

City of Eugene Decarbonization by 2045 for Existing Buildings

*Policy and Program Best Practices Review and
Recommended Roadmap
Commercial & Industrial Buildings*

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making sustainability work

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Project Overview & Purpose

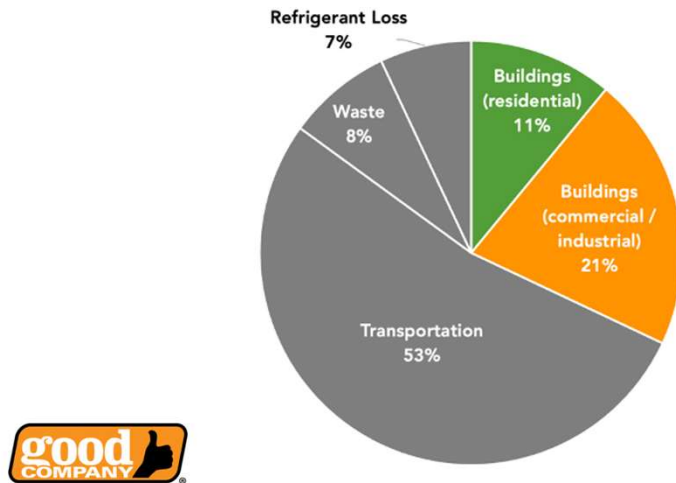
- ▶ What does our existing building supply look like – Commercial and Industrial
- ▶ What are the best practices to decarbonize our existing buildings and how do we look out for those that need extra help?
- ▶ What policies and programs exist and is there money to be found to support the transition?
- ▶ Where could the city act?



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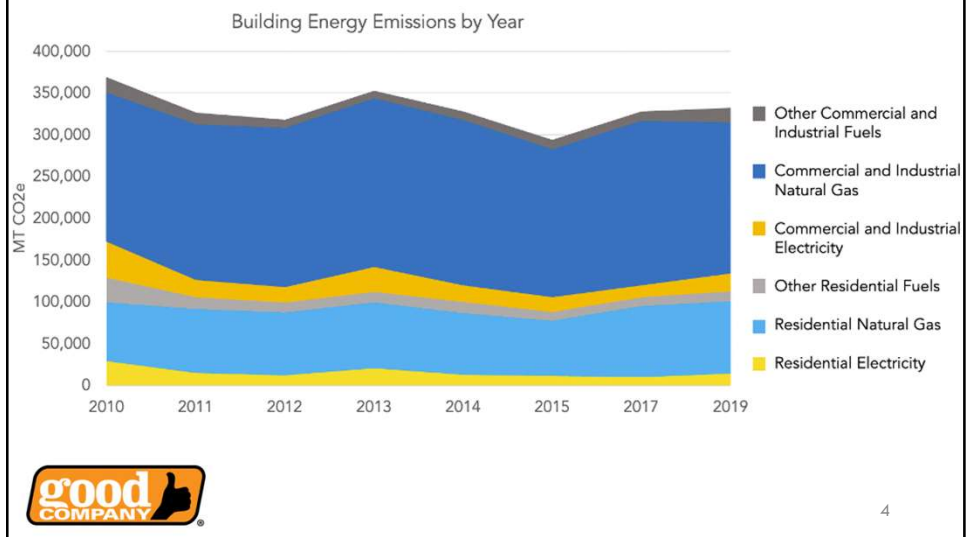
Eugene Community GHG Emissions ~1 million MT CO₂e annually



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Eugene GHG Emissions - Building Energy



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Commercial Sector

Commercial Sector Segments

► Classifications from EIA's Commercial Buildings Energy Consumption Survey:

- Education
- Food sales
- Food service
- Healthcare
- Lodging
- Office
- Public assembly
- Public order and safety
- Religious worship
- Retail
- Service
- Warehouse and storage



