

City of Eugene Decarbonization by 2045 for Existing Buildings

*Policy and Program Best Practices Review and
Recommended Roadmap*

PART 1: Residential Buildings--Draft

Presented by

Joshua Proudfoot, Principal

Aaron Toney, Senior Associate



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making sustainability work

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Project Overview & Purpose

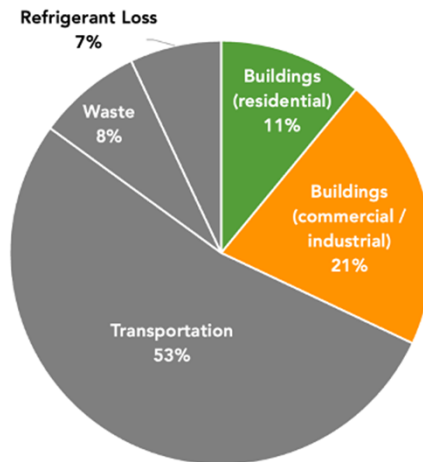
- ▶ What does our existing building supply look like – Residential, Commercial and Industrial (to follow).
- ▶ What are the best practices to decarbonize our existing buildings and how do we look out for those that need extra help? (Low Income and/or BIPOC)
- ▶ What policies and programs exist and is there money to be found to support the transition?
- ▶ Where are the gaps in programs?
- ▶ Where could the city act?



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Eugene Community GHG Emissions ~1 million MT CO₂e annually

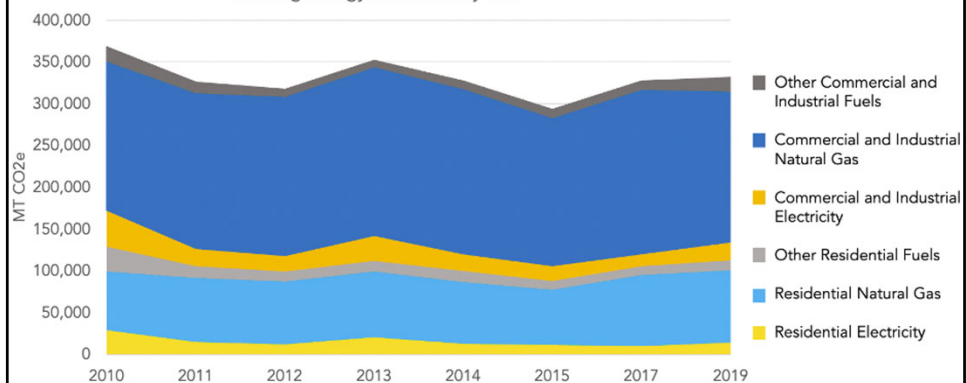


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Eugene Emissions - Building Energy

Building Energy Emissions by Year



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Residential Sector

Building Stock Characteristics

- ▶ Data from American Community Survey and Energy Trust of Oregon
- ▶ Roughly 76,000 total housing units
 - Type: 59% single family; 38% multifamily; 3% mobile home
 - Ownership: 51% owned; 49% rented
 - Age: 65% of housing built before 1990
 - Primary heating fuel: 73% electricity (vs 51% OR av.); 22% natural gas; 3% wood; all other fuels 2% (fuel oil, propane)

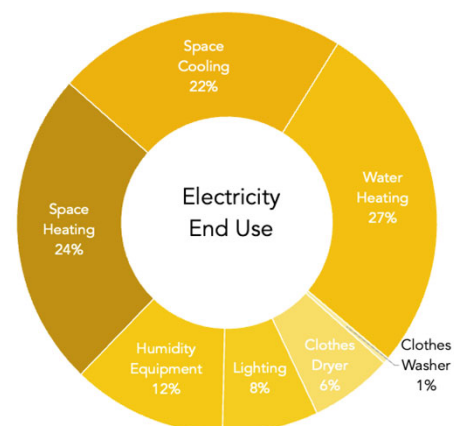
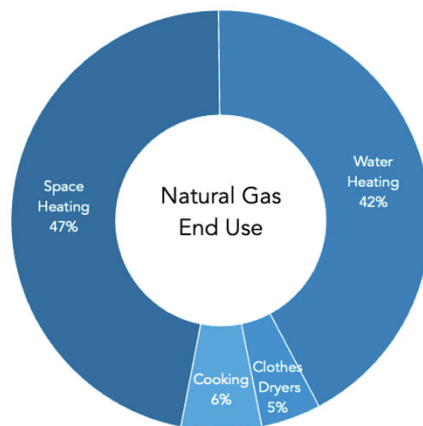


