical household costs associated with the energy used to heat and cool home spaces and water heating, and how to calculate the cost per hour to operate appliances based on their wattage. EWEB also provided an overview and answered questions about the Home Energy Scores they provided to participating households. This was followed by discussions about how to apply incentives available from EWEB to tackle the weatherization and energy upgrades recommended in the individualized Home Energy Score report.

Beyond Toxics provided education on health impacts related to exposure to outdoor air pollution and to indoor air pollution associated with the emissions from gas appliances. Beyond Toxics also introduced participants to upcoming incentives from the Inflation Reduction Act and from the Oregon Solar and Storage Program and walked them through examples of how to apply the incentives based on household income and choice of energy upgrade, e.g., heat pumps, heat pump water heaters, etc. [Links to the Powerpoint slides for all the presentations can be found in Appendix B.]

One of the benefits of the program was how participants' viewpoints changed on what energy efficient technologies were preferred in their homes as their knowledge about the topic increased. These findings can be seen in the results of the "straw polls" taken at the first and third meetings. Prior to the start of the first meeting, the majority of participants identified rooftop solar as their most likely clean energy installation choice. However, after learning about the cost benefits of installing heat pump heating/cooling systems or a heat pump water heater, nearly every household identified appliance upgrades as their first choice for implementing energy efficient technology.

Attitudes about energy preferences began to shift after cohort members learned how to become more energy efficient by prioritizing weatherization improvements (including insulation in attic, walls and floors) and sealing gaps to lower energy costs in Workshop Session 1. Following Workshop Session 2, participants adjusted their preferences to reflect their burgeoning knowledge of their eligibility for financial incentives and rebates for efficient electric heating/cooling heat pumps and heat pump water heaters. After receiving their Home Energy Score in Session 3, preferences became more firmly centered on getting more efficient and modern electric appliances combined with sealing gaps in areas of their homes in order to moderate indoor temperatures and keep air pollution out.

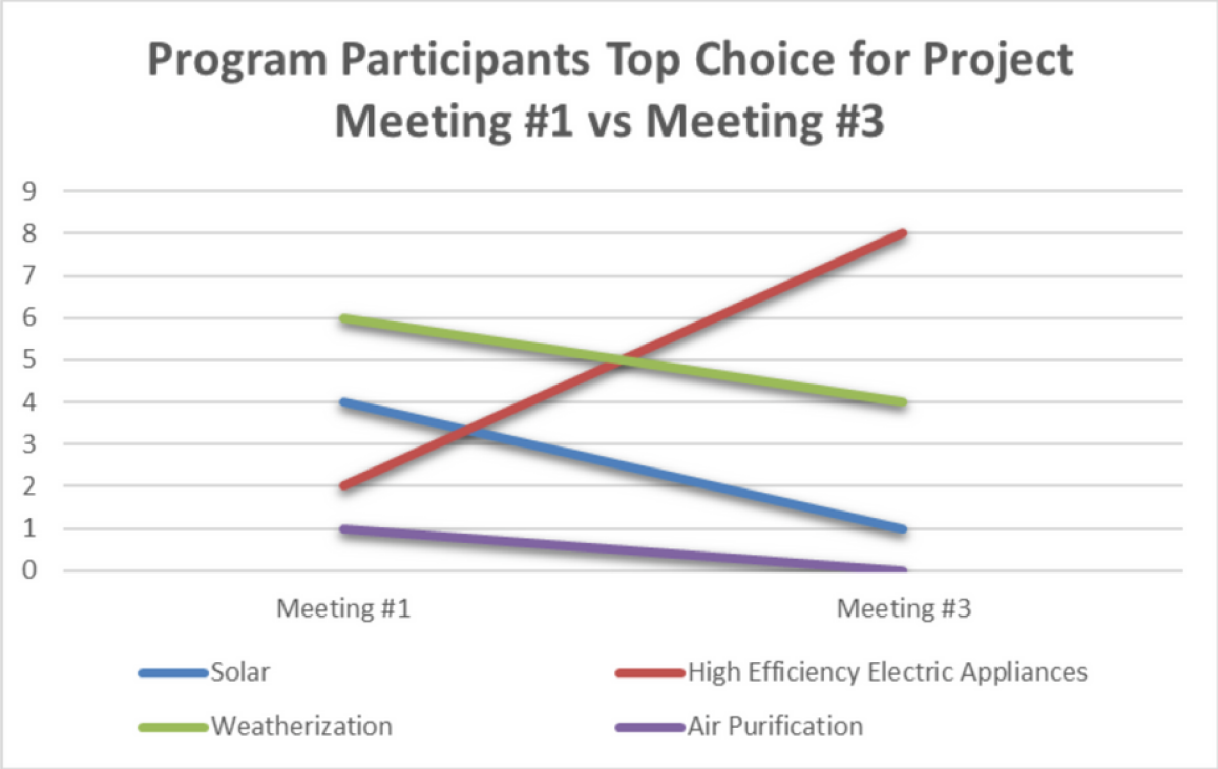
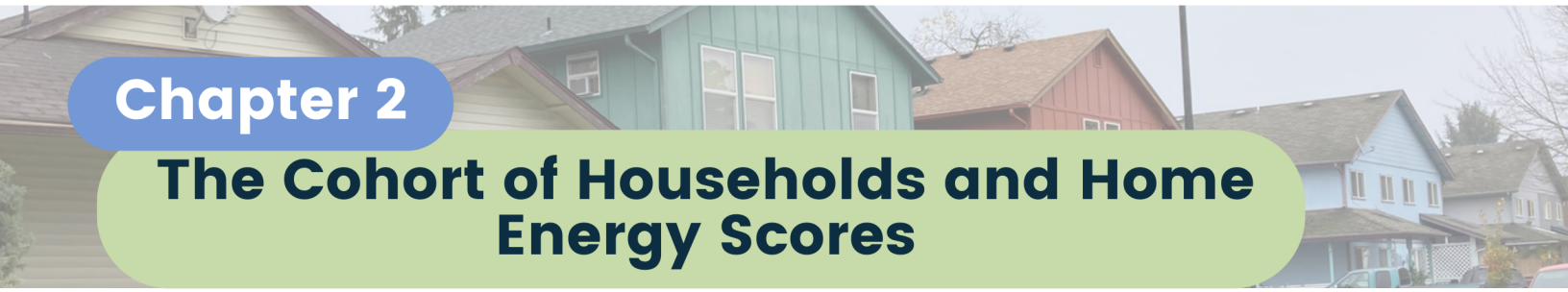


Figure 6. Changes in Preferred Clean Energy Priorities over course of the workshops.



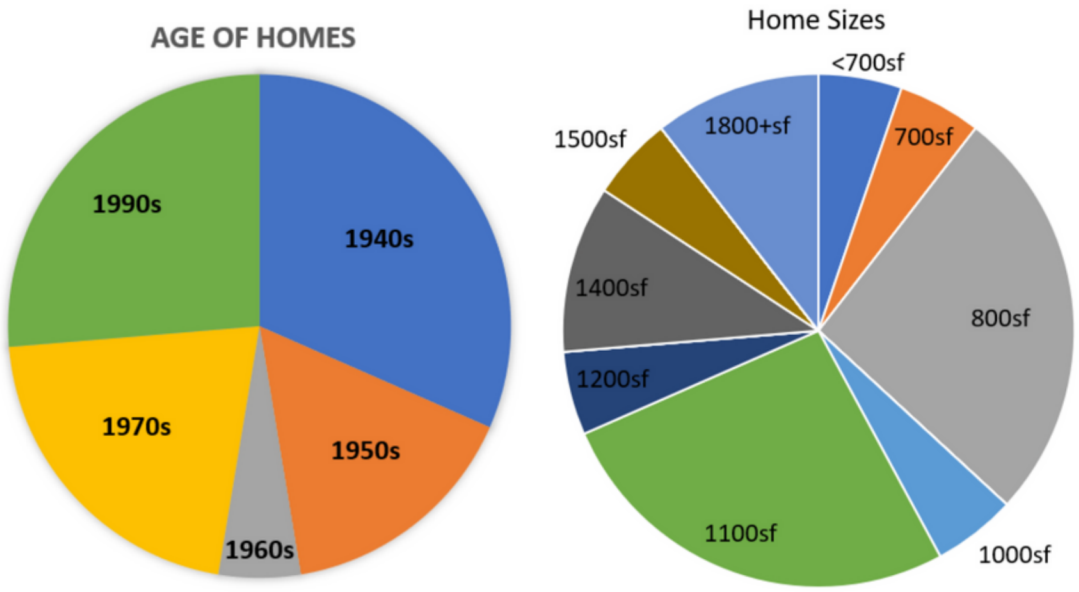
Chapter 2
The Cohort of Households and Home Energy Scores

2.1 Description of Participants

The Bethel area was originally a farming community on the outskirts of the city of Eugene with its own school district and identity. As the city expanded, much of the farmland was rezoned for heavy industrial, railroad and highway. Low-income housing was originally constructed for rail workers and other jobs associated with the timber products industry. The BCEP cohort residents live in a variety of modest-sized homes, some of them from the stock of original worker housing built in the early 1940s and others built within the past 30 years. In many sections of Bethel, there are tracts of manufactured homes. The people we are working with have homes located in the neighborhood directly north of the J.H. Baxter site and live in the area targeted by the EPA for soil testing for dioxin due to contamination from the Baxter site.

Fourteen of the fifteen participating households are homeowners and one household is renting their home.

The Age of Participants' Houses



Type of Home in Cohort	#	Average Age	Age Range
Wood-built Home	12	60	28 yrs - 78 yrs
Manufactured Home	3	27	24 yrs - 29 yrs

Figure 7. The Age and Size of Participants' Houses.

Heating System Types

A little over half of participants already had heat pump systems, with the majority of the remainder using electric resistance and one using gas to heat their homes. Of the households with heat pumps, most of the systems were quite old and were reaching the end of their useful life. Many were too small and thus insufficient to effectively heat and cool the homes.

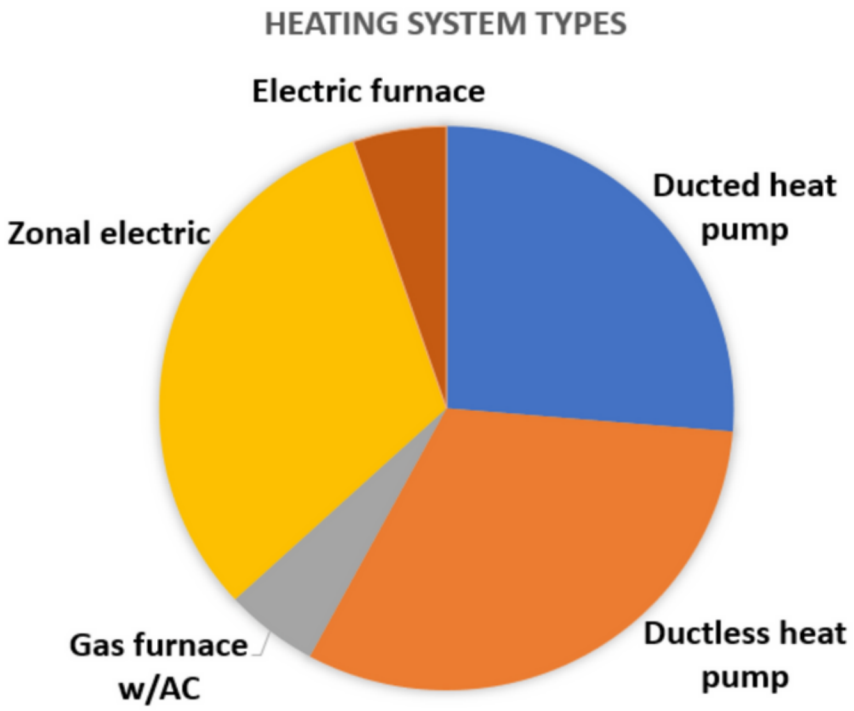
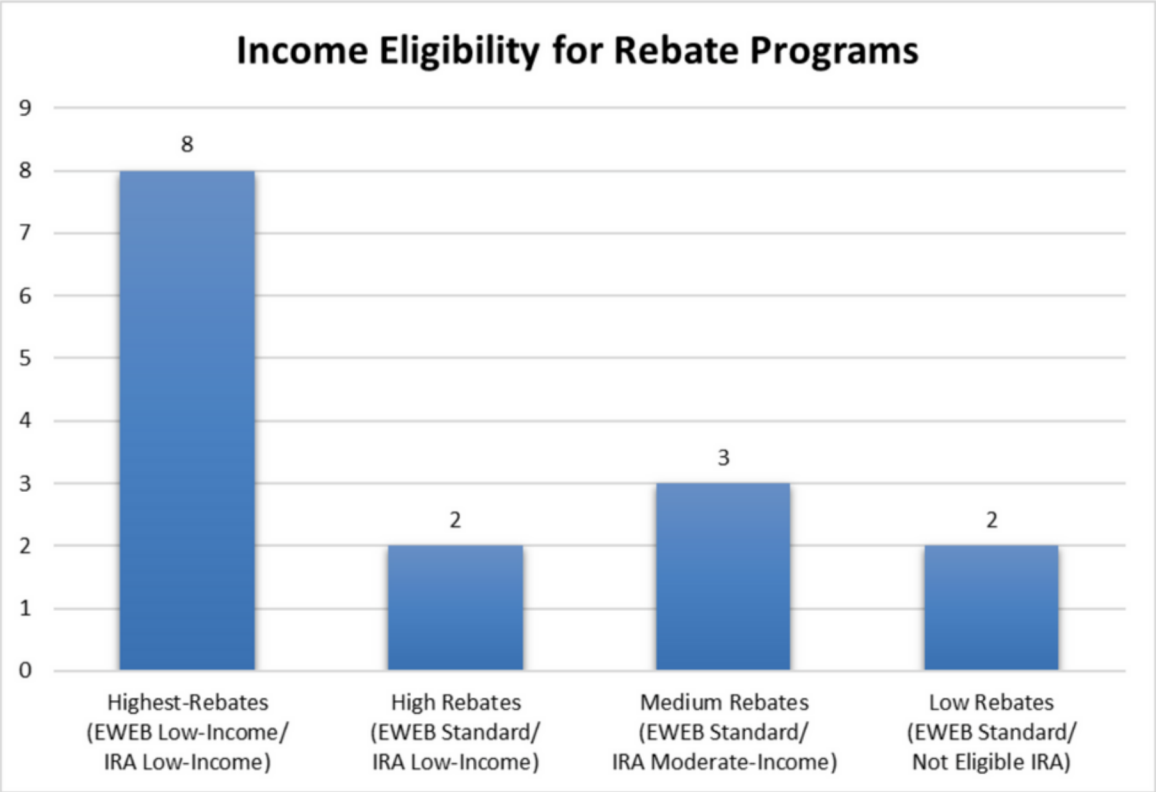


Figure 8. Types of Heating/Cooling Systems Currently In Use.

Income Eligibility for Home Retrofit Programs

Beyond Toxics asked participants to provide their income levels within a range of incomes to help them determine their eligibility for financial incentives. (See Chapter 4, Figures 29 and 32 for income eligibilities for IRA and EWEB incentives, respectively.)

Of the households in the cohort that provided their Income information, the breakdown of income eligibility for various programs is as follows:



Rebates Available	Income Level	EWEB Eligibility	IRA Eligibility	Number of Households
Highest	Lowest: <80% Area Median Income (AMI) and <200% Federal Poverty Level	Low-Income*	Low-Income	8
High	Low-Mid: < 80% Area Median Income (AMI) and > 200% FPL	Standard	Low-Income	2
Medium	Mid: >200% FPL and between 80%-150% Area Median Income	Standard	Moderate-Income	3
Low	High: >150% Area Median Income	Standard	Not Eligible	2

Figure 9. Income Eligibility for Rebate Programs. *Natural Gas customers are not eligible for low-income EWEB rebates. For more information on how to determine income eligibility for different programs, see Chapter 4 on Available Incentives.

Section 2 - EWEB Home Energy Scores

EWEB worked with the households in the cohort to perform Home Energy Score assessments of their homes to identify priority actions and expected cost savings. EWEB prepared home energy scores for eighteen households that originally signed up to participate in the project. Fifteen households completed the required three workshops. The following data reflects the original eighteen participants. A description of the Home Energy Score and the findings from those Home Energy Scores is summarized as follows.

What is a Home Energy Score? The Home Energy Score was developed by the US Department of Energy (DOE) as an affordable, reliable, and easy way to understand a home's energy use. It is similar to a miles-per-gallon rating for a car. EWEB became a Home Energy Score Partner with US DOE in 2016. Since then, EWEB has made modifications to encourage efficient electric heat pumps, and to allow for either in-person or remote assessments for all housing types (including manufactured homes and apartments).