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Commercial Sector

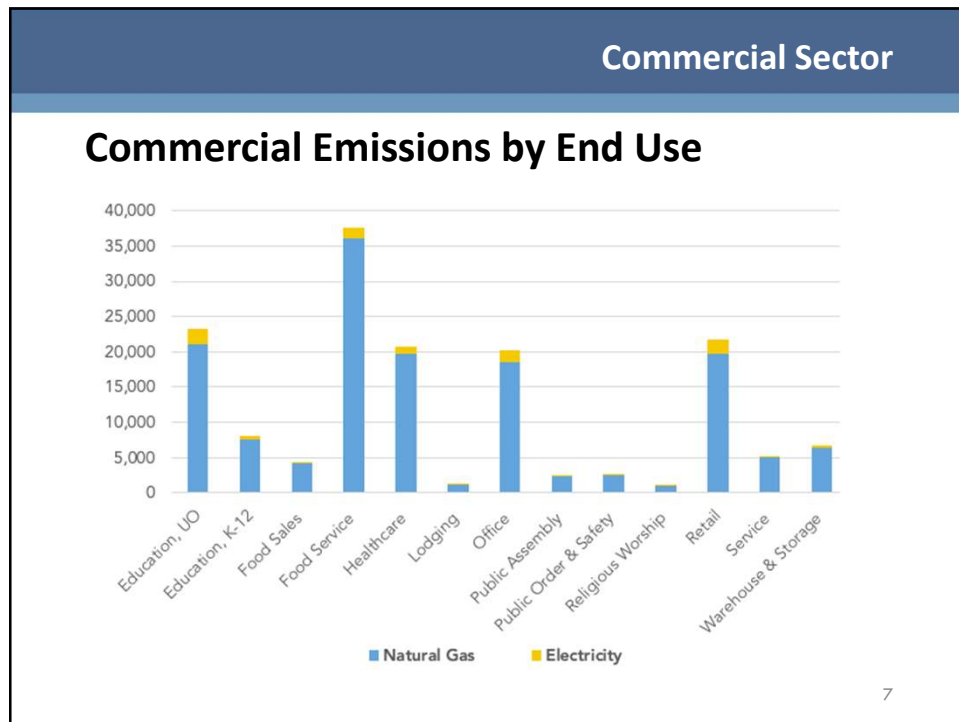
Building Stock Characteristics Data

- Regional data from Northwest Energy Efficiency Alliance's 2019 Commercial Building Stock Assessment
- Majority of building were built pre-1990
- Roughly half of building are >20,000 square feet
- Space heating in commercial buildings mostly uses natural gas in rooftop units, furnaces, or boilers, except lodging
- Water heating in commercial buildings mostly uses natural gas, but with electric in warehouse, service/retail, and offices