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Residential Sector

Common Energy End-Uses

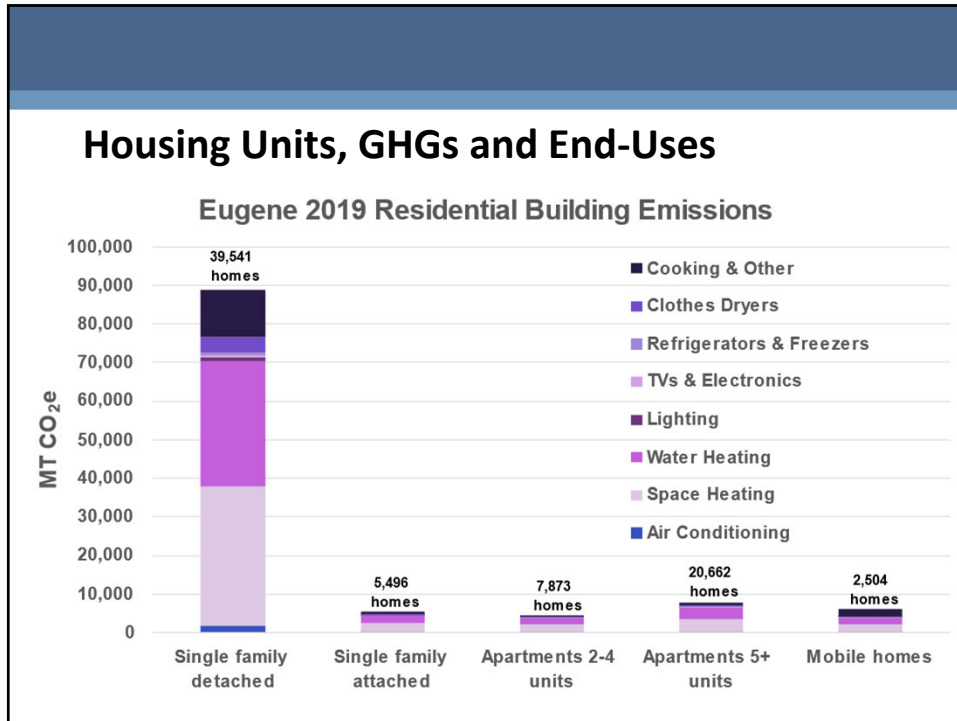


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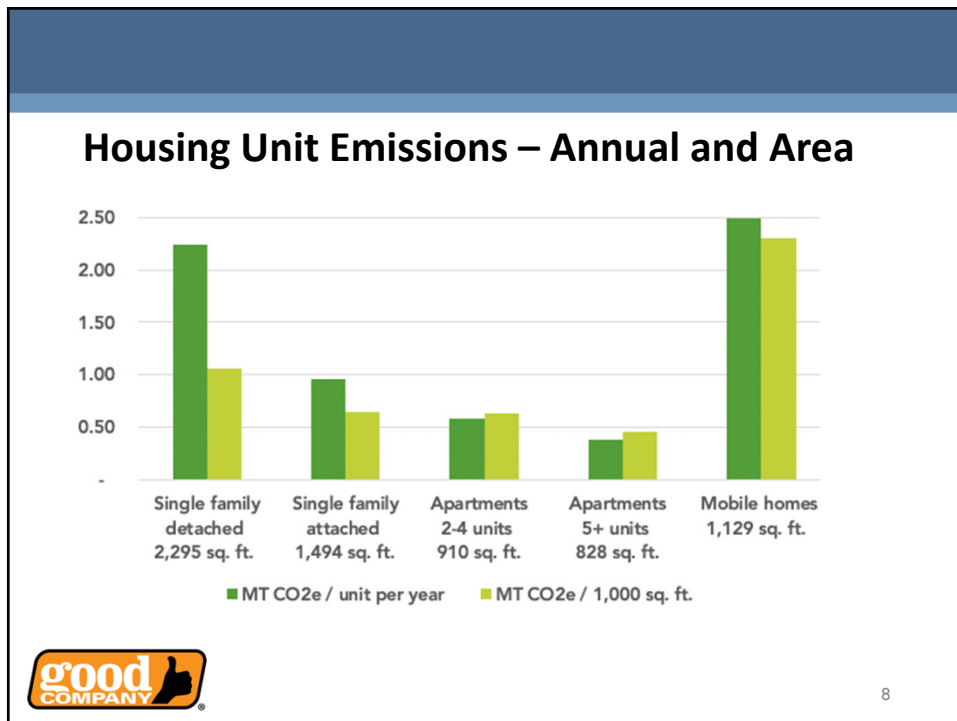
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Slide 5

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Energy Supply Context

Summary of Existing Policies

- ▶ Climate Protection Program
 - 90% emissions reduction by 2050
 - Applies locally to use of natural gas and other fossil fuels
 - NWN planning to use a combination of demand-side and supply-side action for compliance purposes
- ▶ Clean Energy Targets Bill (HB2021)
 - EWEB not regulated under the bill
- ▶ EWEB and NWN will be publishing their Integrated Resource Plans late summer/fall 2022