For comparing energy use across the housing market, a Home Energy Score can be more useful than prior utility bills. It estimates the annual energy use for a home based on the asset (not the occupants), assuming typical occupancy and an average weather year, and assigns a score based on the energy use. The score ranges from 1 to 10, where a score of 1 means the home is expected to use more energy than 85% of US homes, a score of 5 is average energy use, and a score of 10 means the home is expected to use less energy than 90% of US homes (more energy efficient). The report also provides a Score With Improvements, which reflects how the home would score if cost-effective energy improvements are made.

Results of Home Energy Scores. The average score was 4.2 in this group of homes out of a possible 10 points. If the recommended projects were completed, the average score would be 8.6. Example projects include insulation, air sealing, heat pumps and heat pump water heaters.

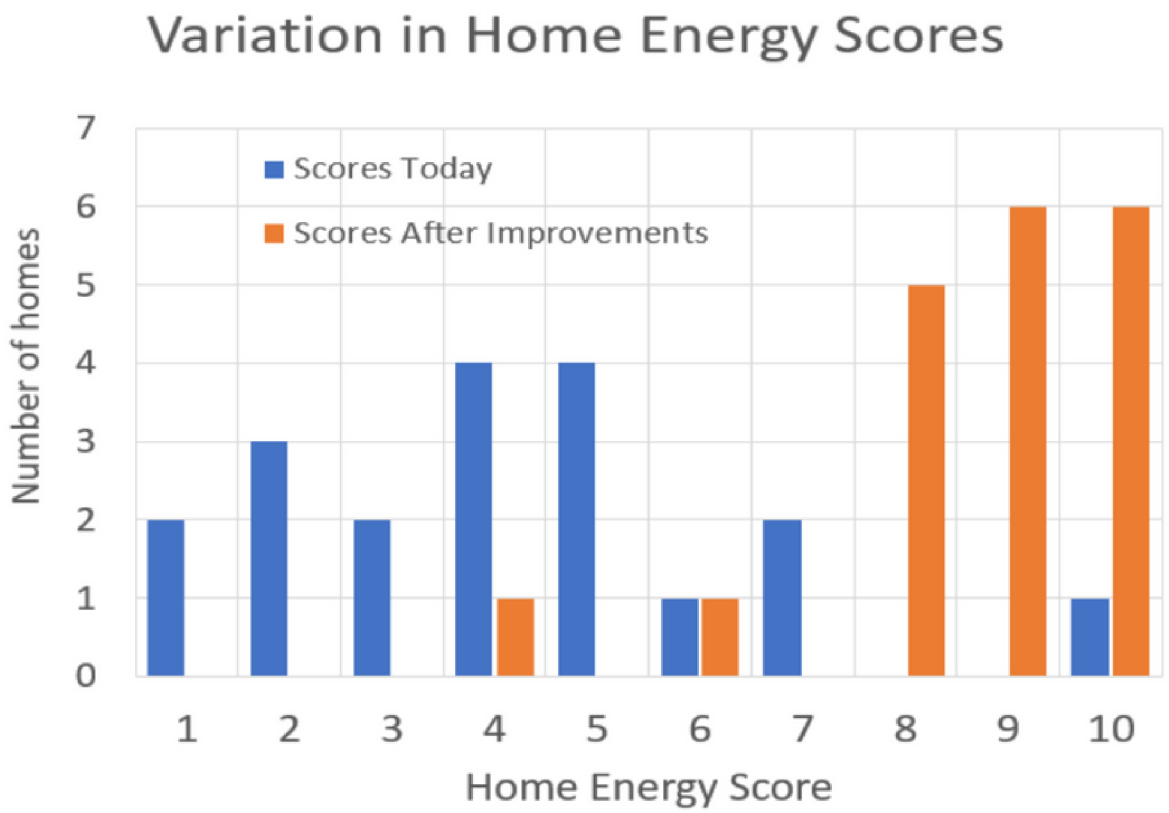


Figure 10. Variation on Cohort Home Energy Scores. EWEB calculated the home energy score currently assigned to homes and compared that with how they would score after implementing EWEB's recommendations for energy upgrades.

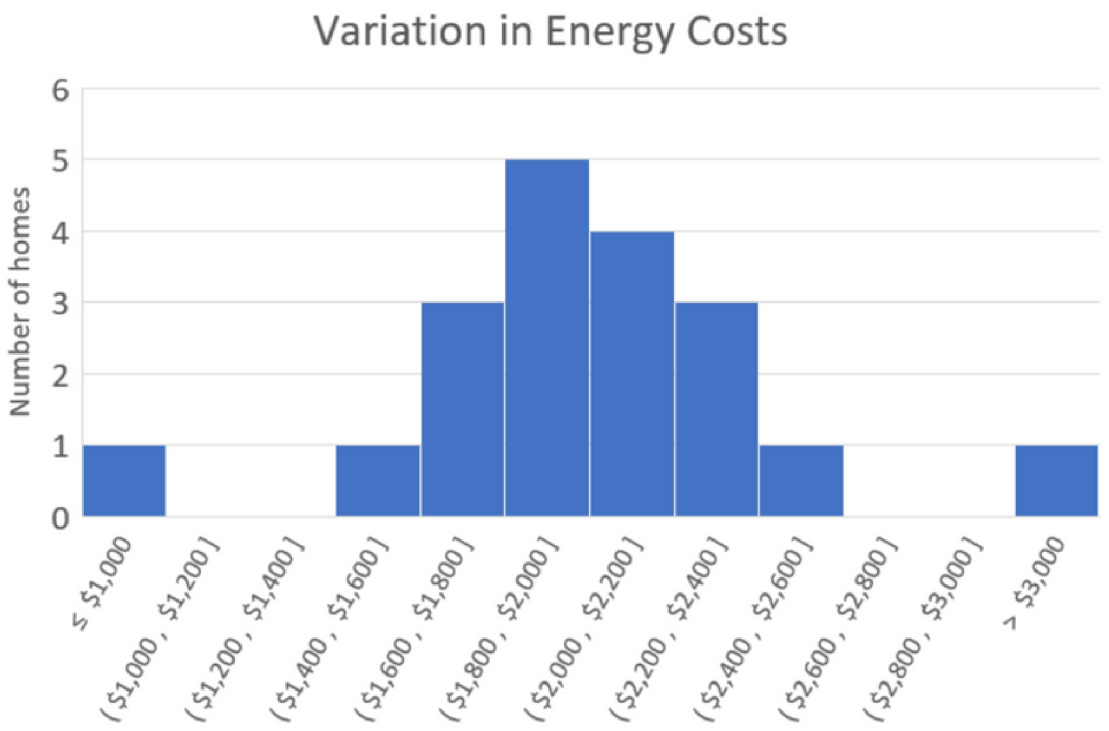


Figure 11. Variation in Energy Costs for Cohort Households. EWEB calculated the expected annual Energy Costs for participating homes. Expected annual energy costs ranged from $298-$3288/yr with an average of $1953/yr.

Participants learned about the energy improvements recommended by EWEB based on their Home Energy Scores. The percent of homes that would benefit from each energy upgrade project type are shown below.

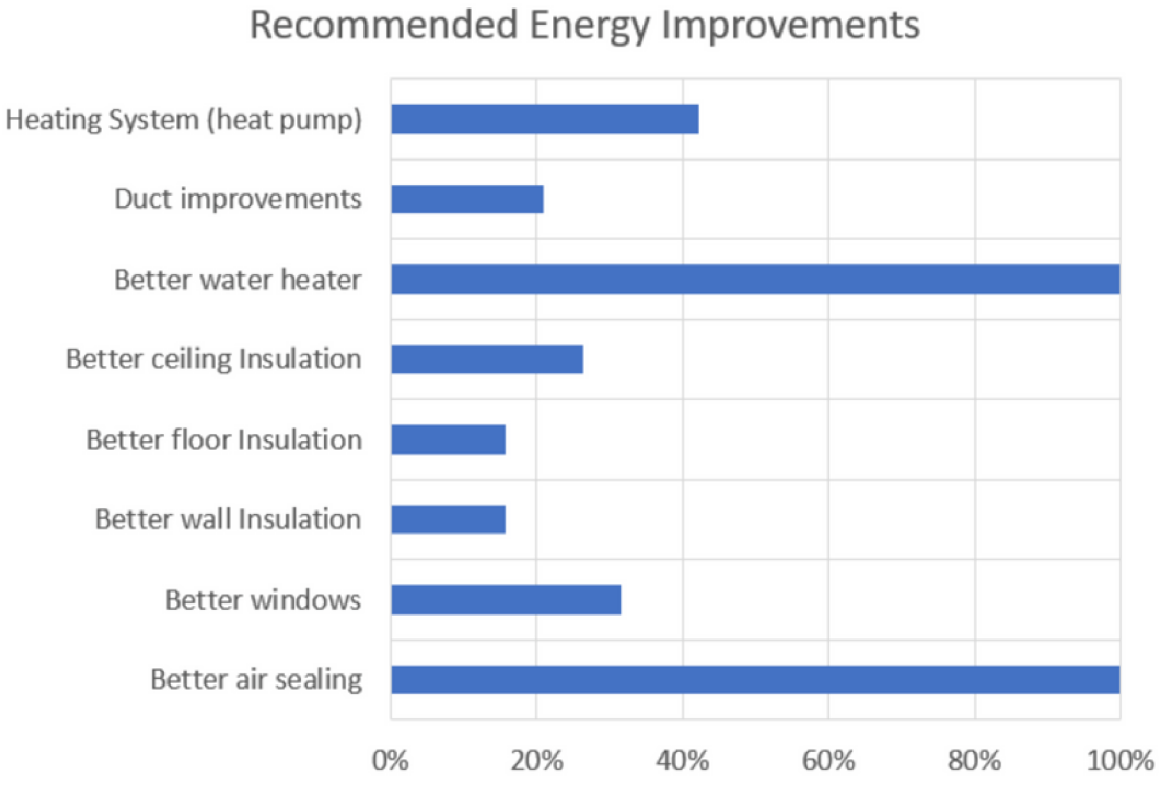


Figure 12. Percent of Homes Needing Energy Efficiency Upgrades

EWEB also calculated estimated annual energy savings if the recommended energy efficiency upgrades were made. Annual energy savings are estimated to range from $237-$1729/yr, with an average savings of $564/yr.

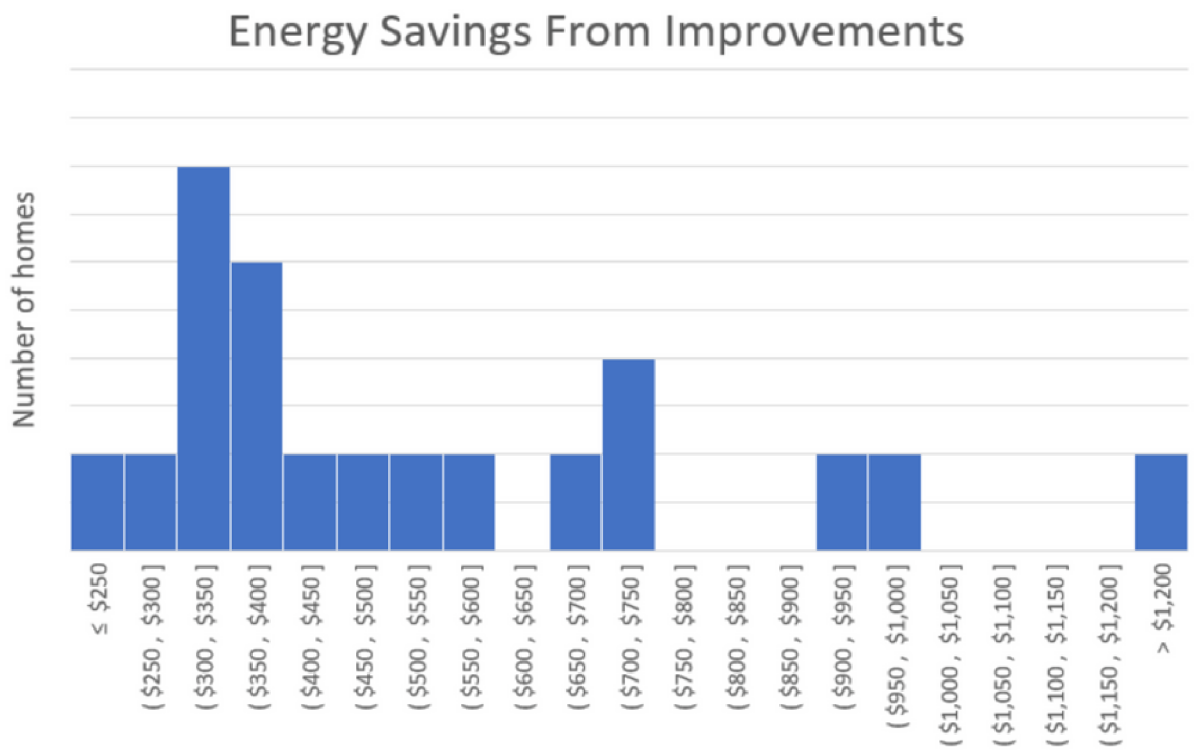


Figure 13. EWEB's Estimated Energy Savings after Upgrades.

Chapter 3
Costs and Benefits

3.1 Costs and Benefits of Clean Energy and Energy Efficiency Projects

The Bethel Clean Energy Study Project found it will be feasible to provide heat pumps, heat pump water heaters, and energy efficiency improvements like insulation to low-income and moderate-income households in the EWEB service area at zero or low-cost by combining Inflation Reduction Act (IRA) and EWEB incentives. These projects will provide energy cost savings compared to natural gas and electric resistance heating units. Building on case studies about IRA funding by Rewiring America incorporating local incentives, low-income households will be able to get heat pumps, heat pump water heaters, and insulation installed for free in most cases and can access zero-interest financing to cover higher costs if needed. With electrification incentives, moderate income households can install heat pumps, and heat pump water heaters at a similar upfront cost to electric resistance or gas alternatives. The incentives can also lower long term operating costs.

The Project found that rooftop solar was less feasible for participating households at this time, with existing EWEB, State of Oregon, and Federal incentives insufficient to overcome high upfront costs of systems. In addition, many participants were not able to afford the added cost of a new roof capable of supporting a solar array if their existing roof was too old or structurally insufficient.

As part of our feasibility study, Beyond Toxics began by modeling expected costs and savings for heat pumps, heat pump water heaters, and solar panels using local and national data sources and taking IRA and EWEB incentives into account. This modeling suggests there is a significant opportunity for cost savings for low-income and moderate-income households that take advantage of upcoming rebates from the Inflation Reduction Act in combination with available incentives from EWEB.

Beyond Toxics is now working with Bethel Clean Energy Project participants on Case Studies where program participants are receiving bids for the projects recommended in their EWEB Home Energy Score. The goal is to complete insulation projects now using existing EWEB rebates for low-income households that cover 100% of insulation costs and installing heat pumps and heat pump water heaters when IRA funds become available. Communications with contractors confirm it is possible to install heat pumps and heat pump water heaters for the prices modeled in our initial analysis, making it highly possible to install heat pumps and heat pump water heaters for free for low-income households and for a low cost to moderate income households.

Costs

The feasibility study looked at three main types of project costs; the installation cost, the annual energy costs, and the final cost to the customer. We will walk through each of these costs in relation to heat pumps, heat pump water heaters, and solar panels.

Types of Costs

- Installation Cost - The cost for materials and labor to install a project.
- Energy Costs - The costs to run an appliance on a monthly or annual basis.
- Associated Project Costs - Costs associated with an energy efficiency or green energy project needed to make the project work. This could include things like wiring for a new 240 V outlet or an electric panel upgrade to support a new heat pump or heat pump water heater or a roof repair if the current roof is unable to support solar panels.
- Final Cost to Customer - The cost the customer pays for a project after available incentives are applied.
- Actual vs. Projected Costs - Projected costs are based on data from National and Regional Government Sources like US Department of Energy's Energy Star Program and the Bonneville Power Administration. Actual costs are based on appliance costs from local retailers and bids from local contractors.

Cost Savings

The feasibility study considered three types of cost savings in the analysis; Energy Cost Savings, Avoided Appliance Replacement Costs, and Incentive Programs including Rebates, Tax Credits, and Zero-Interest Loans.

- Energy Cost Savings - The reduced energy cost of running one appliance in comparison to another
- Avoided Appliance Replacement Costs - Households purchasing a new energy efficient appliance will avoid the cost of purchasing a conventional electric resistance or gas appliance that they would have otherwise purchased.
- Incentive Programs - Incentive programs provide support for energy efficiency and clean energy projects in various ways. The incentives considered in this report include:
    - Rebates- Rebates are subsidies that can be applied to a project to reduce the amount paid by the customer.
    - Tax Credits - Tax credits provide money back to the household the year after a project is installed based on the Installation Cost to the Customer after Rebates are applied.
    - Zero-Interest Loans - Zero-Interest and other low interest loans provide an opportunity to lower the upfront cost of projects and let customers pay for these improvements over time.