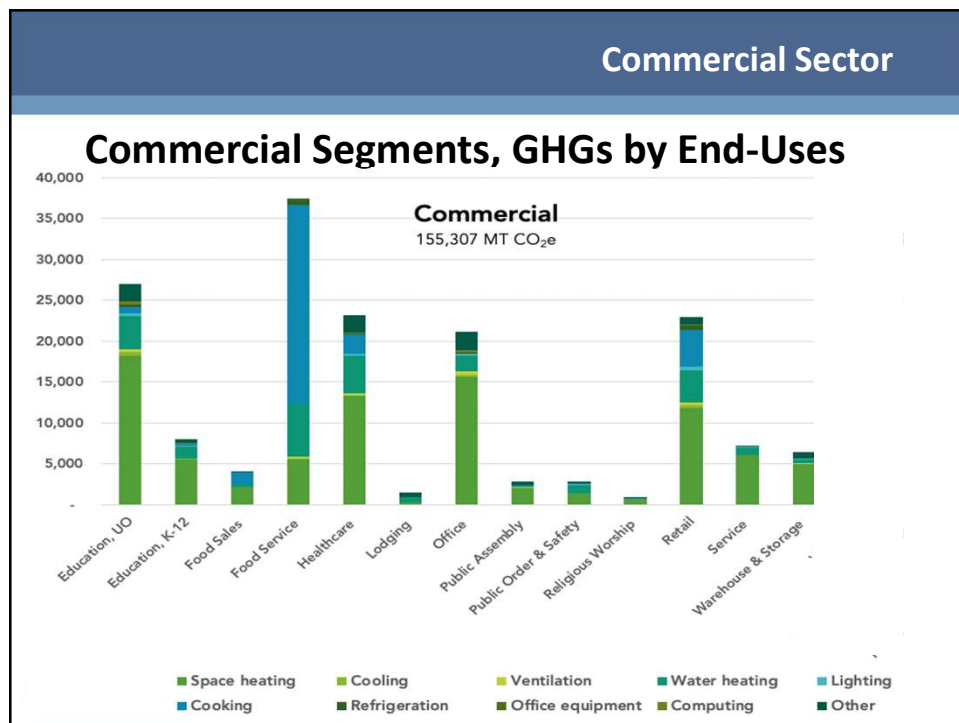


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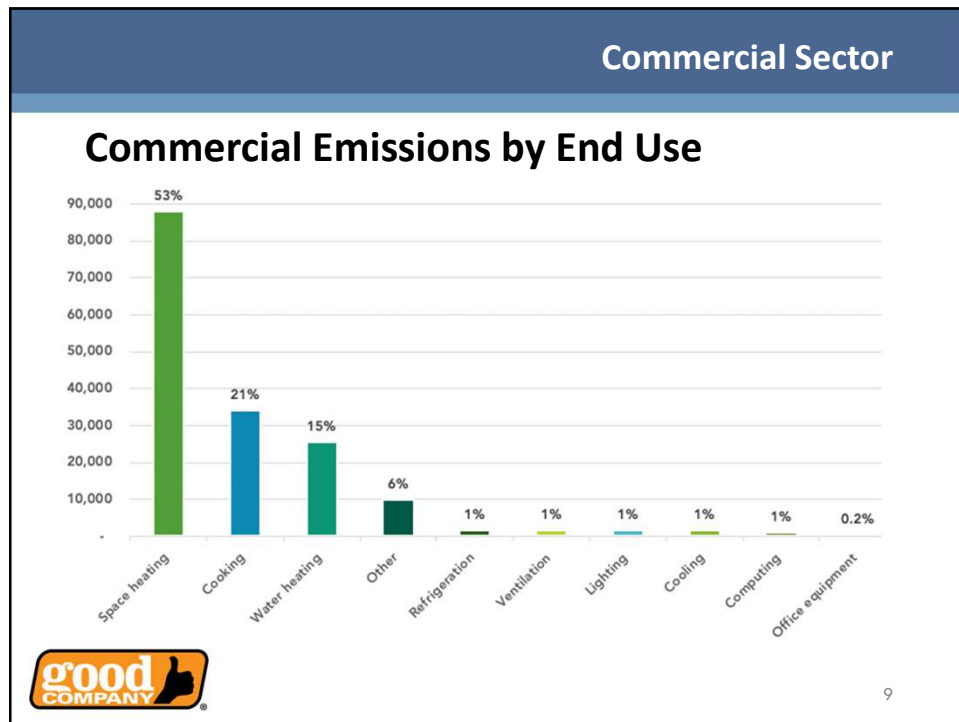
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Energy Supply Context

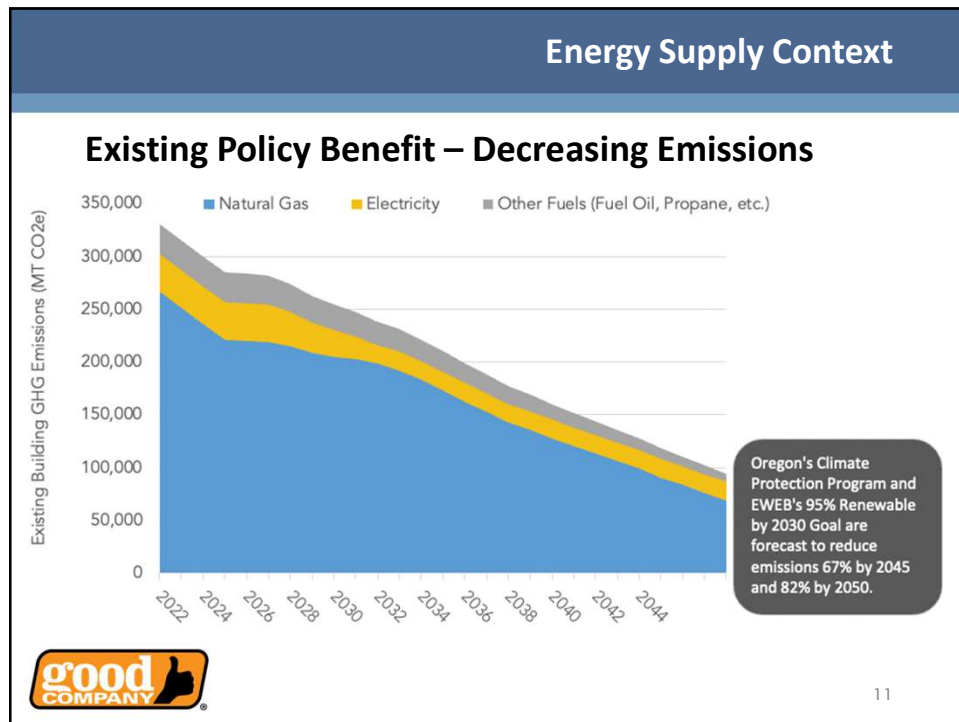
Summary of Existing Policies

- ▶ 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 - Integrated Electric Resource Plan late fall 2022
- ▶ NWN – Final IRP – Came out after report completed