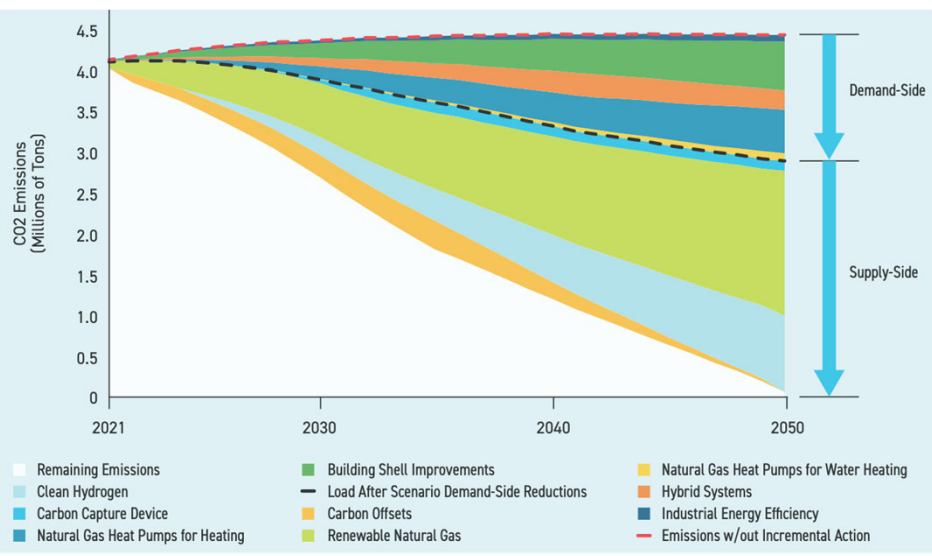


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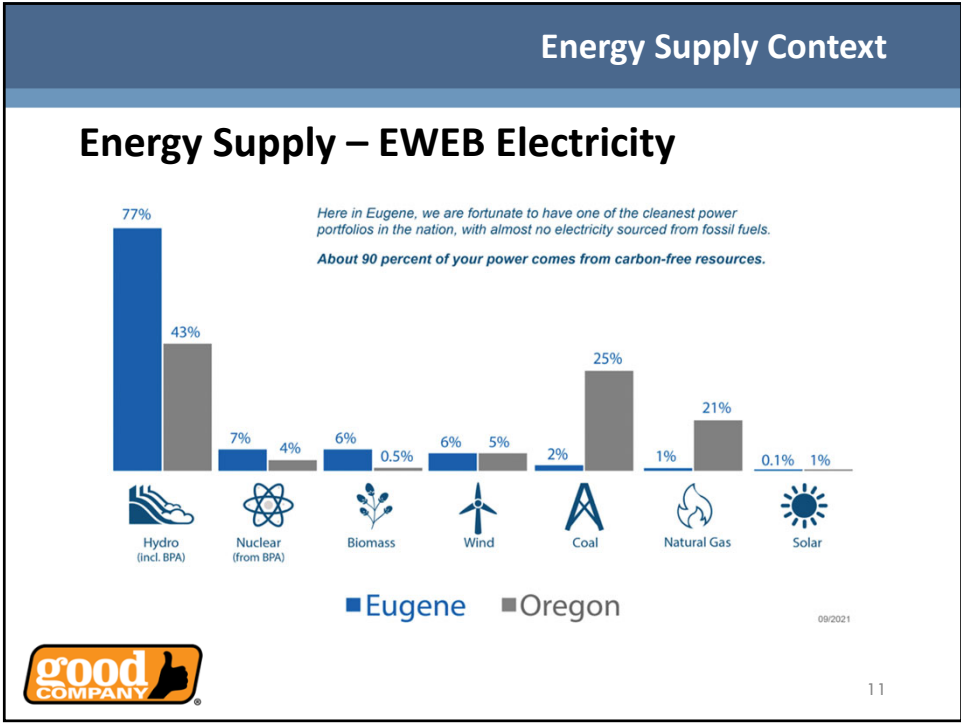
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Energy Supply Context