Incentive Programs Included in Cost Benefit Analysis

The following incentive programs were included in the Cost Benefit Analysis:

- Inflation Reduction Act Electrification Rebates
- Eugene Water and Electric Board Electrification Rebates
- Eugene Water and Electric Board Zero Interest Loans
- Oregon Community Solar and Storage Program Rebates
- Inflation Reduction Act Tax Credits

The Bethel Clean Energy Project researched the following programs for potential usefulness in supporting low-income households, but did not include them in the cost and benefit analysis due to limited fund availability for the Oregon Community Heat Pump Deployment Program and the IRA's Electrification Rebates offering better opportunities to low and moderate income households than the IRA's Whole Home Retrofit Program. It may be possible to use these as supplemental programs to support electrification projects when IRA Electrification Rebates are insufficient.

Programs considered but not included in the Cost Benefit Analysis:

- The Oregon Community Heat Pump Deployment Program
- The Inflation Reduction Act's Whole Home Retrofit Program

In addition, these programs can provide additional resources but were not included in the modeling:

- EWEB Rebates for Insulation - This Program will cover 100% of insulation costs for low-income households.
- EWEB and IRA rebates for Electric Panel and Wiring Upgrades covering costs associated with installing energy efficient appliances. There are significant resources available from the IRA and EWEB to cover the costs of wiring and electric panel upgrades expected to be sufficient to cover 100% of the costs for low-income households.

To learn more about how these incentive programs work, visit Chapter 4 of this report on Available Incentives Programs for detailed descriptions of each program considered in the report and links to 3rd party resources with additional information.

3.2 Cost and Benefit Analysis Findings - Heat Pump Water Heaters (HPWH)

It is feasible to provide heat pump water heaters to low-income households for zero cost and to moderate-income households at low cost by combining IRA and EWEB Rebates and Loans.

Heat Pump Water Heater Project Costs: Low-Income Households

Low-income households will be able to install a Heat Pump Water Heater for free in most cases by utilizing IRA (when made available) and EWEB rebates. Zero-interest financing is also available from EWEB, allowing zero upfront costs for more expensive projects. EWEB has a low income rebate of $1,700 for low-income households and the IRA has a planned rebate covering 100% of out-of-pocket expenses for low-income households up to $1,750 off. Combined, these rebates from EWEB and the IRA can provide up to $3,450 off heat pump water heaters for low-income households. EWEB offers an additional $2,500 in zero-interest financing for low income customers in addition to this amount. This level of rebates is sufficient to cover 100% of the cost of units up to $3,450 and utilizing zero-interest loans allows for projects with zero upfront costs to the customer for units up to $5,950.

Example: In the example below, low-income rebates from EWEB and anticipated from the IRA are expected to cover the entire installation costs for a heat pump water heater, resulting in a zero-cost installation for the low-income household. Zero-interest loans would be available to the customer if the cost of the unit exceeded the $3,450 in available rebates.

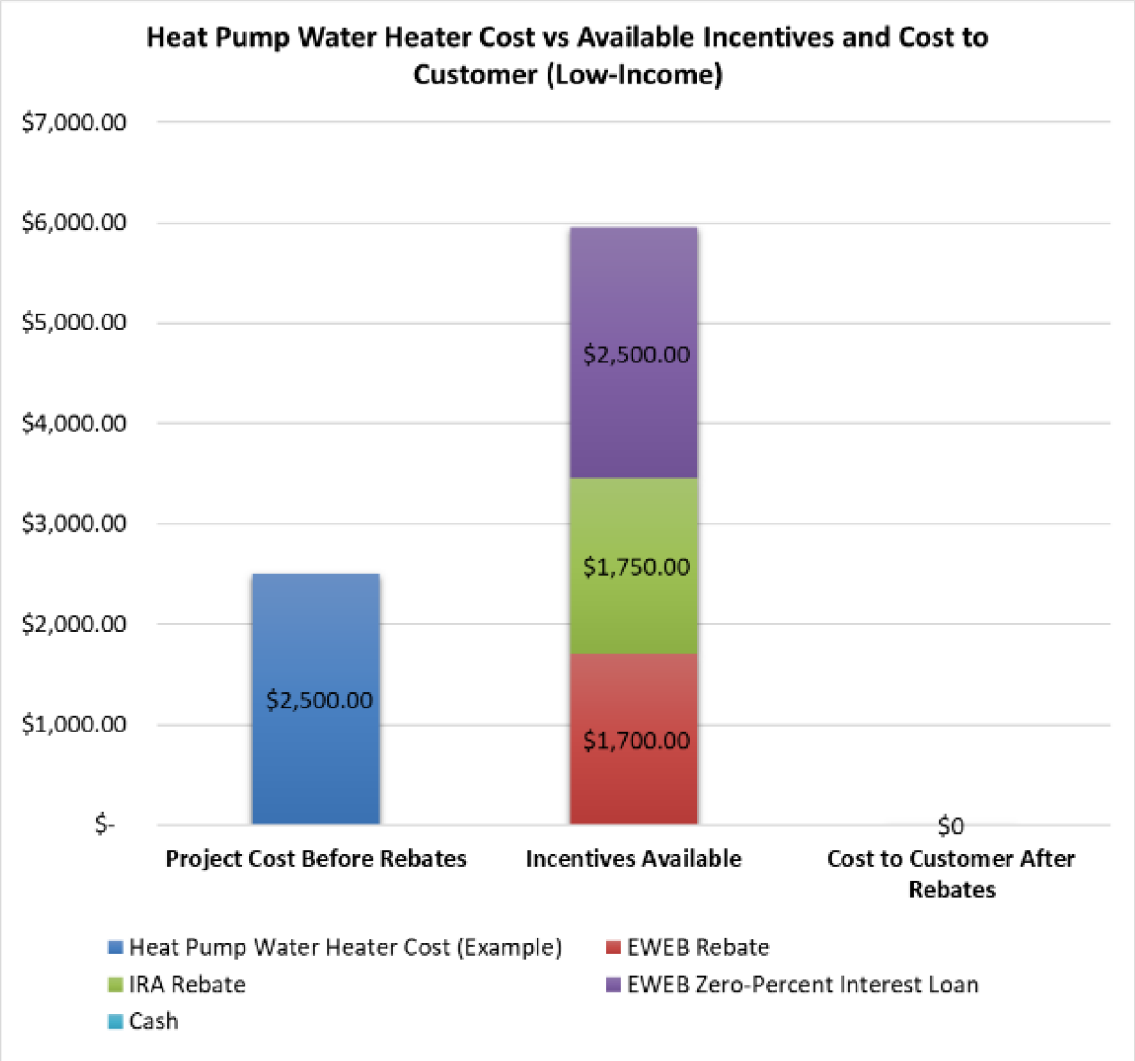


Figure 14. Free Heat Pump Water Heater for Low-Income Household - Installation Cost vs. Available Incentives and Upfront Cost to Customer.

Heat Pump Water Heater Cost Savings - Low-Income Households

The purchase of a Heat Pump Water Heater will lead to lower upfront and long term costs for low-income households utilizing IRA and EWEB Incentives. Heat Pump Water Heaters are extremely energy efficient compared to conventional electric resistance water heaters and natural gas water heaters and will provide annual energy cost savings in comparison to these alternatives.

Example: In the example below, a low-income household that has received a Heat Pump Water Heater for free would receive additional benefits in the form of Energy Cost Savings over the 13-year life of the appliance and the avoided appliance replacement cost of an alternative appliance, modeled below as a low-cost electric resistance water heater. As the customer in this example didn't have any out-of-pocket expenses, they wouldn't receive the 30% tax credit.

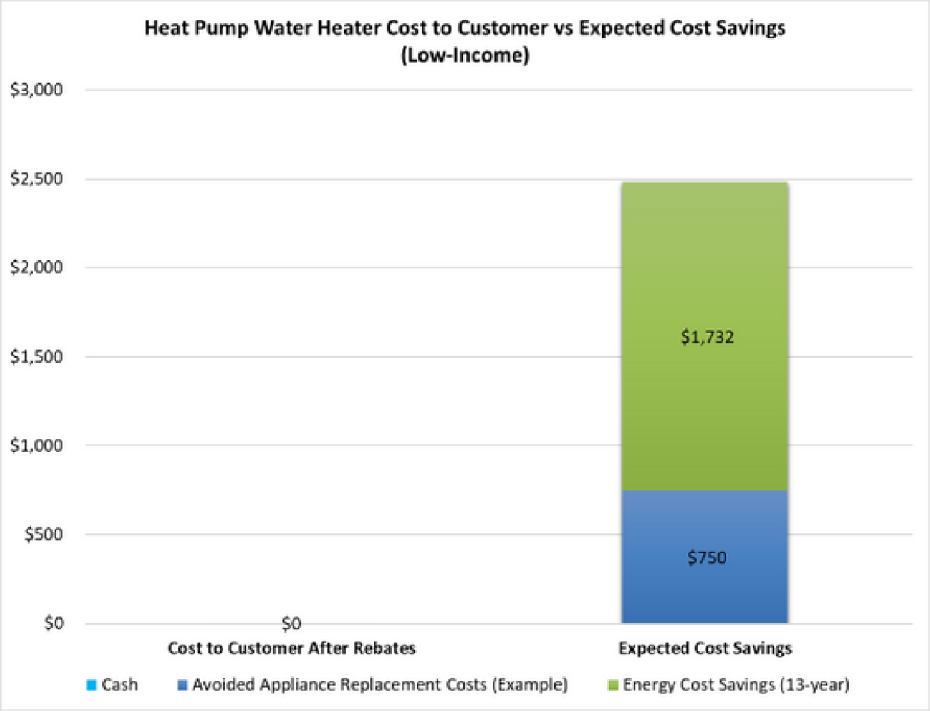


Figure 15. Upfront Costs ($0) vs. Expected Savings from Heat Pump Water Heater Upgrade - Low Income. *Expected cost savings are modeled based on the UES Measures list from the Bonneville Power Administration included in Appendix A of this report.

It is expected Heat Pump Water Heaters can be installed for free in low-income households and result in significant cost savings upfront in avoided appliance replacement costs and over time through lower energy costs than natural gas and electric resistance alternatives.

Example: The graphic below shows the expected upfront and long-term cost of a low-income customer receiving a Heat Pump Water Heater for free then saving money over time as it costs less to heat with a heat pump than the electric and gas alternatives.

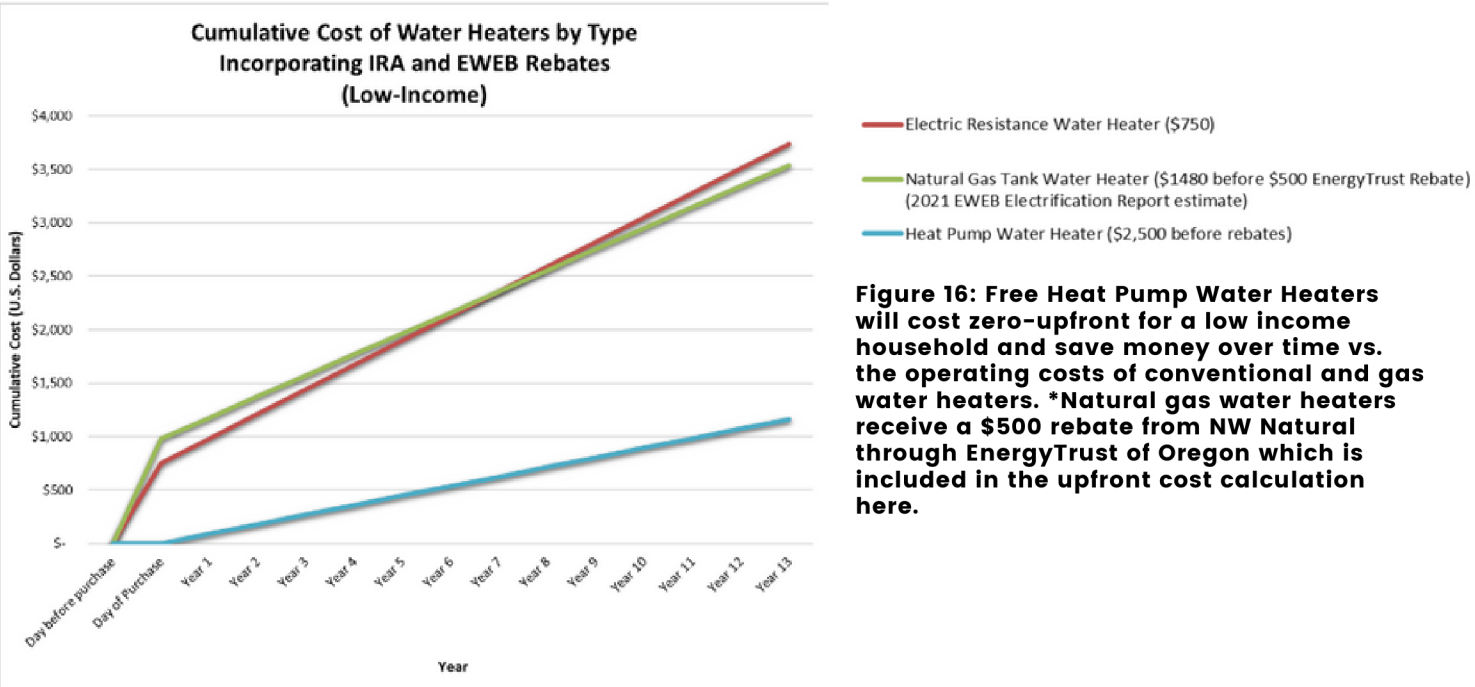


Figure 16: Free Heat Pump Water Heaters will cost zero-upfront for a low income household and save money over time vs. the operating costs of conventional and gas water heaters. *Natural gas water heaters receive a $500 rebate from NW Natural through EnergyTrust of Oregon which is included in the upfront cost calculation here.

Heat Pump Water Heater Project Cost - Moderate Income Households

Moderate-income households will be able to install a heat pump water heater at significantly reduced cost when utilizing IRA rebates and EWEB rebates or loans. EWEB and IRA rebates can provide up to $2,550 off the cost of a HPWH for moderate-income households, $800 off from EWEB and 50% off the remaining cost up to $1,750 off from the IRA. Alternatively, moderate income households interested in having a project with zero upfront cost can utilize EWEB's zero-percent interest loan program up to $2,500 off. Moderate income customers must choose between EWEB's rebates or zero-interest loan, they cannot use both.

This level of rebates from EWEB and the IRA is sufficient to significantly reduce the final cost of a heat pump water heater to moderate-income customers, by more than 60% in some cases.

In the example below, a moderate-income customer installing a heat pump water heater for $2,500 can apply EWEB's Standard heat pump water heater rebate of $800 (available to all customers). The IRA rebate would then cover 50% of the remaining cost up to $1,750 off. In this example, the remaining cost after the $800 EWEB rebate is applied is $1,700. The IRA covers 50% of this amount, $850, with the final $850 to be paid by the moderate-income household. This results in a final cost to the customer of $850, which is $1,650 less than the installation cost of $2,500.

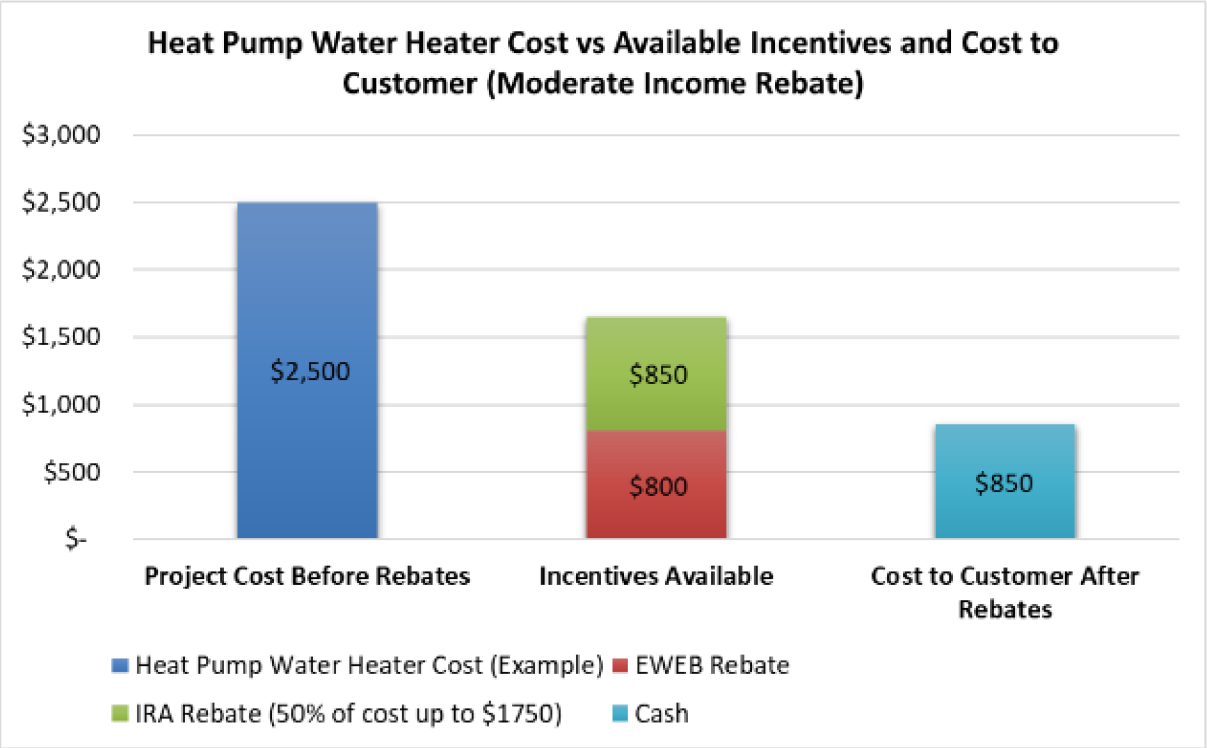


Figure 17. Heat Pump Water Heater for Moderate-Income Household - Installation Cost vs. Available Incentives and Upfront Cost to Customer.