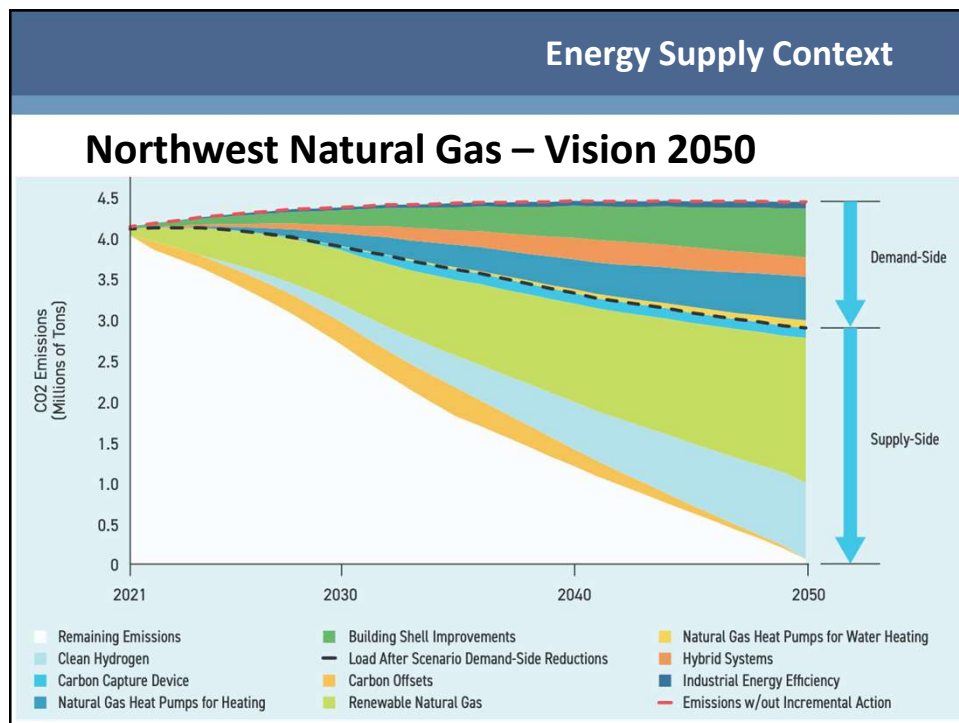
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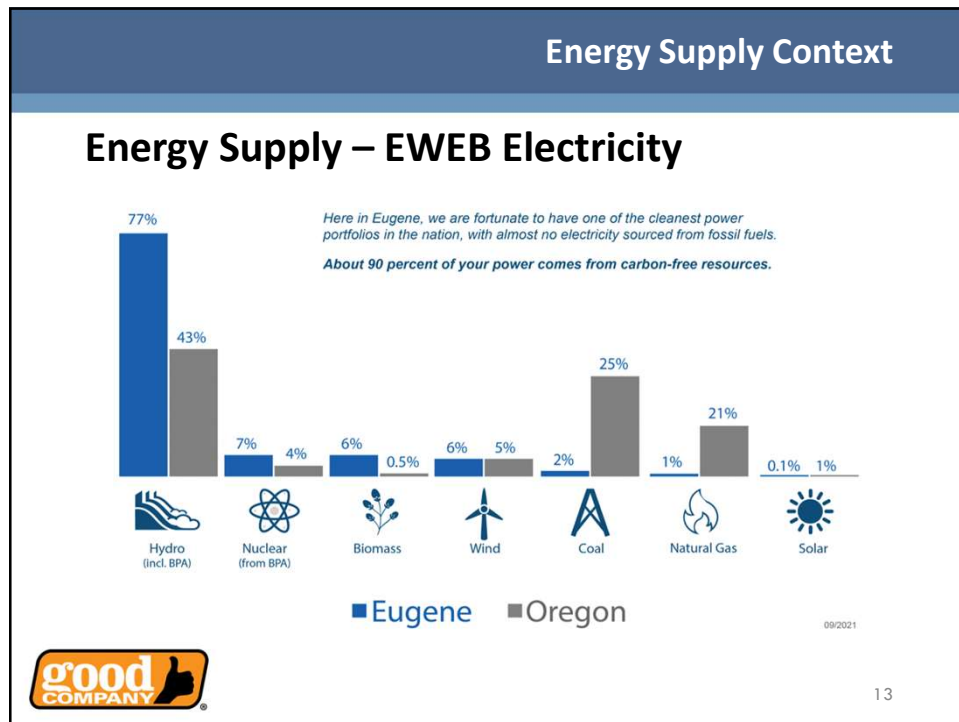
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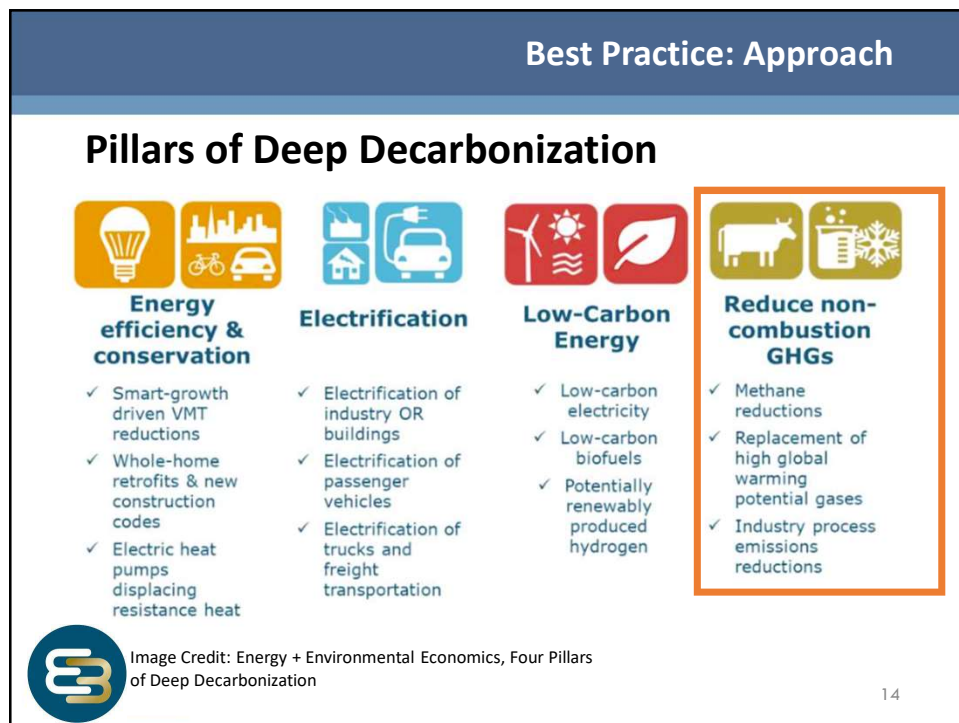
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Best Practice: Energy Efficiency