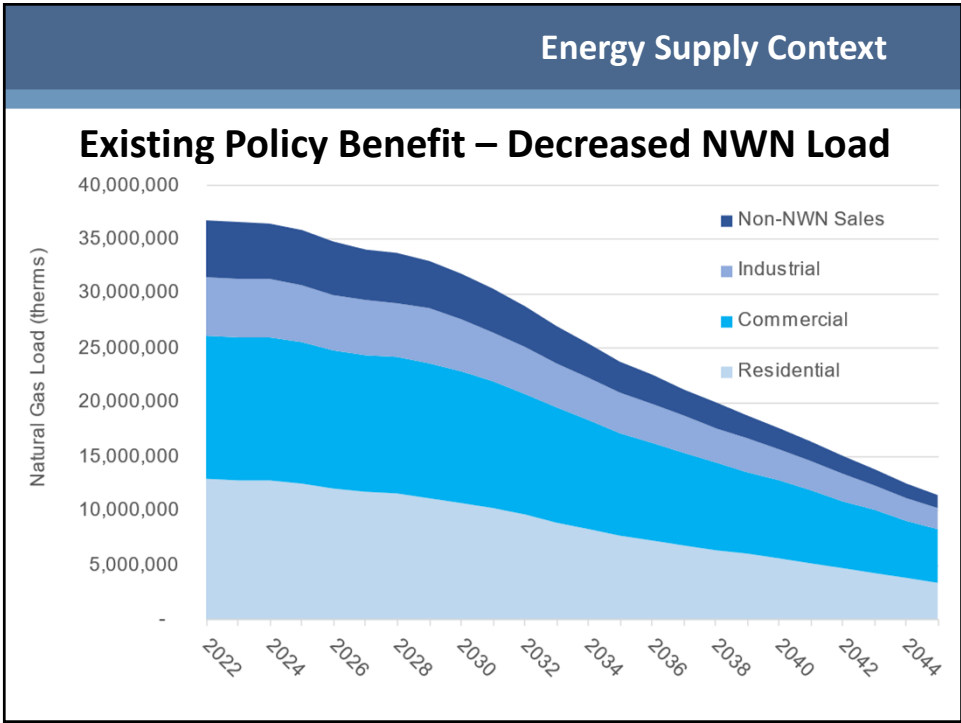
Northwest Natural Gas – Vision 2050



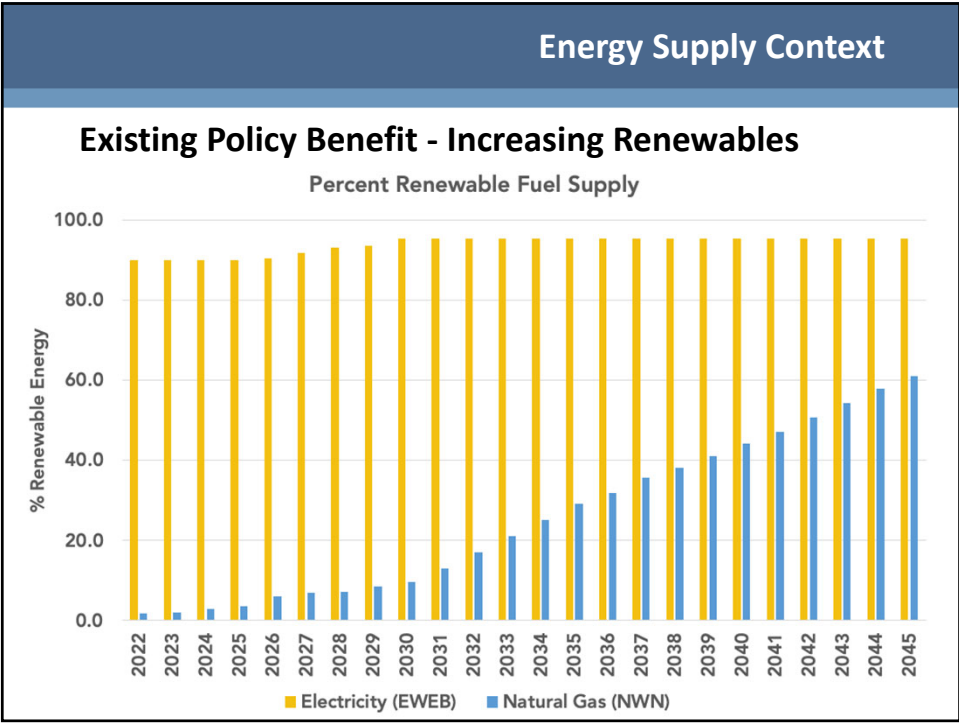
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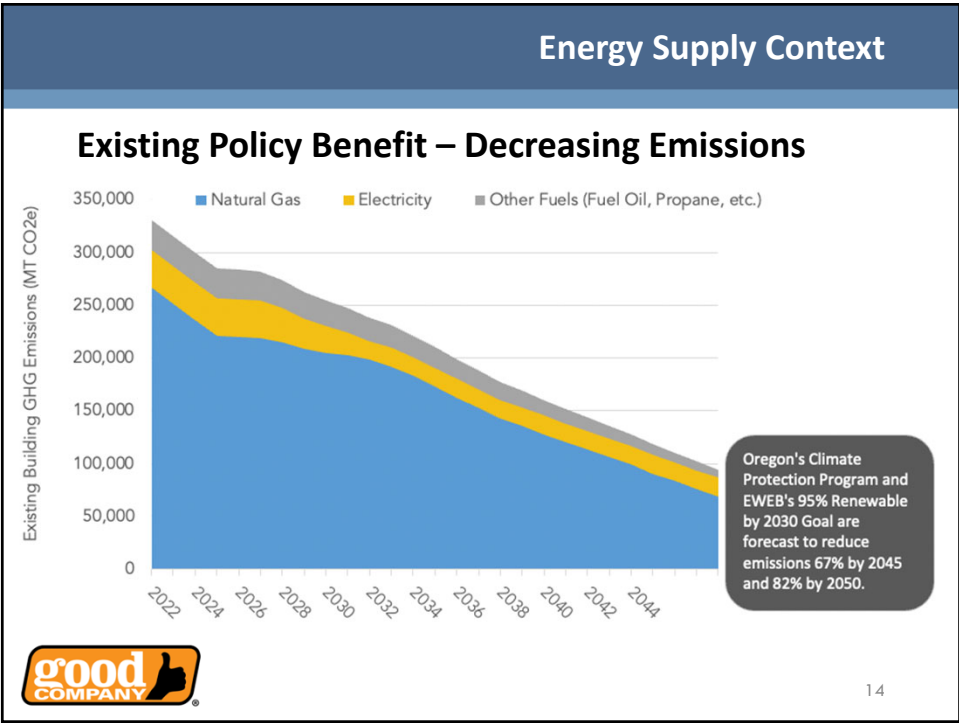
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Best Practice: Approach

Pillars of Deep Decarbonization



Energy efficiency & conservation

- ✓ Smart-growth driven VMT reductions
- ✓ Whole-home retrofits & new construction codes
- ✓ Electric heat pumps displacing resistance heat



Electrification

- ✓ Electrification of industry OR buildings
- ✓ Electrification of passenger vehicles
- ✓ Electrification of trucks and freight transportation



Low-Carbon Energy

- ✓ Low-carbon electricity
- ✓ Low-carbon biofuels
- ✓ Potentially renewably produced hydrogen



Reduce non-combustion GHGs

- ✓ Methane reductions
- ✓ Replacement of high global warming potential gases
- ✓ Industry process emissions reductions



Image Credit: Energy + Environmental Economics, Four Pillars of Deep Decarbonization

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Best Practice: Energy Efficiency

Natural Gas – Cost-Effective Opportunities

- ▶ Data from Northwest Natural, Energy Trust of Oregon, and National Renewable Energy Lab
 - Water heating appliance upgrades, including heat pumps
 - Space heating appliance upgrades, including heat pumps
 - Space heating controls (such as smart thermostats)
 - Weatherization of building envelope

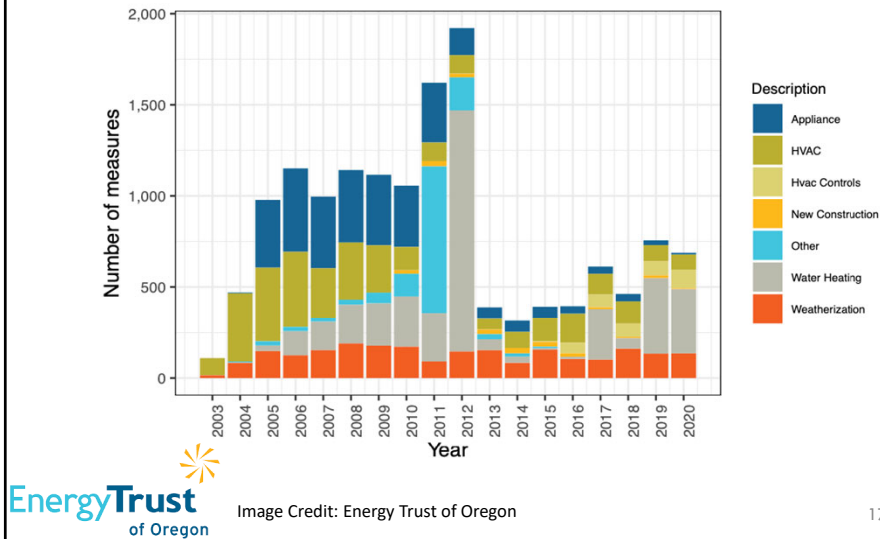


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Best Practice: Energy Efficiency