Heat Pump Water Heater Cost Savings - Moderate-Income Households

The cost savings for moderate-income households installing a heat pump water heater are similar to those for low-income households with one key difference around tax credits. Moderate income households are likely to have out-of-pocket expenses that are eligible for a 30% tax credit, up to $2,000 off, which they will receive the year after purchase.

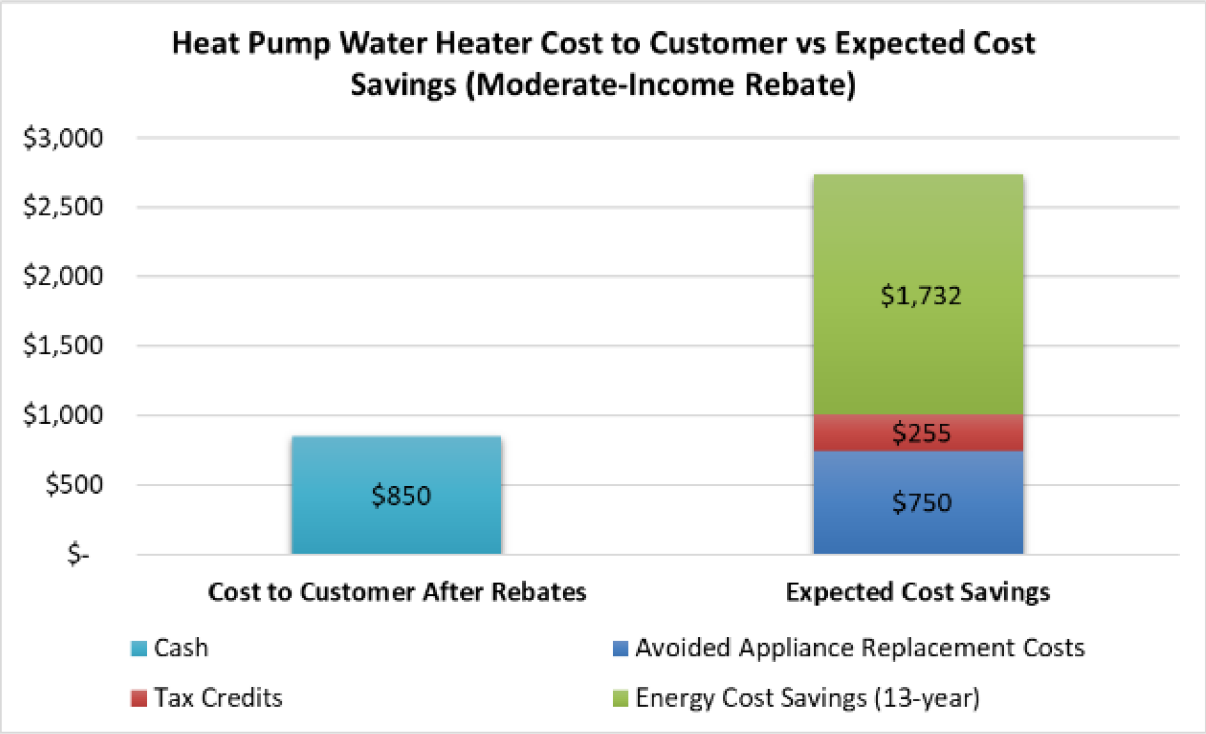


Figure 18. Upfront Costs ($850) vs. Expected Savings from a Heat Pump Water Heater Upgrade - Moderate Income Rebate.

Modeling these costs over time shows that moderate-income households can install heat pump water heaters for upfront costs similar to electric resistance or gas alternatives and then save on energy bills over time.

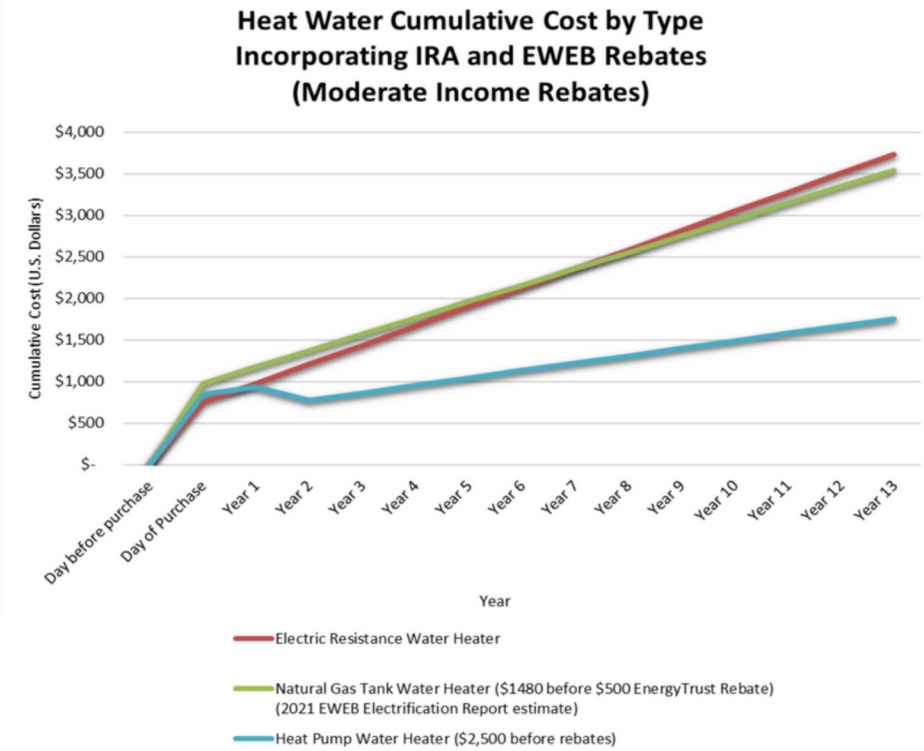


Figure 19: Heat Pump Water Heaters will have low upfront costs for a moderate-income household and save money over time vs. the operating costs of conventional and gas water heaters.

***Natural gas water heaters receive a $500 rebate from NW Natural through EnergyTrust of Oregon which is included in the cost calculation here.**

****Cumulative Costs for heat pump water heaters (blue line) go down in year 2 due to receiving the 30% tax credit the year after purchase.**

Energy Cost Savings: It is estimated that installing a heat pump water heater would result in an energy cost savings of $1,782.16 over the expected 13-year life of the appliance in comparison to what the energy cost would have been with an electric resistance water heater. Energy Cost Savings were modeled using the Bonneville Power Administration's UES Measures list and EWEB's 2021 Electrification Study applying current local utility rates. (Calculations for energy cost savings used in the analysis can be found in Appendix A.)

Actual vs. Projected Costs

Projected costs for Heat Pump Water Heaters were first modeled using cost estimates from the Department of Energy's EnergyStar Program, then confirmed through bids with local contractors and appliance sellers.

	Projected Costs - Heat Pump Water Heater (EnergyStar)	
EnergyStar Estimate	Low Estimate	High Estimate
Equipment	$1,500	$3,000
Labor	$1,000	$3,000
Total	**$2,500**	**$6,000**

*Department of Energy's EnergyStar Program
https://www.energystar.gov/products/ask-the-experts/what-goes-into-the-cost-of-installing-a-heat-pump-water-heater

Actual Costs - Heat Pump Water Heater (Eugene OR)	
Tank Size	50 Gallon
Actual Equipment Cost From Local Appliance Seller	$1,440
Actual Labor Estimate from Local Contractors	$1,100 - $1,600
HPWH Total Cost (Actual)	**$2,540 - $3,040**

The actual costs from local appliance dealers and installers confirm costs are low enough to provide zero-cost heat pump water heaters to low-income households utilizing IRA and EWEB rebates. The costs will vary depending on water heater size and the complexity of installation.

3.3 Ductless Heat Pumps

It is feasible to provide Heat Pumps to low-income households for zero cost and to moderate-income households at low cost by combining IRA and EWEB Rebates or Loans.

Ductless Heat Pump Project Cost - Low-Income Households

Low-income households will be able to install a ductless heat pump for free in most cases by utilizing IRA and EWEB rebates. Zero-interest financing is also available from EWEB, allowing zero upfront costs for more expensive projects. EWEB has a low income rebate of $3,800 for low-income households and we anticipate the IRA will have a rebate covering 100% of out-of-pocket expenses for low-income households up to $8,000 off. Combined, these rebates from EWEB and the IRA can provide up to $11,800 off heat pumps for low-income households. EWEB offers an additional $14,000 in zero-interest loans for high cost projects.

Example: In the example below, the expenses for $10,000 heat pump installation would be completely covered by the available incentives from EWEB and the Inflation Reduction Act, resulting in a zero-cost installation for the low-income household. Zero-interest loans would be available to the customer if the cost of the unit exceeded the $11,800 in rebates available to low-income customers.

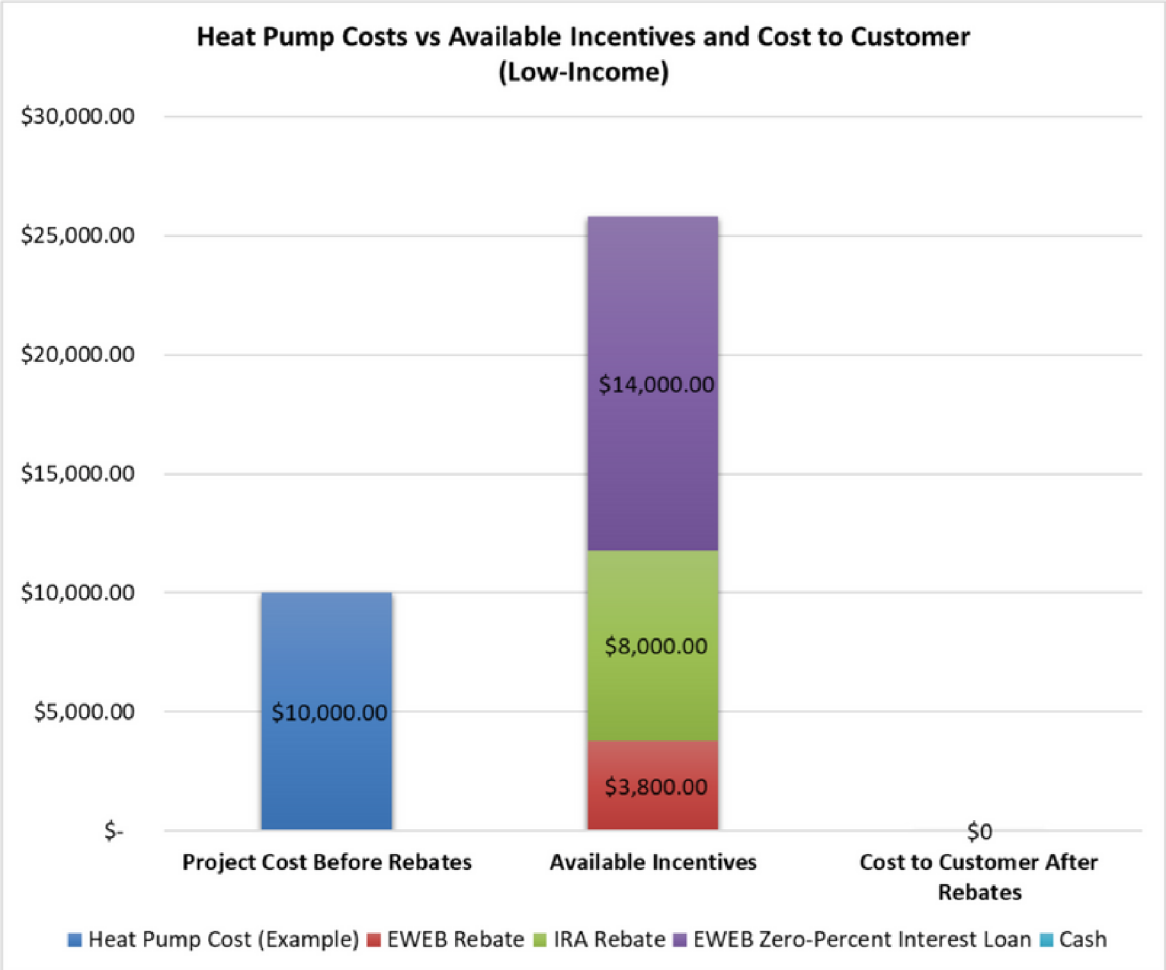


Figure 20. Free Ductless Heat Pump for Low-Income Household - Installation Cost vs. Available Incentives and Upfront Cost to Customer.

Ductless Heat Pump Cost Savings - Low-Income Households

The purchase of a Heat Pump will lead to lower upfront and long term costs for low-income households utilizing IRA and EWEB Incentives. Heat Pumps are extremely energy efficient compared to conventional electric resistance water heaters and natural gas water heaters and will provide annual energy cost savings in comparison to these alternatives.

Example: In the example below, a low-income household that has received a ductless heat pump for free would receive additional benefits in the form of Energy Cost Savings over the 15-year life of the appliance and the avoided appliance replacement cost, modeled here as an electric or gas furnace costing $4,800 installed. As the customer in this example didn't have any out-of-pocket expenses, they wouldn't receive the 30% tax credit.

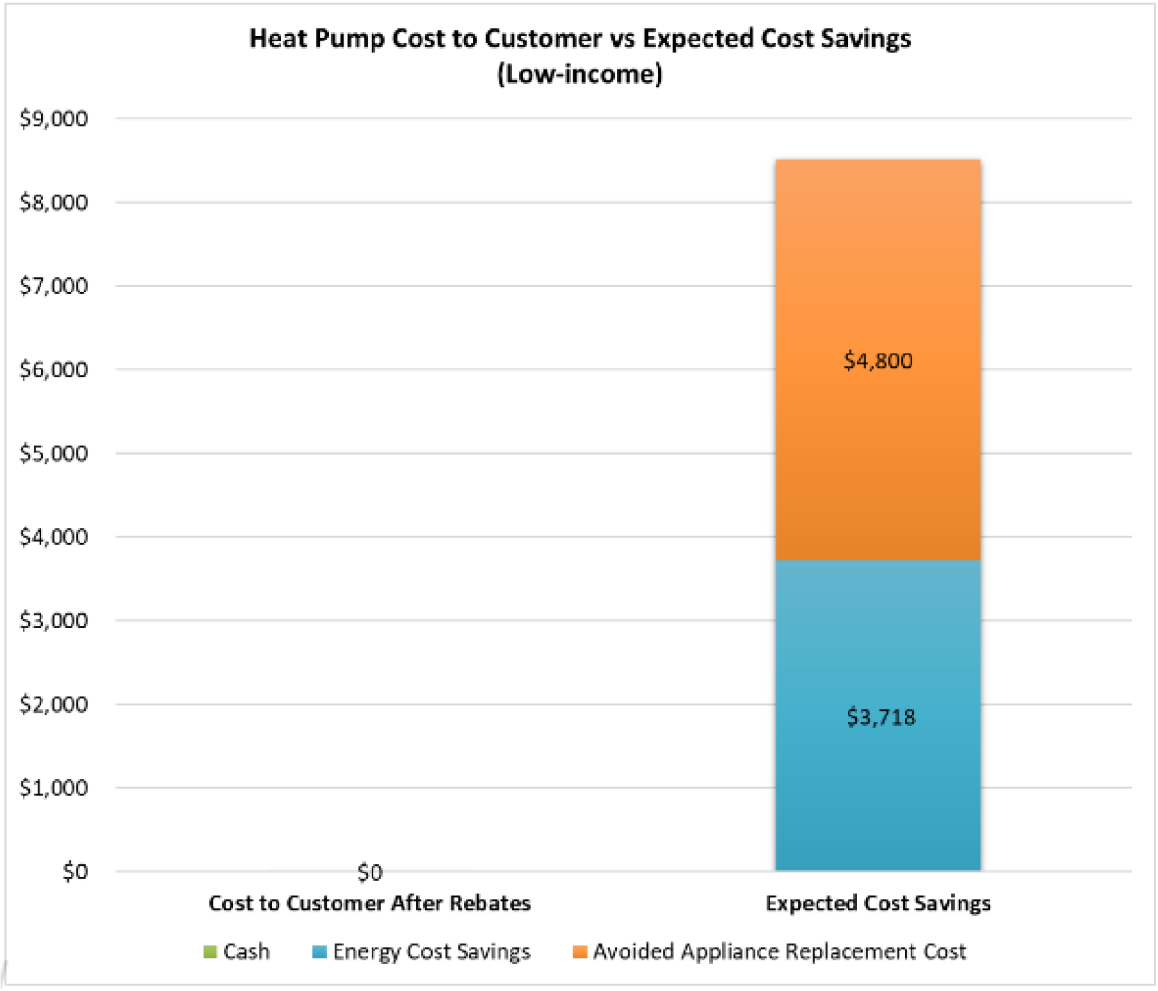


Figure 21. Upfront Costs ($0) vs. Expected Savings from Ductless Heat Pump Upgrade - Low Income.