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
 - Food service, various equipment upgrades



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Best Practice: Energy Efficiency

Electricity – Cost-Effective Opportunities

- ▶ Data from Northwest Power Plan 2021
- ▶ Cost Effective
 - LED lighting
 - Space heating upgrades, including heat pumps
 - Space heating controls (such as programmable thermostats)
 - Refrigeration
 - Motors/Drives
 - Water heating and use upgrades, including heat pumps
 - Electronics
 - Food service, various equipment upgrades



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Best Practice: Energy Efficiency

Commercial Energy Report Program

- ▶ Supports and informs for energy efficiency upgrades for owners, but will requires additional action (beyond benchmarking) to implement
- ▶ Would provide a source of accurate, public community data for planning, tracking, and decision making for both building renters and owners
- ▶ Data might be reported by businesses to the City or by utilities on behalf of businesses
- ▶ Reporting thresholds by building size vary by community program ranging from 5,000 up to 100,000 square feet
- ▶ EPA found that implementation of benchmarking and resulting EE investment typically reduced energy use by 2.4% per year on average



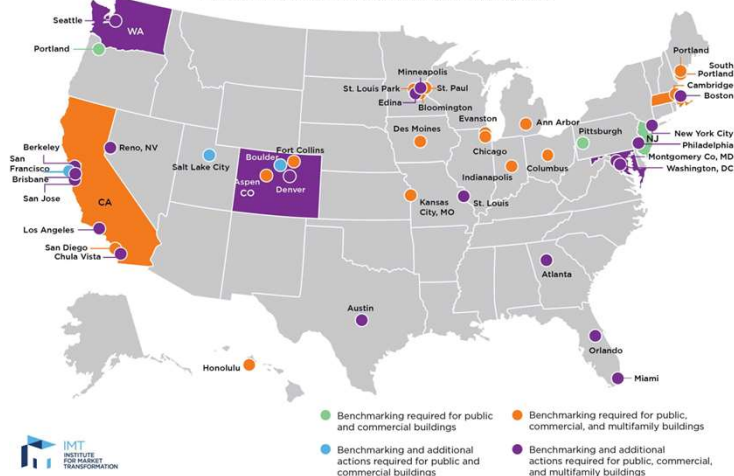
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Best Practice: Energy Efficiency

Commercial Energy Reporting - Examples

U.S. City, County, and State Policies for Existing Buildings:
Benchmarking, Transparency, and Beyond



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Best Practice: Efficiency

Food Service

- ▶ Gas equipment (with electrification barriers)
- ▶ Ventilation energy / Exhaust hoods
- ▶ Staff training for energy savings



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Best Practice: Electrification