Natural Gas – Historical Implementation



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Best Practice: Energy Efficiency

Electricity – Cost-Effective Opportunities

- ▶ Data from Northwest Power Plan 2021
- ▶ Cost Effective
 - Water heating and use upgrades, including heat pumps
 - LED lighting
 - Space heating upgrades, including heat pumps
 - Space heating controls (such as programmable thermostats)
 - Weatherization of building envelope



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Implementation Costs							
EWEB Electrification Study Findings							
Electrification Scorecard	Carbon Reduced	Aggressive Carbon Reduction 2030			1-in-10 Peak Adder	Peak Management Potential	EWEB Engagement Opportunities
		EWEB Participant	EWEB Ratepayer	Society			
Electric Vehicle	🍃🍃🍃	🍃	🍃	🍃	⚡⚡⚡	🍃🍃🍃	Encourage managed charging to avoid peak, increase public and workplace charging opportunities
Heat Pump Water Heater	🍃	🍃	🍃	🍃	⚡	🍃🍃	Consider existing energy efficiency incentive program's influence on electrification of water heating
SFD - Standard Heat Pump	🍃🍃	🍃	🍃	🍃	⚡⚡⚡	🍃	Influence customer space heating technology choices to mitigate peak impacts.
SFD - Cold Climate Heat Pump	🍃🍃🍃	🍃	🍃	🍃	⚡⚡	🍃🍃	Influence customer space heating technology choices to mitigate peak impacts.
SFD - Dual Fuel Heat Pump	🍃🍃	🍃	🍃	🍃	⚡	🍃🍃🍃	Influence customer space heating technology choices to mitigate peak impacts.
Multi-Family Dwelling Space Heat	🍃	🍃	🍃	🍃	⚡	🍃🍃	Participant benefits are lacking, making electrification unlikely. Possible incentive opportunity.
Small Office Space Heat	🍃🍃	🍃	🍃	🍃	⚡⚡	🍃🍃	Participant benefits are lacking, making electrification unlikely. Consider rate design changes for commercial electrification.



Image Credit: Energy + Environmental Economics, Four Pillars of Deep Decarbonization

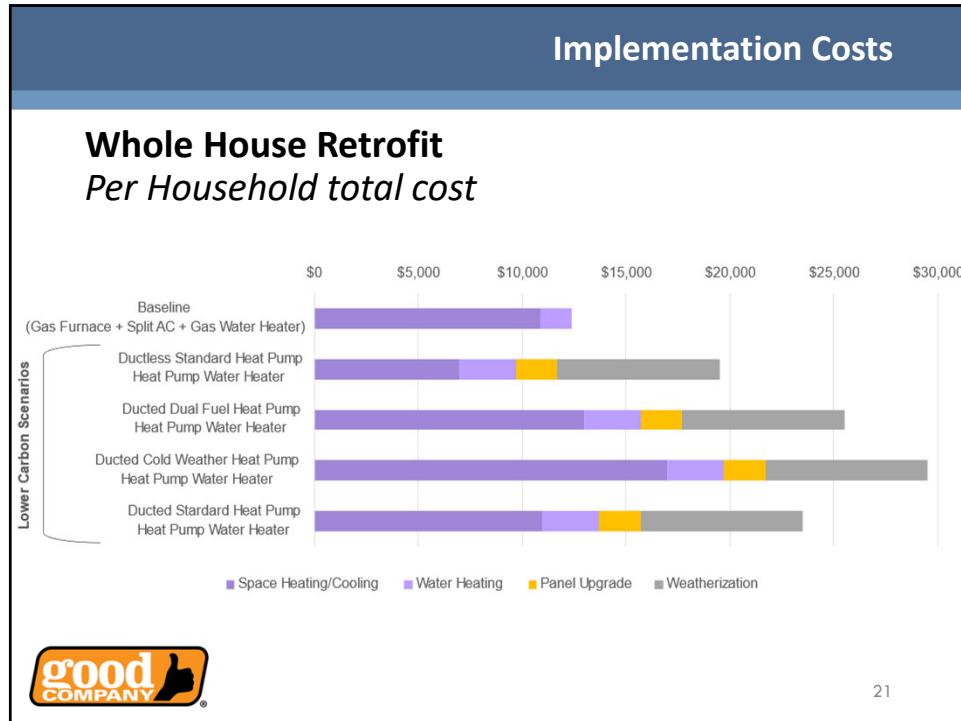
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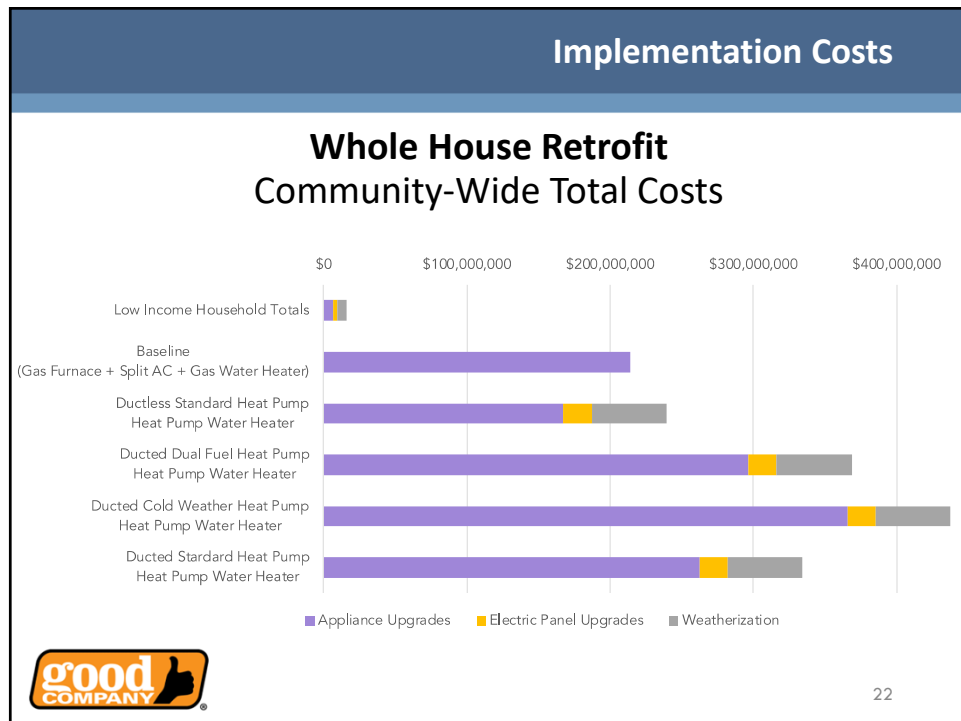
Best Practice: Clean Heat Retrofits	
<h3>Clean Heat Retrofit Costs</h3> <ul style="list-style-type: none"> ▶ Clean Heat Retrofit = Electric appliances, weatherization, and panel upgrades ▶ Cost data from EWEB and Homes for Good 	