It is expected Heat Pumps (HP) can be installed for free in low-income households and result in significant cost savings upfront in avoided appliance replacement costs and over time through lower energy costs than natural gas and electric resistance alternatives.

Ductless Heat Pump Project Costs - Moderate Income Households

Moderate-income households will be able to install a Heat Pump at significantly reduced cost when utilizing IRA rebates and EWEB rebates or loans. EWEB and IRA rebates can provide up to $9,000 off the cost of a HP for moderate-income households, $800 (ductless) to $1,000 (ducted) off from EWEB and 50% off the remaining cost up to $8,000 off from the IRA. Alternatively, moderate income households interested in having a project with zero upfront cost can utilize EWEB's zero-percent interest loan program for a loan up to $14,000. Moderate Income Customers must choose between EWEB's rebates or zero-interest loan, they cannot use both. This level of rebates from EWEB and the IRA is sufficient to significantly reduce the final cost of HP to moderate-income customers.

Example: In the example below, a moderate-income customer installing a HP for $10,000 applies EWEB's Standard Ductless HP rebate of $800 that is available to all customers. The IRA rebate then covers 50% of the remaining cost up to $8,000 off. In this example, the remaining cost after the $800 EWEB rebate is applied is $9,200. The IRA covers 50% of this amount, $4,600, with the final $4,600 to be paid by the moderate-income household. This results in a final cost to the customer of $4,600.

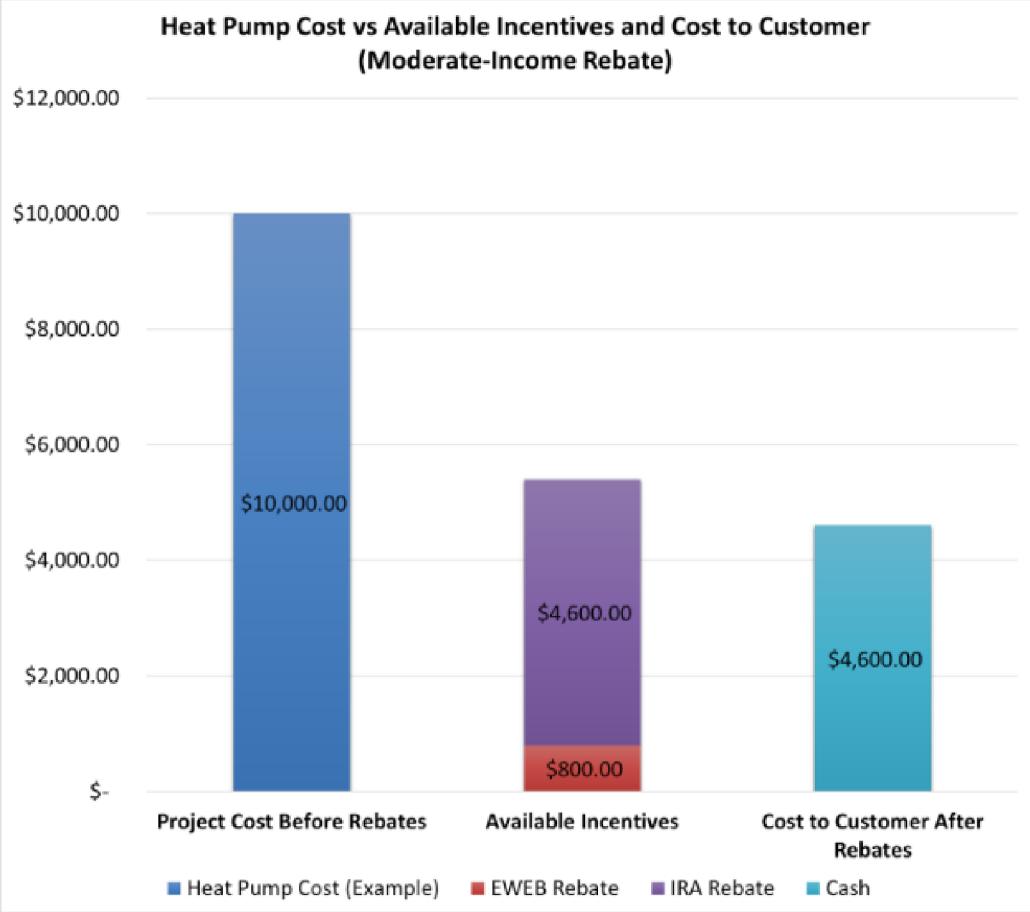


Figure 22. Reduced Cost Ductless Heat Pump for Moderate-Income Household with IRA and EWEB Rebates - Installation Cost vs. Available Incentives and Upfront Cost to Customer.

Ductless Heat Pump Cost Savings - Moderate-Income Households

The cost savings for moderate-income households installing HP are similar to those for low-income households with one key difference around tax credits. Moderate income households are likely to have out-of-pocket expenses that are eligible for a 30% tax credit, up to $2,000 off.

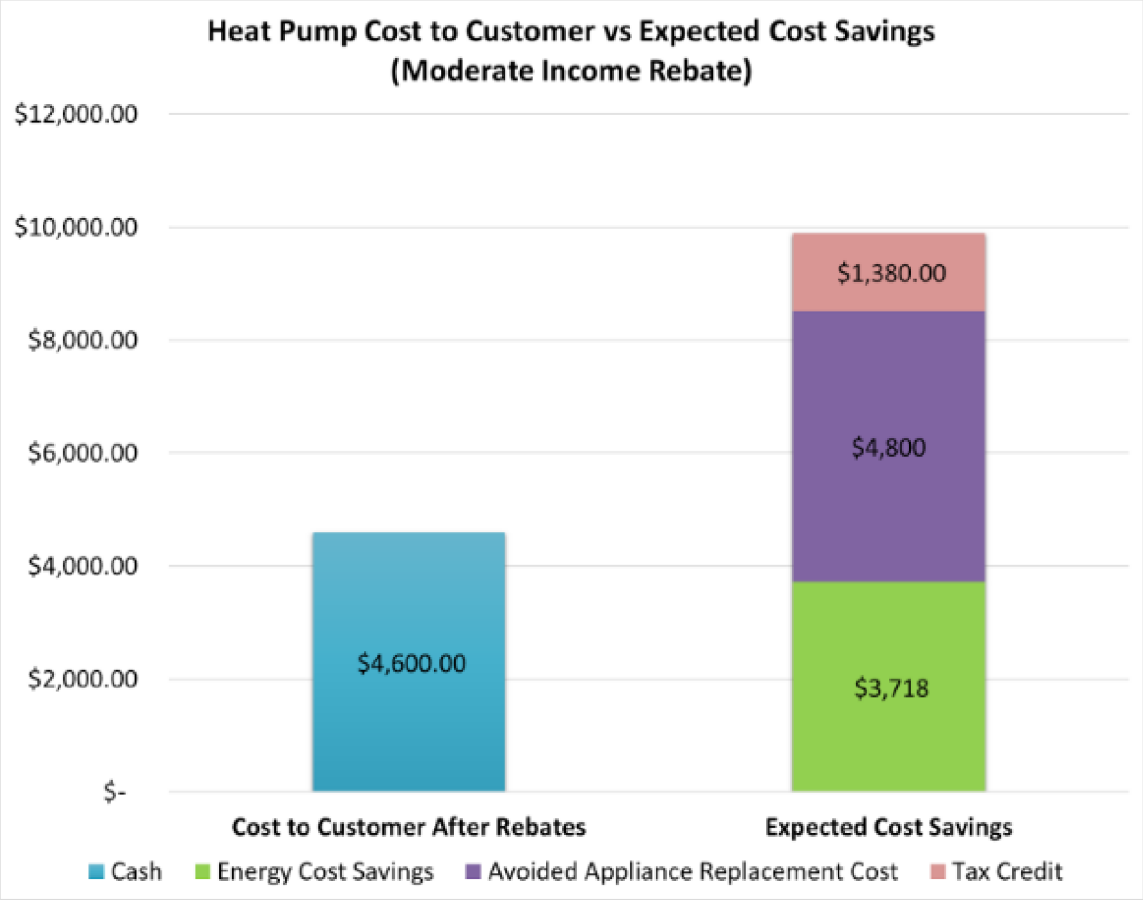


Figure 23. Upfront Costs ($4,600) vs. Expected Savings from Ductless Heat Pump Upgrade - Moderate Income.

Heat Pumps - Moderate-Income Loans

Moderate income customers interested in reducing their upfront costs and paying off a heat pump over time can access EWEB financing up to $14,000. The customer will pay a little bit more over time, but the upfront cost can be reduced to as little as $0 and some of the rebate funding that is no longer received from EWEB is partially backfilled by the IRA and available tax credits.

Example: In the example of a $10,000 heat pump, a moderate income customer would receive rebate for 50% off ($5,000) from the IRA and use a $5,000 zero-interest loan from EWEB as the matching funds. This is a little more than the $4,600 paid by the customer utilizing a rebate that must pay the cost upfront.

The proud owner of a new ductless heat pump.

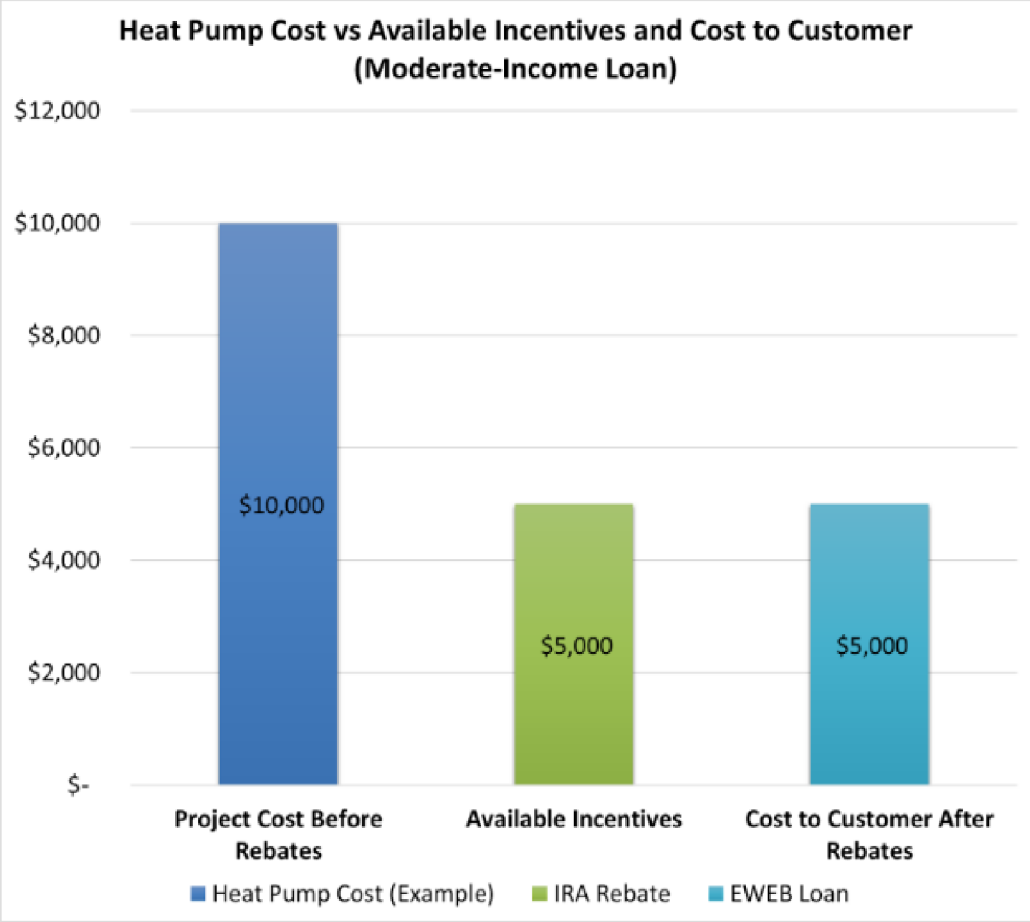


Figure 24. Reduced Cost Ductless Heat Pump for Moderate-Income Household with IRA Rebate and EWEB Loan - Installation Cost vs. Available Incentives and Upfront Cost to Customer.

The cost savings for a moderate income customer utilizing an EWEB loan would be the same as those for a customer using an EWEB rebate. The difference is the loan borrower will pay a little more over time than the customer using a rebate who paid upfront and who will receive a slightly higher tax rebate due to higher costs paid by the customer.

Example: In the example of a moderate-income customer receiving a zero-percent loan from EWEB, the customer would have a $5,000 loan instead of a $4,600 upfront payment and would receive a tax credit of $1,500 (30% of 5,000) rather than $1,380 (30% of $4,600).

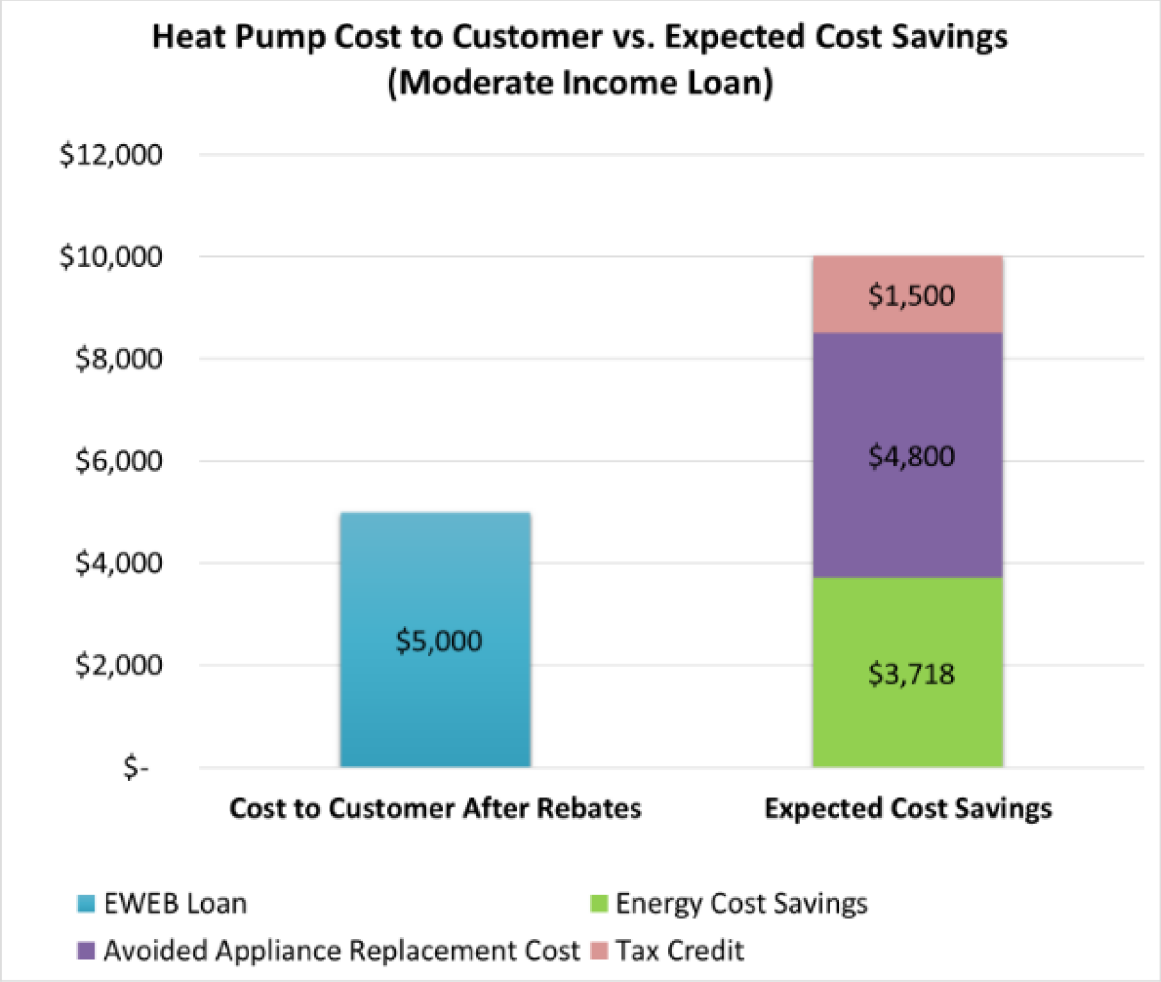


Figure 25. Customer Costs Covered by EWEB Loan ($5,000) vs. Expected Savings from Ductless Heat Pump Upgrade - Moderate Income. *Energy Cost Savings - Projected Energy Cost Savings of $3,718 over 15-years were calculated using the Bonneville Power Administration's UES Measures List statistics for Heat Pumps. See Appendix A.