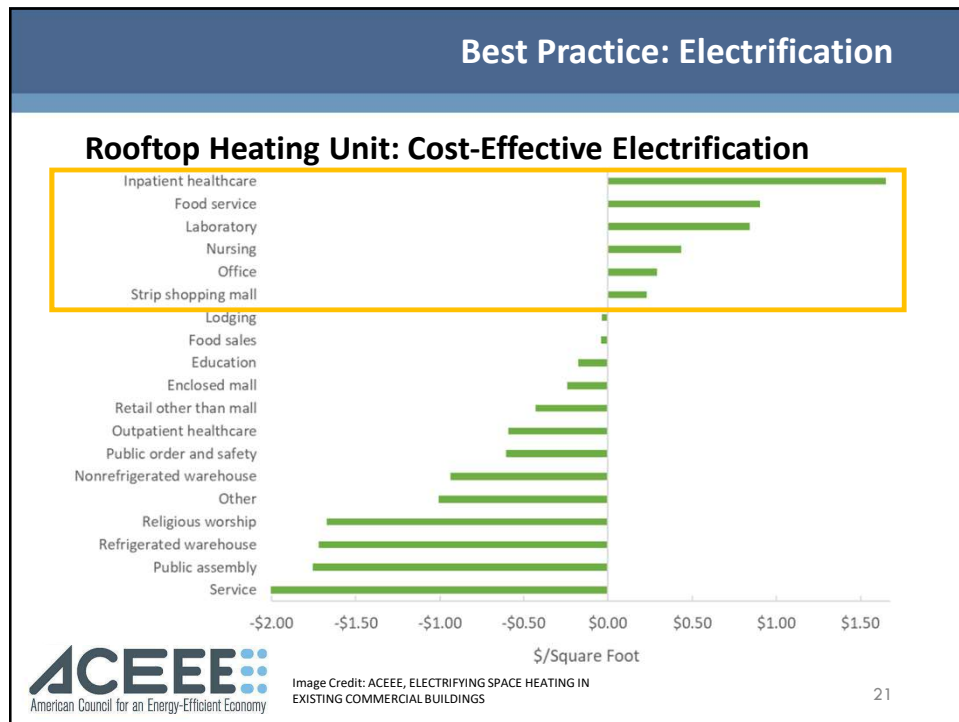
EWEB Electrification Study Findings

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.

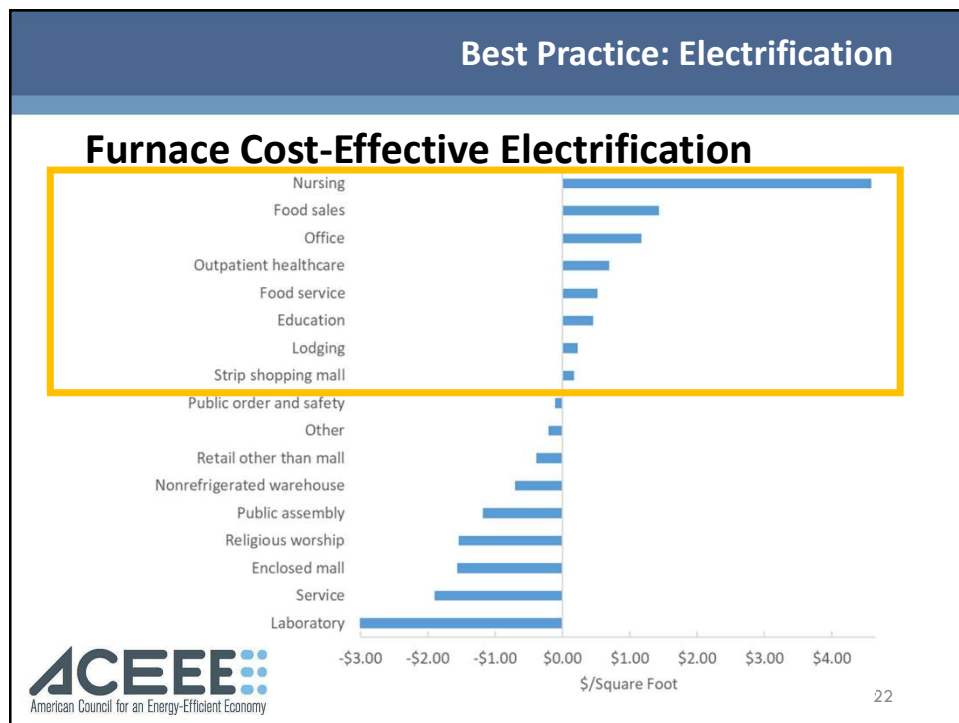


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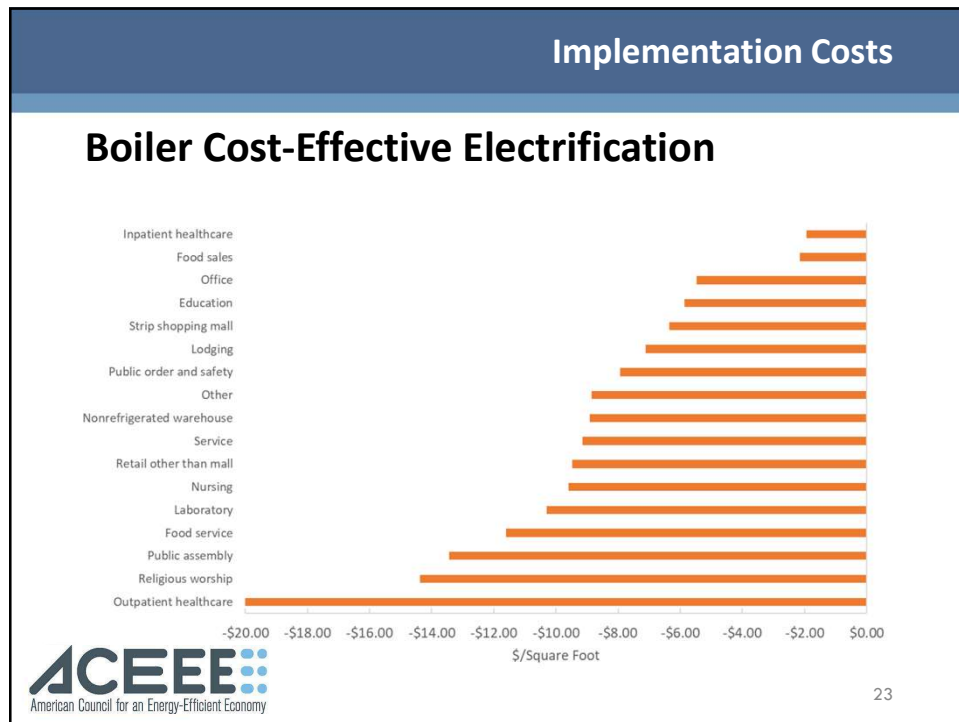
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Funding