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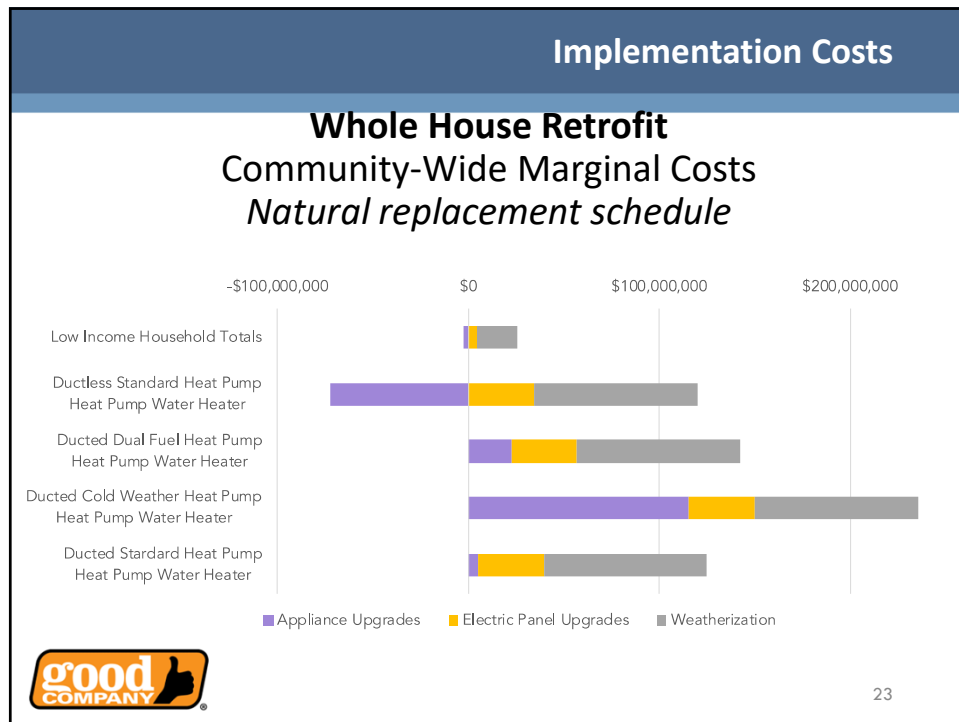
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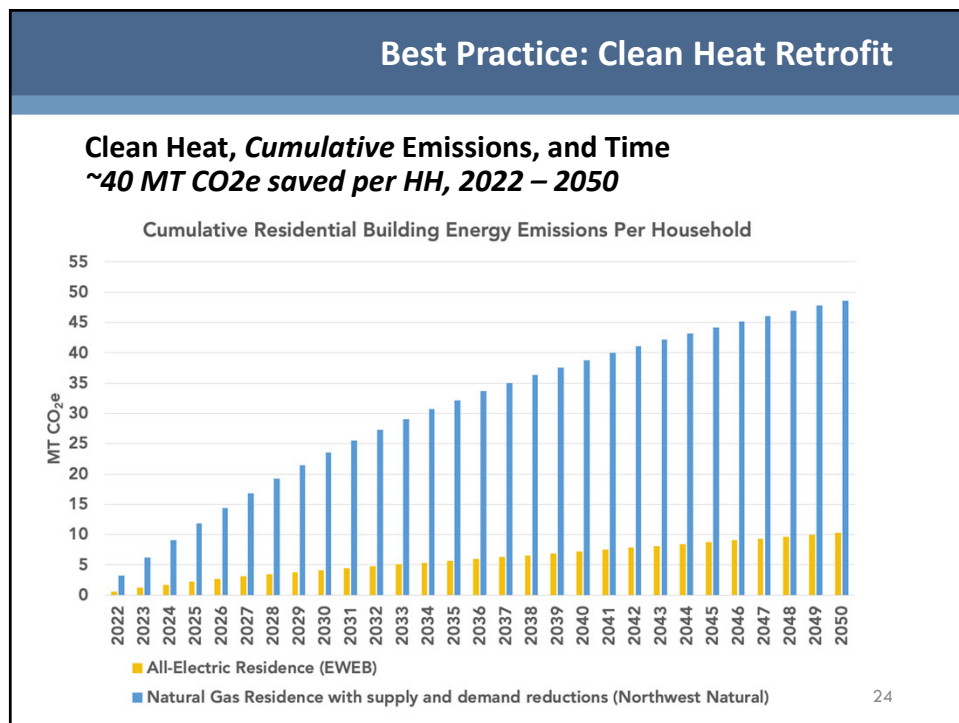
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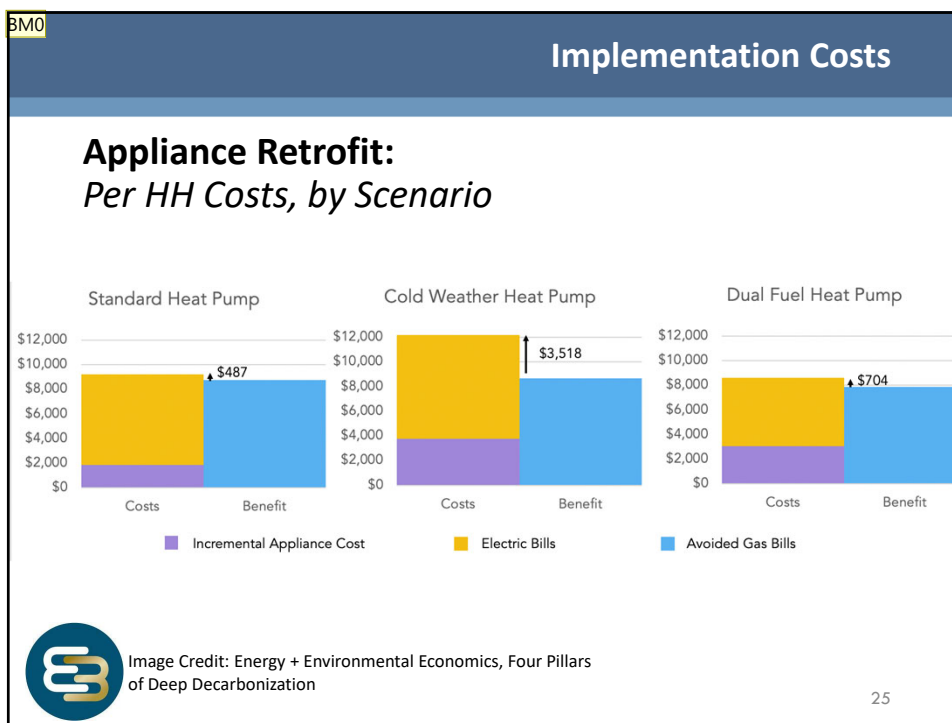
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Best Practice: Distributed Renewables