Projected vs. Actual Costs

Beyond Toxics modeled a heat pump with a cost of $10,000 based on the cost of $9,800 for a Ducted Standard Performance Heat Pump modeled in EWEB's 2021 Electrification Study. This cost was roughly in line with other case studies such as those from Rewiring America which modeled costs ranging from $4,000-$20,000.

We consulted a local HVAC installer in Eugene who stated, "The average cost to have a new heat pump installed is somewhere around $5,500, but you could end up paying as little as $4,000 or well over $10,000." Estimates from local contractors suggest that most families in Eugene can install heat pumps for less than the modeled cost point of $11,800. The conclusion is that local costs would be low enough to provide heat pumps to low income households for free, similar to our initial modeling.

Beyond Toxics is beginning work with a pair of Bethel Clean Energy Project participants to reach out to contractors for site specific bids for their projects with a goal of installing the first projects starting in the Fall 2023 or Winter 2024.

A summary of the calculations we used to estimate the project costs utilizing financial incentives from local and anticipated federal programs are summarized in the chart on the next page.

	Example Cost	EWEB Rebate Amount	Cost after EWEB Rebate	IRA Rebate Amount	Cost after IRA Rebate	EWEB Loan Amount	Upfront Cost	Tax Credit (30% of consumer cost)	Final Cost
Heat Pump Water Heater		**Up to $1750**							
Low-income	$2,500	$1,700	$800	$800	$0	$0	$0	$0	$0
Moderate Income (EWEB Rebate)	$2,500	$800	$1,700	$850	$850	$0	$850	$255	$595
Moderate Income (EWEB Loan)	$2,500	$0	$1,250	$1,250	$1,250	$0	$850	$375	$875
Heat Pump		**Up to $8,000**							
Low-income	$10,000	$3,800	$6,200	$6,200	$0	$0	$0	$0	$0
Moderate Income (EWEB Rebate)	$10,000	$800	$9,200	$4,600	$4,600	$0	$4,600	$1,380	$3,220
Moderate Income (EWEB Loan)	$10,000	$0	$10,000	$5,000	$5,000	$5,000	$0	$1,500	$3,500

Figure 26. Summary of the Calculations for Costs and Incentives Used in Chapter 2.

3.4 Associated Costs

Wiring and Electric Panels

In some cases, installing new energy efficient appliances will require the installation of new wiring or a new electric panel. EWEB, the Oregon Community Heat Pump Program, and the IRA offer incentives to cover wiring and electric panel costs associated with the installation of energy efficient appliances like heat pumps and heat pump water heaters. EWEB offers $5,000 for electric panel upgrades for low-income households and the IRA offers $2,500 for wiring and $4,000 for an electric panel. In many cases, these incentives will cover the entirety of associated electric panel and wiring costs for low-income customers and significantly lower cost for moderate-income households.

Insulation, Weatherization, and Air Sealing

EWEB will pay the entire installation cost of insulation for low-income customers and has a rebate of $0.80/sf of insulation up to 50% of eligible cost for all customers. They also have a rebate for Air Sealing of $0.10/sf for air sealing for all customers. The IRA has an $1,800 incentive for insulation, weatherization, or air sealing.

As EWEB's offer will pay 100% of eligible insulation costs for low-income households, it may make sense for these households to have EWEB pay for insulation and focus IRA funds on other upgrades.

3.5 Solar

Installing Rooftop Solar is infeasible for the low-income households in the cohort at this time utilizing available incentive programs from EWEB and the State of Oregon's Solar and Storage Program. It is unlikely the households participating in the Bethel Clean Energy Project will be able to access rooftop solar panels without additional grants, rebates, or low-interest loan programs becoming available to support solar access for low-income households due to the high upfront cost and long payback times for rooftop solar systems. In addition, many households would need to invest in a new roof before planning a rooftop solar system installation.

EWEB provides a rebate of $0.40/W Installed capacity up to $2,500 and the Oregon Solar and Storage program offers a rebate of $1.80/W of installed capacity up to $5,000 for low-income households.

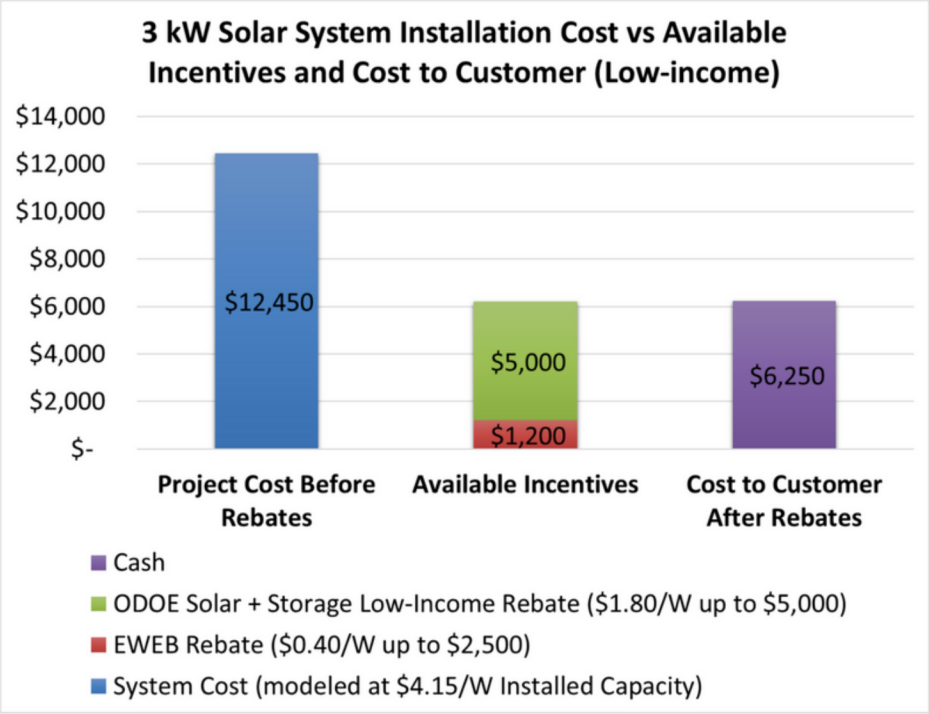


Figure 27. The Cost of Installing a 3kW rooftop solar system using available incentives.*Solar Project Costs: Solar Project costs are modeled as $4.15/W of installed capacity based on projects that have previously received EWEB incentives.

Example - 3-kW Rooftop Solar Project Cost: A low-income customer purchasing a 3 kW Solar system for $12,450 at a cost of $4.15/W of installed capacity could have approximately half the cost covered by available incentives.

Example: A low-income customer purchasing the 3 kW system modeled above would pay $6,250 and produce approximately $6,000 of electricity over a 20-year period. An additional incentive for the customer is a federal tax credit given the year after the system is installed of 30% of the cost to the customer, $1,875 in this case. This 3 kW System with an upfront cost for $6,250 after rebates would generate roughly $300 of power per year for an expected $6,415 in 20-year cost savings and the customer would receive a tax credit of $1,875 in year 2.

Unfortunately, the 20-year cost savings of the example solar project aren't much higher than the purchase price and, without low-cost financing or additional incentives, a project like this would have too high an upfront price and too a long a payback time to be feasible for a low-income household.

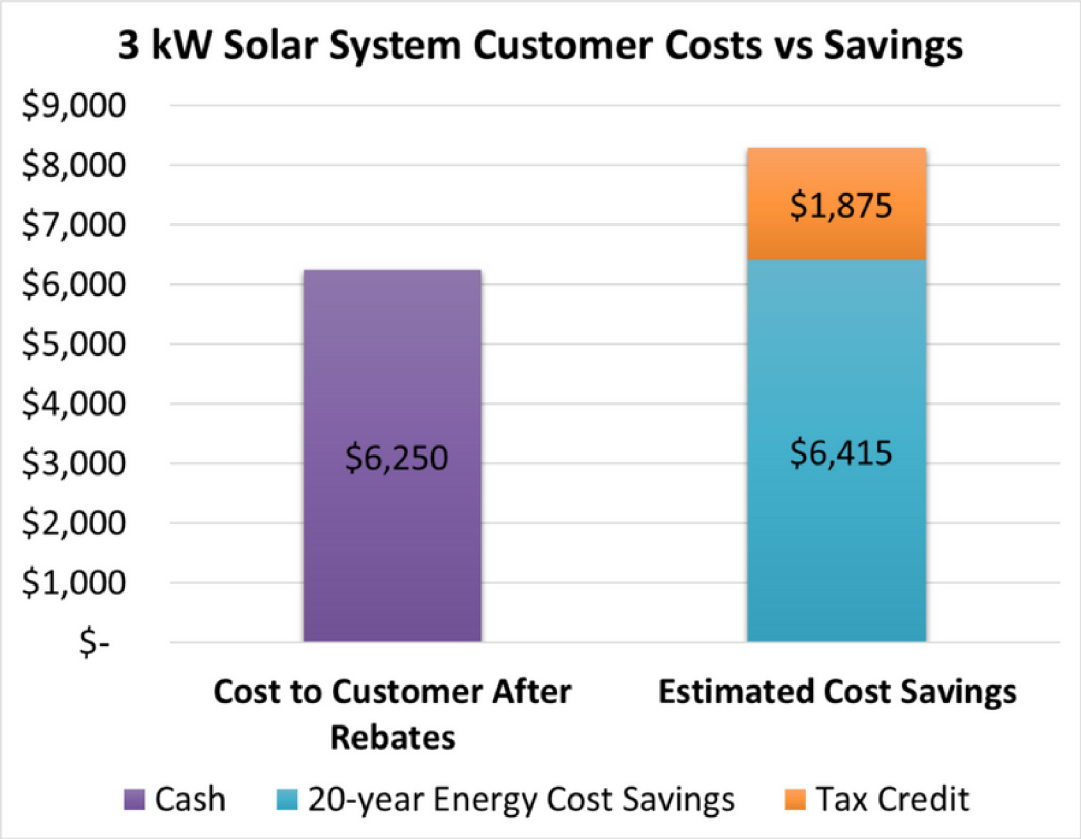


Figure 28. Rooftop Solar System Customer Upfront Cost vs. Cost Savings Over Time. *20-year Energy Cost Savings Modeled as 1100 kWh/yr generated for each kW of Installed Capacity at EWEB's current utility rate of $0.0972/kWh of savings.

3.6 Cost and Benefits Conclusion

It is highly feasible to install heat pumps and heat pump water heaters for free for low-income households and for low-cost or zero-upfront cost for moderate income households in Eugene utilizing resources from the Inflation Reduction Act and EWEB. Communications with contractors and research into Heat Pumps and Heat Pump Water Heaters available for retail consumer purchase confirm that heat pumps and heat pump water heaters can be installed at a low enough price that incentives from EWEB and the Inflation Reduction Act will cover the entire cost for low-income households and a large portion of the cost for moderate income households. There are also significant rebates available from EWEB and the IRA to assist with wiring and electric panel upgrades that may be necessary to install heat pumps and heat pump water heaters.

Heat pumps and heat pump water heaters will save these households money over time in comparison to electric resistance or natural gas units while reducing greenhouse gas emissions. The IRA and EWEB incentives will lower the upfront costs of these units significantly and increase their cost effectiveness in comparison to the alternatives.

EWEB's Insulation Program to cover 100% of insulation costs for low-income households and IRA rebates for insulation, weatherization, and air sealing provide an important opportunity to provide free or low cost retrofits and lower household and community energy use. EWEB encourages homeowners to consider insulation, air leaks, and windows before upgrading their heating system; however, every home is unique and may benefit from further consultation, particularly to explore using all available incentives, rebates and loans to maximize a full suite of energy efficiency and cost savings actions.

Rooftop solar is less feasible utilizing existing funding mechanisms at this time as existing EWEB, State of Oregon, and Federal incentives are insufficient to overcome high upfront costs of systems and slow payback times. This may be overcome if new incentives or low-interest financing options can be arranged. In addition, many participants were not able to afford the added cost of installing a new roof capable of supporting a solar array as their existing roof was too old or structurally insufficient.

However, this community is ripe to take advantage of opportunities for community solar. The community is developing a vision, and eventually an advocacy campaign, to convert the approximately 40-acre J.H. Baxter site to a community solar project and emergency preparedness supplies storage site. There is general agreement amongst residents and local elected officials that this site must be cleaned up and put to use to directly benefit the adjacent community. A community solar project would promote energy justice by offsetting the high costs of energy and producing clean energy locally. Replacing heavy industrial manufacturing with community solar on this particular property would also reduce future exposures to industrial emissions and resulting health impacts, and serve as a form of reparations to help ameliorate the history of harm and danger experienced by Bethel residents.

Opportunities

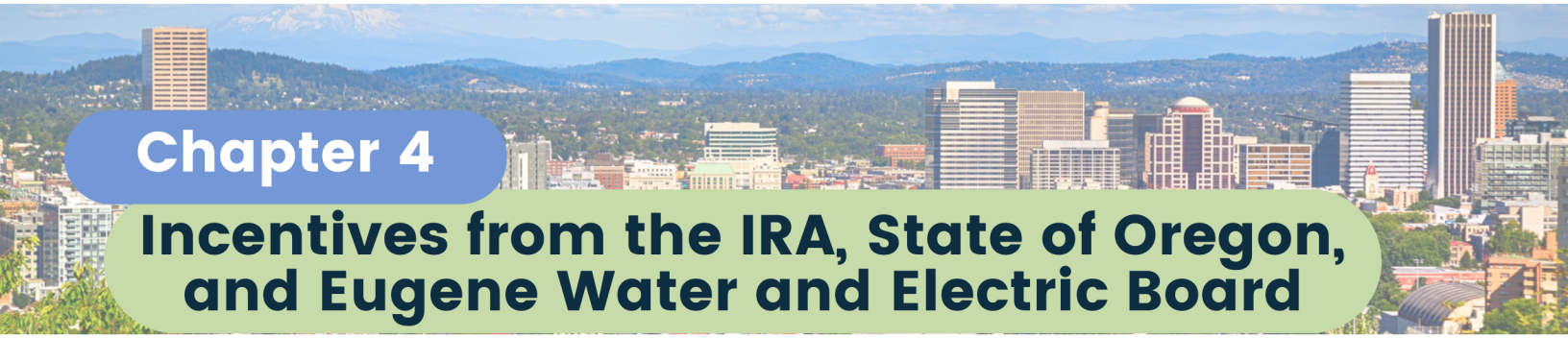
One opportunity for potential cost savings is to aggregate smaller projects into a single large project for bidding purposes. By grouping projects from multiple households together into a single bid, customers could potentially receive lower project costs from contractors than they would be able to if they were pursuing the project by themselves.

Challenges

Lack of Resources and Sustainable Model for Outreach - While the IRA is going to provide significant resources to help low-income households electrify, there is not yet a sustainable model for organizations to do outreach to low-income communities to help them access these resources. There is a proposed $500 rebate from the IRA to incentivize contractors to work with low income households.

Funding - Community-based organizations will need to search for grants or other funding mechanisms that could support outreach to underserved and environmental justice communities and assist these consumers identify their energy and health needs, create their unique energy efficiency work plan, coordinate contractor bidding and apply for local, state and federal funding assistance.

Length of EWEB Loans payback terms - EWEB Zero-Interest Loans help households lower the upfront cost of a heat pump or heat pump water heater, but the short loan terms of 4-5 years means there will be higher costs over the first few years after purchase. Spreading this loan payment over a longer period could allow households to utilize energy cost savings to pay for the loan. Our partner, Seeds for the Sol offers this type of "pay-as-you-save" loan repayment model which allows a consumer to make a monthly payment equal to the monthly dollar savings on their energy bills. Beyond Toxics and Seeds for the Sol are expanding our partnership to be able to offer the preferred loan program to low and moderate income residents we serve.