Available Options

▶ Community-Scale

- Inflation Reduction Act
- State of Oregon incentives – cooling centers and community
- Sales Tax or Surcharge (Portland Clean Energy Fund) *State law now precludes
- Private Equity / Energy Performance Contract (Ithaca, NY)
- Climate/Green Bonds *Constitutional limitations, issued as revenue bond
- Energy Savings Performance Contract (ESPC)

▶ Building Owners

- Inflation Reduction Act
- Utility-sponsored programs, including Energy Trust of Oregon Programs
- Property Assessed Clean Energy (PACE) Financing
- Energy Savings Performance Contract (ESPC)

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Focus on Equity

Equity Considerations and Best Practices

- ▶ Very little precedent from existing decarbonization plans on how best to structure programs in commercial sector
- ▶ Identify additional targeted commercial incentives by further engagement with local businesses
- ▶ Programs should be structured to ensure equitable distribution of local incentives for minority, women, veteran-owned businesses with low-profit margins such as food service
- ▶ Green jobs workforce development partnerships

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Recommendations

Commercial Sector

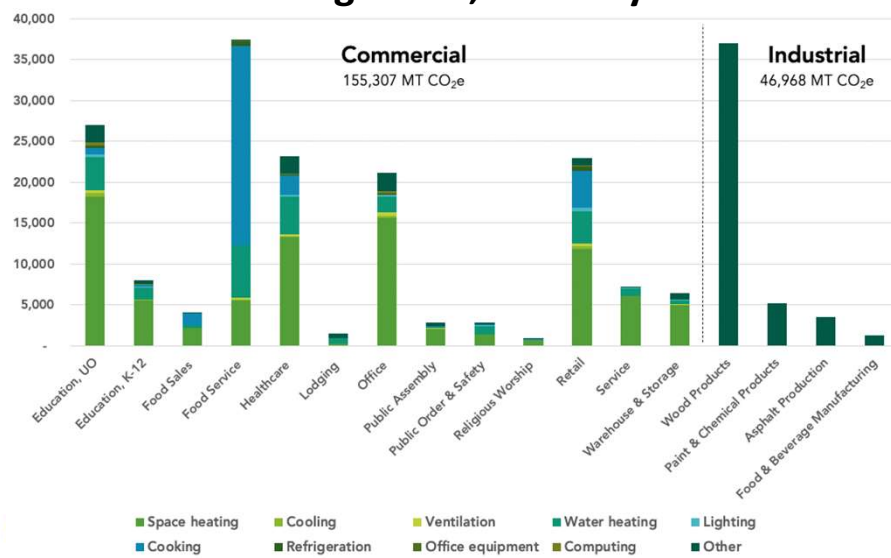
- ▶ Prioritize businesses with older existing buildings
- ▶ Prioritize offices, strip malls, government, and healthcare
- ▶ Lead by example and decarbonize City office buildings
- ▶ Engage with business owners of food service and buildings with boilers
- ▶ Prioritize businesses with low profit margins, and historically underserved
- ▶ Implement a Commercial Energy Reporting Program
- ▶ Partner with local job training groups to serve the equipment distributors and installers
- ▶ Amplify existing programs' outreach, program management, and funding