Residential Solar PV + Battery Backup

- ▶ Provides local resiliency in case of emergency
- ▶ Per Unit Costs
 - Data from Northwest Power Plan 2021
 - 5.6 kW system
 - \$16,000 (PV system only)
 - \$28,000 (PV system + battery backup)
- ▶ May be considered to reduce additional load needs
- ▶ Example community costs
 - EWEB found the need for 10 aMW to electrify 50% space and 85% water
 - Assuming a capacity factor of 25% for solar PV and average 5.6 kW system
 - Filling the load would require about 7,000 residential systems locally
 - Requiring a rough first cost of \$100 million for solar PV systems only; and \$200 million for solar + battery back up

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Low priority

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Local Services										
Local Agency or Program	Low-Income Programs	Energy Costs	Home Repairs	Energy Audit	Building Envelope	Heating / Cooling Systems	Water Heating	Electric Panel Upgrades	Onsite Renewables + Storage	Mobile Home Upgrades
City of Eugene	✓		✓	✓						✓
EWEB / BPA	✓	✓		✓	✓	✓	✓	✓	✓	✓
Habitat for Humanity	✓		✓							✓
Lane County / Homes for Good	✓		✓		✓	✓		✓		✓
Low Income Home Energy Assistance Program	✓	✓	✓		✓					✓
Northwest Natural Gas / Energy Trust	✓				✓	✓	✓			✓
Oregon Department of Energy	✓					✓			✓	✓
Oregon Health and Community Services	✓		✓		✓	✓	✓			✓
St. Vincent de Paul of Lane County	✓									✓
State Home Oil Weatherization Program					✓	✓				✓
Catholic Community Services/ Oregon Energy Fund		✓								

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Funding

Available Options

▶ Community-Scale

- Energy Efficiency Block Grants (USDOE, Q4 of 2022)
- Sales Tax or Surcharge (Portland Clean Energy Fund)
- Private Equity / Energy Performance Contract (Ithaca, NY)
- Climate/Green Bonds
- Social Impact Bonds
- Affordable Housing Bonds With County and Utility
- Special Assessment Districts
- General Obligation Bond – Public vote

▶ Home and Building Owners

- Utility-sponsored programs
- Government-sponsored programs
- Property Assessed Clean Energy (PACE) Financing
- Energy Savings Performance Contract (ESPC)