Chapter 4
Incentives from the IRA, State of Oregon, and Eugene Water and Electric Board

In this section we will go over the incentives available for energy efficient appliances, weatherization projects, and rooftop solar available to low-income households living in the Eugene area. First we will go over incentives offered through the Inflation Reduction Act followed by those available from the State of Oregon and the Eugene Water and Electric Board.

4.1 Federal Incentives - Inflation Reduction Act (IRA) Home Electrification Rebates, Whole Home Retrofits and Tax Credits

The Inflation Reduction Act offers two main incentives programs to encourage home energy retrofits. The first is Home Electrification and Appliance Rebates and the second is Whole Home Retrofits. These programs cannot be used concurrently but can potentially be phased into two separate projects.

Home Electrification and Appliance Rebates

The first major electrification program from the Inflation Reduction Act is the High Efficiency Electric Home Rebate Act (HEEHRA). This Electrification Rebate Program provides rebates for customers to access various energy efficiency improvements and appliances for their home including Heat Pumps, Heat Pump Water Heaters, Weatherization, and associated costs like Wiring and Electric Panels. The program also offers special incentives for Heat Pump Clothes Dryers and Electric Stoves for households switching those appliances off natural gas.

The program offers the highest level of incentives to low-income customers. Contractors can offer low-income customers 100% off energy efficiency improvements up to the amounts listed in the chart below. The IRA defines low-income households as those making less than 80% Area Median Income (defined below).

The program also offers rebates to moderate-income customers. Contractors can offer 50% off the energy efficiency improvements up to the amounts listed below. The IRA defines moderate-income households as those making between 80%-150% Area Median Income (defined below).

The program does not offer rebates to higher income households, those making greater than 150% Area Median Income.

Electrification Rebates Available	Rebate Amount
Heat Pump	$8,000
Heat Pump Water Heater	$1,750
Electric Panel	$4,000
Weatherization	$1,600
Wiring	$2,500
Heat Pump (conversions from Gas only)	$840
Induction Stove (conversion from Gas only)	$840
Total	Up to $14,00

Figure 28. Inflation Reduction Act Rebates
https://www.rewiringamerica.org/ira-fact-sheets https://www.rewiringamerica.org/IRAguide

In this program, low-income customers are eligible for the highest level of rebates, 100% off up to the amounts listed. For example, on a $10,000 Heat Pump a low-income customer accessing IRA rebates could receive 100% of out-of-pocket costs up to $8,000, so they would get $8,000 off (the max amount allowed). Moderate income customers can get 50% off up to the amounts listed. In the same example of a $10,000 Heat Pump, a moderate-income customer could receive 50% of out-of-pocket costs off up to $8,000, so they would get $5,000 off (50% of $10,000).

Income Eligibility for IRA Rebates

Income Eligibility for IRA Rebates is based on Area Median Income, a local measure for income levels that varies based on where you live and the local income levels. The current levels of Area Median Income in Lane County are listed below. Those making less than 80% AMI are eligible for 100% off up to the amounts listed above. Those making between 80%-150% AMI are eligible for 50% off up to the amounts listed above. Those making over 150% AMI are ineligible for IRA rebates.

Household size	80% Area Median Income (Lane County)	150% Area Median Income (Lane County)
1	$39,900.00	$74,812.50
2	$45,600.00	$85,500.00
3	$51,300.00	$96,187.50
4	$56,950.00	$106,781.25
5	$61,550.00	$115,406.25
6	$66,100.00	$123,937.50
7	$70,650.00	$132,468.75
8	$75,200.00	$141,000.00

Figure 29. Income Eligibility for IRA Rebates in Lane County.

Whole Home Retrofits

The second major electrification program from the Inflation Reduction Act is the Whole Home Retrofits program. This program requires an energy assessment that shows the project will result in a certain percentage of energy use reduction to access the rebates. This program will be better suited for higher income households that are ineligible for the IRA's Electrification Rebates. It is not possible to use Home Electrification Rebates and Whole Home Retrofit Rebates for the same project, but it may be possible to split large projects into two stages to utilize both programs.

Expected Reduction in Energy Use	Incentives Available
20-35% reduction	50% off Project cost up to $2,000
Greater than 35% reduction	50% off Project cost up to $4,000
20-35% reduction (low-income)*	80% off Project cost up to $4,000
Greater than 35% reduction (low-income)*	80% off Project cost up to $8,000

Figure 30. Whole Home Retrofit Incentives. *Households making less than 80% AMI qualify as low income for purposes of the Whole Home Retrofit Program.

As the Home Electrification Rebates will provide greater benefits to low-income households than the Whole Home Retrofit Program and they can't be used concurrently, we did not include this program in our modeling.

Tax Credits

Tax credits are incentives that reduce the customers tax burden on the following year's taxes. The IRA offers a 30% tax credit on Heat Pumps and Heat Pump Water Heaters up to $2,000 each up to a combined total of $3,200. The program also offers tax credits of 30% up to the following amounts for a combined total of up to $1,200:

- Insulation $1,200
- Doors $500
- Windows $600
- Electrical panel $600
- Energy Audit $150

There is also a 30% tax credit on rooftop solar installations.

For more on available tax credits, see Rewiring America's Fact Sheet here: https://assets.ctfassets.net/v4qx5q5o44nj/3FYfJiYMILiXGFghFEUx0D/279f180456183d560d9c68d4de8baa67/factsheet_25C_25D.pdf

4.2 State of Oregon Rebates - Oregon Community Heat Pump Deployment Program and Solar and Storage Program

Oregon Community Heat Pump Deployment Program

In 2022, the Oregon State Legislature authorized the Oregon Department of Energy to undertake rulemaking for the Community Heat Pump Deployment Program (SB 1536). The program provides subsidies for two new heat-pump incentive programs, one for low-income homeowners and another for renters. The program responded to a heat dome event in Oregon in 2021 that sent temperatures up to 116 F and is reported to have killed 116 people statewide (https://www.oregonlive.com/data/2021/07/oregons-heat-wave-death-toll-grows-to-116.html).

The new heat-pump incentive for low-income home-owners will be distributed through a grant to a local government, utility, or non-profit, potentially in partnership with nonprofits with a history of working with environmental justice communities. Money is prioritized for households making <60% AMI or <200% Federal Poverty Level.

The Oregon Department of Energy launched the Oregon Rental Home Heat Pump program providing rebates to landlords who install energy efficient heat pumps and electrical upgrades from approved contractors to rental properties. Contractors will be able to offer rebates up to $4,000 for equipment and another $4,000 for associated electrical upgrades.

Oregon Solar and Storage Rebate

The Oregon Solar and Storage Rebate provides rebates for rooftop and community solar projects and battery power storage projects. For Solar projects, the program offers $1.80/W of installed solar capacity up to $5,000 (or 60% of customer costs - whichever is less) to low-income and moderate-income qualified households. Higher income households are eligible for $0.20-$0.40/W of installed capacity.

However, funding for this program has all been reserved for 2023 and the program won't be open again until 2024.
https://www.oregon.gov/energy/Incentives/Pages/Solar-Storage-Rebate-Program.aspx

4.3 Local Utility Eugene Water & Electric Board Rebates & Loans

A list of EWEB Residential Rebates is included on the following page. For purposes of this Analysis, the most relevant incentives are those for Ducted Heat Pumps, Ductless Heat Pumps, Insulation and Air Sealing, Electric Panels and Wiring, and Heat Pump Water Heaters.

EWEB offers both rebates and zero interest loans as incentives to invest in energy efficiency projects to its residential customers.

EWEB will pay the entire installation cost of insulation for low-income customers and has a rebate of $0.80/sf of insulation up to 50% of eligible cost for all customers. They also have a rebate for Air Sealing of $0.10/sf for air sealing for all customers. The IRA has an $1,800 incentive for insulation, weatherization, or air sealing.

EWEB has two levels of residential rebates available. The first is a standard set of rebates that EWEB offers to all residential customers. The second is a set of more generous rebates that EWEB offers to low-income customers. EWEB defines low-income customers as those that make less than 200% Federal Poverty Level (defined below). EWEB also offers additional benefits to renters in some cases.

EWEB offers zero-interest loans for its customers to invest in Energy Efficiency Projects. Low-income customers can access both rebates and loans for the same project, whereas moderate-income and high-income customers must choose between accessing EWEB's rebates or loans.

EWEB offers a subsidy for solar projects of $0.40/W of installed capacity funds permitting.

Program	Rebates Available	Loan Limit (0% interest)	Program Requirements
Ducted Heat Pump	$1,000 Income eligible: $3,800 for owner occupied or $1,000 for rentals	$15,000	Air-source heat pumps only. For income eligible amount, home must have electric heat.
Ductless Heat Pump	$800 Income eligible: $3,800 for owner occupied or $1,000 for rentals	$6,000, plus $2,000 per additional head, up to $14,000	For buildings with more than 4 units (side-by-side condos/townhouses, or apartments) check with EWEB for eligibility. Homes with existing ducted heat pumps are not eligible to participate. If there is a pre-existing ductless heat pump, it must be removed. For income eligible amount, home must have existing electric heat.
Insulation & Air Sealing	$0.80/sf of insulation, up to 50% of eligible cost, plus $0.10/sf for air sealing Income eligible: 100% of eligible insulation cost, plus $0.10/sf for air sealing	$4,000 plus $1,000 for air sealing	Home must have electric heat and be poorly insulated. For income eligible, a minimum of 2 bids are required. Air sealing limited to being an additional component of an attic and/or underfloor crawlspace insulation project in single-family homes.
Windows	$4.00/sf of glass Income eligible: $20/sf for owner occupied or $10/sf of glass for rentals	$4,000 for U-factor ≤ 0.25 or $6,000 for U-factor ≤ 0.22 Multifamily: $3,500 + $500/unit up to $20,000	For buildings with more than 4 units (side-by-side condos/townhouses, or apartments) check with EWEB for eligibility. Homes with existing ducted heat pumps are not eligible to participate. If there is a pre-existing ductless heat pump, it must be removed. For income eligible amount, home must have existing electric heat.

Heat Pump Water Heater	$800 Income eligible: $1,700 for owner occupied, $1,000 for rental	$2,500	Must be Tier 3 and on a qualified products list, with at least a 40-gallon tank. For income eligible amount, home must have electric water heat.
Electric Panels and Wiring	N/A Income Eligible: $5,000	$20,000	Learn more at Must be Tier 3 and on a qualified products list, with at least a 40-gallon tank. For income eligible amount, home must have electric water heat.
New Construction	$1,000 heat pump, ducted or ductless $800 heat pump water heater NEEM manufactured homes: $1,200 (v1.1) or $1,400 (v2.0)	N/A	EWEB encourages homes to be built with efficient low-carbon electric heating and water heating systems. Rebates for multifamily, affordable housing and custom projects are available but not listed here, contact us for details.

Figure 31. EWEB Rebate and Loan Programs Overview

***EWEB's Incentives for low-income households to upgrade their home heating systems are only available to customers whose current primary heating system is electric. Customers switching from gas heat are only eligible for EWEB's Standard Heat Pump Rebates.**

EWEB Low-Income Eligibility

EWEB defines low-income customers as those making less than 200% Federal Poverty Level (FPL). Federal Poverty Level is a national Statistic for Poverty that is based on national average wages and is the same nationwide.

The current income levels for 200% FPL that EWEB uses as its cutoff points for eligibility for low-income incentive are listed below. FPL is based on household size, with higher income cutoffs for larger households.

Customers making less than 200% FPL are eligible for EWEB's Low-Income Rebates and Zero-Interest Loans. Customers making more than 200% FPL are eligible for EWEB's Standard Rebates or Zero-Interest Loans.

How to Apply: For EWEB customers interested in applying for rebates, they can fill out EWEB's Application Form here: https://secure.eweb.org/ProgramApp.aspx

Household size	EWEB Low-Income Eligibility (200% Federal Poverty Level)
1	$31,266.00
2	$40,886.00
3	$50,506.00
4	$60,126.00
5	$70,280.00
6	$80,560.00
7	$90,840.00
8	$101,120.00

Figure 32 Low-Income Eligibility for EWEB Incentive Programs

Learn More About Available EWEB Incentives: https://www.eweb.org/rebates-and-savings/residential-incentives-rebates-loans-and-conservation

Learn More About All Available EWEB Rebates: https://www.eweb.org/rebates-and-savings

4.4 Combining Incentives - Stacking IRA and EWEB Incentives

The following is a chart showing IRA incentives and EWEB Incentives for low-income households that could potentially be combined for greater total benefit. The IRA incentives for Heat Pumps and Heat Pump Water Heaters are the main ones explored in the cost and benefits section of this report.

Combined IRA & EWEB Rebates	Federal IRA Rebates (Low-Income-100% off up to amount listed, Moderate-Income-50% off up to amount listed)	EWEB Rebates (Low-income and standard)	Total Rebates Potentially Available for low-income households (<200% FPL and <80% AMI)
Heat Pump (HVAC)*	$8,000	$3,800** (low-income), $800 ductless and $1,000 ducted available for all customers	$11,800
Heat Pump Water Heater	$1,750	$1,700 (low-income), $800 available for all customers	$3,450
Heat Pump Clothes Dryer***	$840	N/A	$840
Weatherization	$1,600	100% of insulation costs (low-income), $20/ sq ft windows and $40 for insulated entry doors	100% of insulation costs, $1,600 from IRA, and $20/ sq ft windows and $40 for insulated entry doors
Electric Panel & Wiring	$4,000 Electric Panel and $2,500 for Wiring	$5,000 Electric Panel and Wiring (low-income)	$11,500
Electric Stove***	$840	N/A	$840
Total	up to $14,000	Low-income customers can access $8,000 in low-income incentives, then access standard rebates (for which they have not already received the low-income incentive)	Up to $22,000 (low-income incentives), additional standard EWEB rebates.

Figure 33. Combined IRA and EWEB Incentives Chart

*Additional Funding for Heat Pumps for low-income households and associated costs may also be available through the Oregon Department of Energy's Community Heat Pump Deployment Program, but funds for this program are very limited.

**EWEB's Incentives for low-income households to upgrade their home heating systems are only available to customers whose current primary heating system is electric. Customers switching from gas heat are only eligible for EWEB's Standard Heat Pump Rebates.

***IRA rebates for Heat Pump Clothes Dryers and Electric Stoves are only available for customers switching from Natural Gas, not customers who already have an electric stove or clothes dryer.

For Info on how home income eligibility for these programs interact, see Appendix C.

Chapter 5
Discussion

5.1 Benefits of Community Engagement and Involvement

Throughout the duration of the project, participants expressed the opinion that participating in the Bethel Clean Energy Project was both beneficial and interesting. The opportunity to learn directly from knowledgeable EWEB and Beyond Toxics staff was identified as a clear benefit. The majority of participants described that they had gained necessary basic knowledge from listening to the presentations that allowed them to understand energy efficiency and make decisions on what changes they want to make to their home energy systems and appliances. Many described that the most important benefit was having their Home Energy Score explained and get answers tailored to their particular needs and situation.

For example, answers to the following question indicate the types of benefits participants gained from participating in the project:

Would you recommend participating in a Clean Energy Workshop like this to your neighbors in the future?

"Yes. Even more important than finding out about heat pumps was to learn that my wife and I qualify for the full rebates from both the agencies! Zach Mullholland's info was great, he is amazing! So, yes I definitely would!"

"Yes. I don't know how many people know about this. New neighbors with more children, wondering how much they know. My hairdresser, masseuse didn't know about it. Would love a contact sheet with bullet points and to hand out sheets for neighbors [so I can] help out letting people know about meetings, etc."

What is one of your main take-aways from this experience?

"There are some really good incentives and programs to become more efficient and that's good to see how great options work depending on income, especially because we are new homeowners. I know EWEB has had incentives about windows but [now I] understand that this could be cost free if we come in at the right time."

"I didn't know much about this to begin with, and wasn't thinking about it as a renter. Solar always sounds good but it sounds like a heat pump is a much more effective way to tackle energy costs and efficiency."

"I learned a lot of good info. [At first] I thought solar panels were good but [now I know I] need to make the house more energy efficient first."

"The one take-away is thinking seriously about the heat pump and heat pump water heater. Not something we thought about before and didn't even realize it was a possibility. Learning that and learning that we are eligible for 100% rebates that's definitely important. And to be a part of a group that is asking questions who are dealing with the same things, that is wonderful."

“Concrete direction on [best] bang for the buck and ways to save energy.”

"Yes - would be able to take next steps sort of. Thinking about installing a new front door. Decided to hold off to see if I qualify for EWEB/Federal incentives, but have air gaps and need to replace doors for better weatherization. Husband was a gardener who passed away from cancer during last year’s heat wave. Now have less money to afford door work but definitely will prioritize health and climate change updates. Never knew I was two blocks away from J.H. Baxter.”

Did you find the Home Energy Score to be helpful and easy to understand?

A benefit of this cohort was being able to receive a free home energy audit from EWEB and have the opportunity to discuss their results as a group. Some participants would have benefited from more individualized discussions about the recommended projects from their home energy score, which we are including as part of our assistance with their Clean Energy Work Plan.