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Focus on Equity

Equity Considerations and Best Practices

- ▶ **Need permanent, effective cooling for health and safety**
- ▶ Needs exist beyond available funding, long waitlists
- ▶ Programmatic Stacking of funds is always required
- ▶ Serving fully from all programs requires case management
- ▶ **Focus on oldest mobile and single-family homes**
 - Greatest emissions per year and per square foot
 - Aggressive outreach and targeted marketing needed to reach those who are unaware of existing programs
 - Funding is needed to address issues that prevent upgrades – repairs, contamination (lead/asbestos), ownership
 - Allocate % of funding to disadvantaged households

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Recommendation 1

Prioritize actions for existing buildings

- Existing buildings represent a large proportion of Eugene's current emissions and will continue to do so for the foreseeable future.
- All future buildings will be built to higher standards so there is less opportunity for measures to reduce emissions.
- Even with the Climate Protection Program, the bulk of the emissions are in the current housing supply up until 2050.

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Recommendation 2

Mobile/manufactured and single-family homes hold the most reduction potential

- Single family homes make up the largest portion of emissions
- **Mobile/manufactured homes** have the largest per unit and per square foot emissions, due largely to their building envelopes.
- **Low-income single-family homes** represent a significant equity and emissions reduction opportunity
- **Low-income apartments need permanent cooling**

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Recommendation 3

Finance, outreach, and project management are critical

- The **financing** required for administering such a large acceleration in decarbonization would likely come from private debt
 - An ESCO organization could aid in securing funding.
- Coordinated **outreach** needs amplification.
 - There are many agencies and service providers, but they do not coordinate in messaging or in practice.
 - A central messaging resource would let all parties know about all the potential financial and practical services available for low-carbon retrofits
- **Project management** is crucial.
 - A central project manager would streamline and troubleshoot the application processes, increasing access.
 - A project manager could connect consumers and contractors to accelerate the current ad-hoc process
 - Or take a greater managerial role as in the Ithaca example.

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Recommendation 4

Align timelines (but not goals) with the State's

- Aligning the timepoints will make compliance and reporting easier for companies and agencies.
- 100% by 2050 pushes beyond the State's goal of 80% by 2050 but with less paperwork

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Questions



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Best Practice: Energy Efficiency

Supporting Action – Home Energy Score

- ▶ Voluntary scoring already promoted by ODOE/City
- ▶ Low-income already supported by UO/City
- ▶ Could be made mandatory at the point of sale/rental

	Energy/ Utility Costs	Energy Efficient Characteristics	Home Energy Score	Energy Audit	Educational Information
Chicago, IL	✓				
Minneapolis, MN	✓	✓			
Kansas		✓			
South Dakota		✓			
Portland, OR			✓		
Berkeley, CA			✓	✓	
Montgomery County, MD	✓				✓
Alaska	✓				
Hawaii	✓				
Massachusetts					✓
Austin, TX				✓	
San Francisco, CA				✓	

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Implementation Costs

Natural Gas – Forecast Cost, by Sector

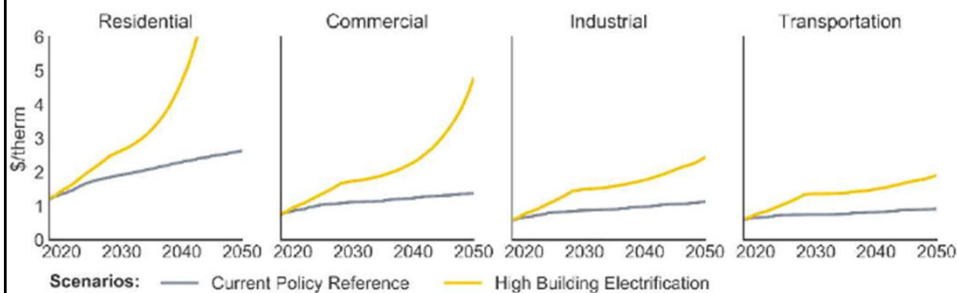


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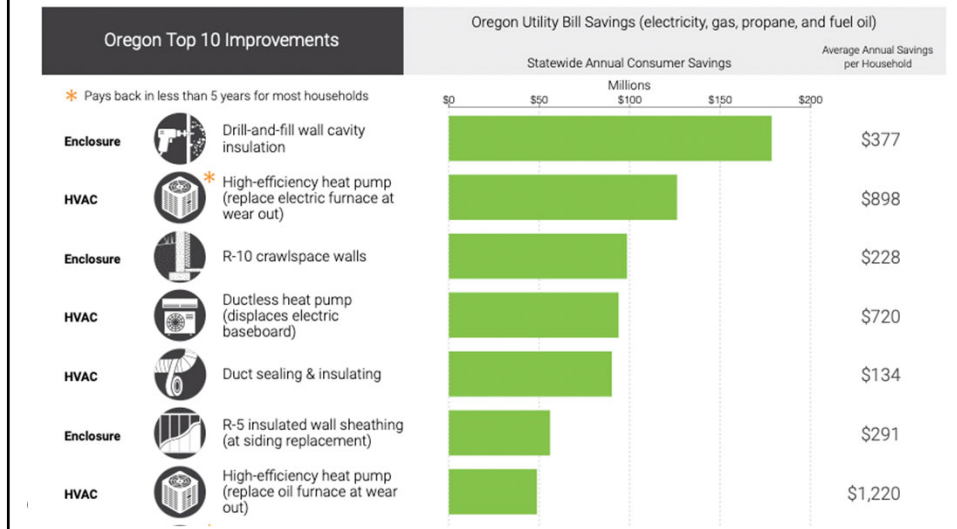
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Best Practice: Energy Efficiency

NREL Analysis Efficiency Opportunities



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