"Yes, it was interesting. I can see that it’s a rough sketch but I came in about 60% better for energy use, because I’m already doing a lot to reduce energy consumption. But for the amount of power I pay for, should be more efficient. Learning about usage vs. efficiency was eye-opening. Electric bills are heinous."

"No, it was not easy to understand. Maybe it would be helpful to... discuss it. I can’t do phone calls, I need face to face or having it written down."

What are other benefits you experienced?

During open interview questions, many participants expressed they felt a sense of camaraderie and "community," and they saw this as a true benefit:

“I was thinking, is this an organization that I could come ask questions to anytime? I feel like I could if I have questions.”

“Any human contact is good for us. It is good to know that I can call Arjorie. You guys are looking out for us and that’s the best thing I got out of it - we have someone to talk to.”

“I think that BT is awesome, I appreciate having people from all different parts of the neighborhood.”

Is there anything Beyond Toxics could have done differently to help make these sessions more accessible for you?

We also asked participants about what would have made their experience better. We received some helpful recommendations:

“The slides would have been beneficial to print out or handouts to what the slides say. A lot of times presenters talked about different things that are on slides which I liked, but would be nice to refer to slides later. Good for notes in the moment too. Having a counseling moment afterwards would have been cool.”

“It was accessible, and I would appreciate materials in written format. I would have liked printed slides during the presentation. It was a lot of info. Want transcript of sorts. I need to read something at the same time, can't retain info from talking.”

“[Invitations by] Google Calendar would have also been helpful.”

“I love the solar farm idea! Maybe a community…space to house community emergency tools. That sounds great - both good ideas.”

5.2 Plans for Clean Energy Technology Implementation

Many participants felt they will move forward with weatherization or energy efficiency implementation because they gained a clear understanding of incentives available for their income level, and the economic and energy benefits of completing one or more projects. Over the course of the project, there was a clear shift from uncertainty about the benefit of taking action on energy efficiency technologies towards prioritization and commitment to install one or more efficiency upgrades.

Installing rooftop solar panels was a common clean energy choice at the beginning of the project cohort. However, a shift in thinking occurred over the course of the three weeks. Heat pumps and weatherization moved up to top implementation priorities. This shift could have been encouraged by presenters repeatedly emphasizing the adage that "You have to eat your energy vegetables, like weatherization, before eating your energy cookies, like rooftop solar!" The presentation from Eugene Water and Electric Board explained the cost to run different appliances based on their wattage and distributed Home Energy Scores that recommended insulation and appliance upgrades but did not recommend solar. In addition, presentations from Beyond Toxics showed that incentives are likely to cover 100% of the upfront costs of insulation and appliance upgrades for low-income households but not cover 100% of the upfront costs of solar, which may have lead to this change in attitudes.

Participants commented on how much they appreciated meeting their neighbors and learning as a group. A few stated that they never or very rarely had the opportunity to interact with their neighbors. They felt that the meetings and discussions with their neighbors helped alleviate a pervading sense of isolation.

Overall participants were inspired to implement a personal energy efficient action plan. One household immediately purchased a heat pump hot water heater during the three weeks of meetings. However, many others still had questions about how it all could work for them before they could make a decision. To take steps towards installing clean energy technology, a few participants alluded to or stated that they would like to continue to be able to get assistance directly from Beyond Toxics. Some people wanted help understanding their Home Energy Scores. Some felt they needed more guidance to find the right incentives to be able to implement their first step towards greater efficiency and newer technology. Getting help finding a qualified contractor to do the work was a potential stumbling block for some.

For example, while a number of households already had a heat pump system, some felt it was too old, was sized too small to heat or cool all the rooms of the home (particularly second story bedrooms) or, in general, didn't work well and should be replaced; however, households weren't sure if they would be eligible for rebates or other incentives to replace an existing heat pump. Others wanted more help understanding if they would be required to put in a new electrical panel, or new plumbing, or how to make a decision between ducted versus ductless heat pumps.

Beyond Toxics concluded that the three-week pilot project provided participants a solid foundation of knowledge of clean energy options and potential financial incentives to begin planning energy efficiency upgrades. In addition, participants felt supported and inspired to make necessary changes to their energy systems and energy consumption. However, many are choosing to wait until the federal IRA financial incentives are made available before taking concrete steps towards implementation. We also recognized that there wasn't enough time for a necessary deeper analysis of each households' needs. People would also benefit from our help putting people in touch with qualified contractors who could give an accurate scope of work and job bid.

5.3 How Was This Project Catalytic?

In the course of the 6-month project, we are able to identify ways this project served as a catalyst to build new professional connections and discover unanticipated community benefits.

As a public utility, EWEB has an obligation to be responsive to community needs. We found the EWEB staff to be open and receptive to learning about the project and working with Beyond Toxics to help us clarify ways their organization could help make our project impactful for the community participants. We scheduled at least six meetings to discuss the project, our goals, their capacity, the agendas for each of the three community education meetings and arranging for the Home Energy Scores to be completed in time to distribute during the final meeting. The EWEB staff who attended the community meetings expressed their gratitude for being able to learn about community members' concerns and needs. EWEB staff were particularly impacted by listening to participants' deep concerns about ongoing problems of exposure to polluted air and the prevalence of cancers and respiratory illnesses in their own families and amongst their neighbors. One EWEB staff person commented that attending the BCEP meetings heightened his awareness of the benefits of electrification in a pollution-burdened neighborhood. In particular, this person noted how heat pumps seemed to be specifically impactful in homes with outside air quality and contaminant issues because individuals would not have to open their windows to cool down when having heat pumps to air condition the space, an immediate benefit that would reduce their exposure to outside contaminants.

The BCEP project also put us in contact with Seeds for the Sol, Electrify Oregon and Earth Advantage, three organizations seeking to promote home electrification and the shift away from natural gas and other fossil fuels to heat, cool and/or run appliances.

Firsthand knowledge of the dire needs of environmental justice communities also inspired Beyond Toxics to join with other advocates to support the passage of the climate related legislative concepts in the 2023 Oregon Legislature.

Climate Resilience Package (HB 3409 C Engrossed) will provide essential public services to reduce climate and air pollution, support healthy, affordable, resilient communities, and create family-wage jobs across Oregon by leveraging unprecedented federal funding for climate and clean energy. The full package includes these bills:

- Resilient, Efficient Buildings Policy Package (SB 868, 869, 870, 871) - Leverages federal funding to improve efficiency of homes and buildings; supports healthy, affordable, resilient communities and family-wage job creation across Oregon.
- Community Resilience Hubs (HB 2990) - Funds community resilience hubs and networks across the state to coordinate and provide access to resources and services for vulnerable populations during disasters.

The project proved highly successful as a catalyst for strengthening community resilience by building neighbor-to-neighbor connections from the ground up. Comments shared during the exit interviews illuminated how many participants felt they had found an organization that they could trust to present well-researched information, represent their interests and understand their situation. Participants frequently mentioned feeling that they increased their interest in climate and energy issues and felt more confident that they were prepared to pursue projects to improve their energy efficiency.

Participants also expressed their excitement that not only were they feeling much more confident about solving their own residential energy needs, they also felt empowered to work towards greater energy efficiency and independence for the Bethel community. The group coalesced around the visionary goal of converting the highly polluted 32 acre J.H. Baxter site into a community solar installation and a community resilience and emergency preparedness storage site. Picturing the site for community-centered beneficial uses engendered a sense of hope and pride that they could take action to reverse decades of neglect and poor planning that has plagued the Bethel neighborhood and resulted in negative health outcomes.

5.4 Quantifying What it Takes to Do Effective Community Engagement and Build Community-Centered Work Plans

A core goal of this project was to share information that affirms the lived experience and collective power of residents living in the shadow of dozens of industrial facilities that are responsible for air, water, soil and noise pollution. A common theme expressed in the community is that they feel abandoned by city and state government and ill served by state agencies responsible for protecting environmental health. In order to carry out a successful project in the Bethel community, significant investments must be made to ensure strong outreach and engagement.

We calculate that the four Beyond Toxics staff members assigned to this project collectively worked between 1,800-1,900 hours over the course of 6 months. These hours are spent completing the following tasks:

- Planning Meetings
  - Internally amongst project staff
  - With Vertuelab
  - With EWEB
  - With Seeds for the Sol
  - With Earth Advantage
- Door-to-door canvassing
- Research and data analysis
- Phone calls to engage participants, confirm their information and participate in all three meetings
- Arranging for Spanish interpretation
- Arranging for meeting space and rentals, room set-up, food shopping and set-up, signage
- Document preparation and printing

- Preparing presentations for three meetings
- Arranging the stipends for each participant
- Exit interviews
- Writing and reporting

5.5 Beyond Toxics Next Steps

Our organization plans to build out our Community Clean Energy and Climate Equity project in the Bethel neighborhood as well as continue to develop model templates for other organizations and communities to follow. A list of our next steps include, but are not limited to:

- Expand partnership with Seeds for the Sol, led by Julie Willams, who has extensive experience connecting electrification contractors with homeowners and providing Pay as You Save loans or no-cost financing.
- Work with members of the cohort to conduct 2 case studies where local appliance dealers and contractors were contacted to give bids. We are assisting the 2 low-income households move forward to launch pilot projects to install energy efficient appliance upgrades at zero-cost in the Fall of 2023 or Winter of 2024 based on the findings in this report.
- Continue to work with cohorts as IRA and State of Oregon Incentives become available to assist them in accessing the funds.
- Offer to convene a cohort get-together once the federal rebates and incentives are published to help participants navigate the federal information and understand the application process.
- Apply for additional funds to assist this cohort and future BCEP cohorts in making changes.
- Expand the pilot project into a BCEP Cohort 2 using the lessons learned, the partnerships we made with EWEB and Seeds for the Sol and implementing the suggestions we were given to improve the project.
- Expand to train additional low-income households how to access Clean Energy Projects by initiating a mini-pilot project to assist 3 households start their energy workplan and access no cost options through local, state and federal financial incentives.
- Quantify Greenhouse Gas reductions from home retrofit and electrification projects and calculate reductions in community harm using the social cost of carbon as projects are planned implemented.

- Explore offering trainings for Unions, Contractors, and Real Estate Agents
  - Work with Labor groups to train their electricians, plumbers, insulators, and HVAC installers how they can offer these incentives to their low-income clients
  - Work with BIPOC-owned businesses to train them to offer these incentives to their low-income customers.
  - Work with realtors to offer these incentives to their low-income customers before listing their houses for sale or after purchase.
  - Work with realtors to encourage home sellers to get a Home Energy Assessment completed before listing the home and to clearly communicate the energy efficiency characteristics of the home to potential buyers.
- Consult with and support EWEB to adopt new policies to advance the adoption of electrification including:
  - Allowing all customers to access both rebates and zero-interest loans, as low-income customers are able to do, rather than having to choose one or the other;
  - Allowing low-income natural gas customers to access low-income incentives to switch from gas to high efficiency electric heat pumps for space and water heating;
  - Developing more distributed and locally produced solar power to increase resiliency during heat and air pollution emergencies and other disaster scenarios.
- Engage the community and build collective momentum to support a Community Benefits Project including a community solar project and emergency preparedness storage on the J.H. Baxter site. Work with EWEB, local officials, City of Eugene departments of Public Works and Planning, the Oregon Department of Environmental Quality, Oregon Department of Energy and the US EPA to overcome obstacles and take advantage of federal funding opportunities.

Chapter 6
Appendix

Appendix A - Data Used in Modeling

Items highlighted in yellow were used for energy cost savings estimates for Heat Pumps and Heat Pump Water Heaters.

Chart 1: UES Measures List from the Bonneville Power Administration with expected reductions in energy use from installing Heat Pumps and Heat Pump Water Heaters in comparison to alternatives.

BPA Deemed Measures - HPWH, DHP, ASHP		
Technology	**Heat Pump Water Heater**	**Ductless Heat Pump**
BPA EEC Reference Number	RWHWH13102	RHVHS13016
Annual kWh Savings (Site)	1371	2550
Incremental Capital Costs (no incentives)	$629	$4,039
Measure Life (Years)	13	15
Annual Cost Savings (@$0.0972/kWh)	$133	$248
Lifetime Cost Savings	$1,732	$3,718

Full List of UES Measures: https://www.bpa.gov/energy-and-services/efficiency/bpa-energy-efficiency-tracking-system/beets-templates-and-tools

Chart 2: Expected Annual Energy Cost Savings from a Heat Pump Water Heater from Bonneville Power Administration's UES Measure List, Department of Energy's EnergyStar Program, and EWEB's 2021 Electrification Study. The more conservative estimate from BPA was used in modeling energy cost savings of a HPWH in comparison to an electric resistance water heater, which was also more conservative than the estimates from the EnergyStar Program. The estimate from the 2021 EWEB Electrification was used to model cost savings for a HPWH in comparison to a natural gas tank water heater updated using current utility rates.

Annual Energy Cost Savings HPWH vs. Electric Resistance WH	Expected Annual kWh Savings	Expected Annual Energy Cost Savings (net savings in Comparison to Electric Resistance WH @ $.0972 per kWh)	Lifetime Energy Cost Savings (13-years)
BPA - UES Measures - HPWH above conditioned space (level used in modeling)	1,371	$133	$1,732
BPA - UES Measures - HPWH above unconditioned space	1,451	$141	$1,833
DOE - EnergyStar (2 people)	1,880	$183	$2,376
DOE - EnergyStar (3 people)	2,820	$274	$3,563
DOE - EnergyStar (4 people)	3,760	$365	$4,751
Expected Annual Energy Cost Savings HPWH vs. Natural Gas WH	**Expected Annual Cost Savings from reduced gas use (gross)**	**Expected Annual Energy Cost Savings (net savings, HPWH in comparison to Natural Gas WH)**	**Expected Lifetime Energy Cost Savings - 13 years (net savings, HPWH in comparison to Natural Gas WH)**
EWEB - 2021 Electrification Report*	$196	$113	$1,469
Expected Cost 2023 - Update using current Utility Rates**	$265	$175	$2,279

*Eugene Water & Electric Board (Nov, 2021), Electrification Impact Analysis Phase 2 (Page 37), https://www.eweb.org/documents/about-us/electrification-study-phase-2-final-report.pdf

**Based on estimated price increases of $0.09148 to $0.0972 per kWh and $0.90732 to $1.22 per therm

Appendix B - PowerPoint Presentations

PowerPoint Presentations from Bethel Clean Energy Project Community Meetings are on the Beyond Toxics Resource Page: **https://www.beyondtoxics.org/resources/**

Appendix C - Income Guidelines for Rebates when Combining Programs

Due to different income eligibility rules used by the federal IRA and Eugene's local utility, EWEB, consumers may find they may or may not be eligible for all available rebates. EWEB uses Federal Poverty Level as a measure whereas the IRA uses Area Median Income. Thus, depending on household size and income, a household trying to utilize EWEB and IRA rebates could qualify as low-income eligible for both programs, one program, or neither program. The different combinations of program eligibility for IRA and EWEB Incentives are shown in the following chart.

Eligibility for EWEB and Inflation Reduction Act Rebates by Household Size and Income

Group	A	B	C	D	E
Level of Rebates Available	Highest Rebates Available	High Rebates Available	High Rebates Available	Medium Rebates Available	Lowest Rebates Available
	EWEB Low-Income + IRA @ 100%	EWEB Standard + IRA @ 100%	EWEB Low-Income + IRA @ 50%	EWEB Standard + IRA @50%	EWEB Standard + NO IRA
Household Size	<200% FPL and <80% AMI	>200% FPL and <80% AMI	80% - 200% AMI and <200% FPL	80%-150% AMI and >200% FPL	>150% AMI and >200% FPL
1	<$31,266	$31,266-$39,900		$39,900-$74,812.5	>$74,812.50
2	<$40,886	$40,886-$45,600		$45,600-$85,500	>$85,500
3	<$50,506	$50,506-$51,300		$51,300-$96,187.50	>$96,187.50
4	<$56,950		$56,950-$60,126	$60,126-$106,781.25	>$106,781.25
5	<$61,550		$61,550-$70,280	$70,280-$$115,406.25	>$115,406.25
6	<$66,100		$66,100-$80,560	$80,560-$123,937.50	>$123,937.50
7	<$70,650		$70,650-$90,840	$90,840-$132,468.75	>$132,468.75
8	<75,200		$75,200-$101,120	$101,120-$141,000	>$141,000

*Natural Gas customers are not eligible for low-income EWEB rebates

*Customers who are income qualified for low-income EWEB Rebates (including gas customers) also qualify for State of Oregon Heat Pump Rebates

Appendix D - Additional Resources

Rewiring America Fact Sheets -https://www.rewiringamerica.org/ira-fact-sheets
Rewiring America IRA Guide - https://www.rewiringamerica.org/IRAguide