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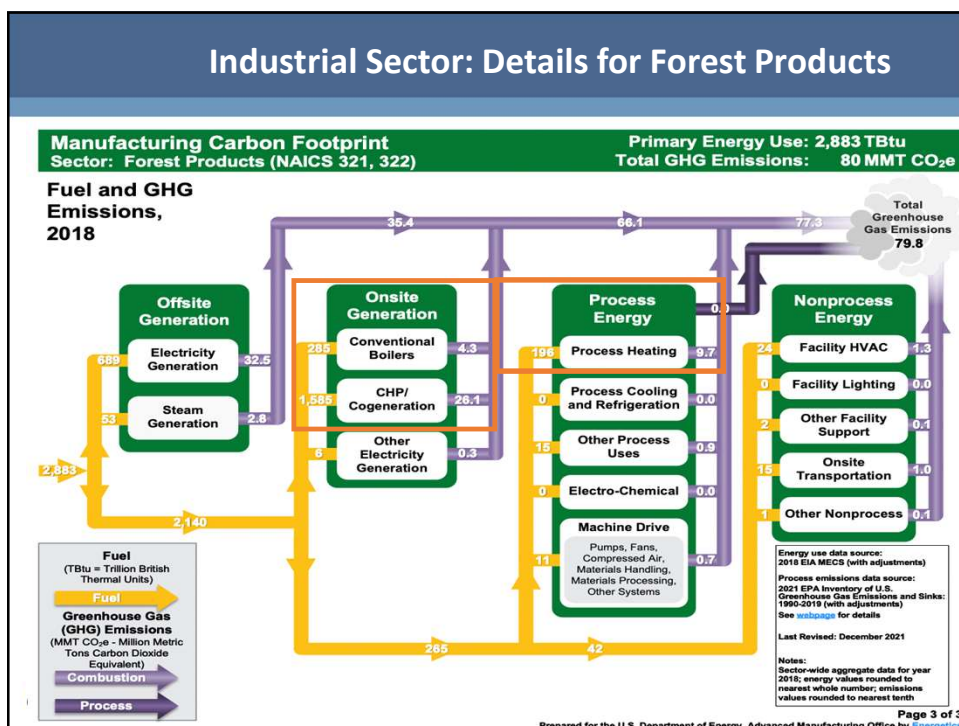
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Industrial Sector

Commercial Segments, GHGs by End-Uses



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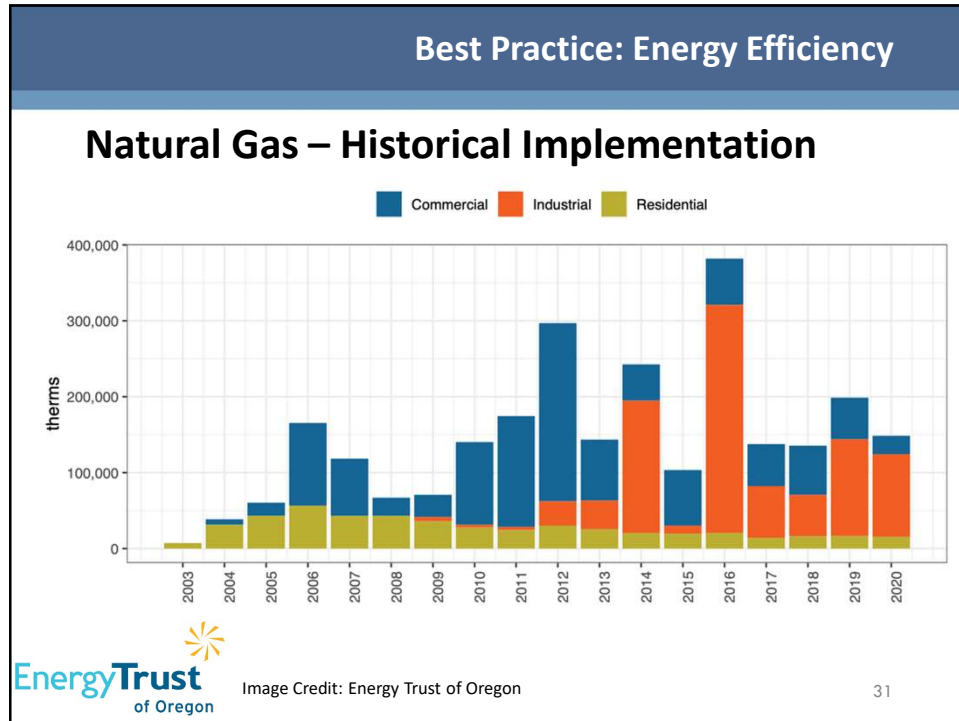
Wood Products: Context

Decarbonization and Regulatory Context

- ▶ In 2011, EPA implemented the Industrial, Commercial, and Institutional Area Source Boilers: National Emission Standards for Hazardous Air Pollutants (NESHAP) rule – often called the Boiler MACT Rule
- ▶ Conflicting priorities
 - Wood has problems with cost of air toxic controls
 - Natural gas is a fossil fuel currently
- ▶ Recent significant investments in gas boilers and wood residuals going to other product uses
- ▶ Production Equipment has 20-40+ year life spans

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Best Practice: Energy Efficiency

Natural Gas – Cost-Effective Opportunities

- ▶ Data from Energy Trust of Oregon
- ▶ Cost Effective
 - Process heating
 - Water heating
 - Space heating upgrades, including heat pumps
 - Space heating controls (such as programmable thermostats)

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Best Practice: Energy Efficiency

Electricity – Cost-Effective Opportunities

▶ Data from Northwest Power Plan 2021

▶ Cost Effective

- Strategic energy management
- Pumps
- Fans and blowers
- Refrigeration
- Lighting

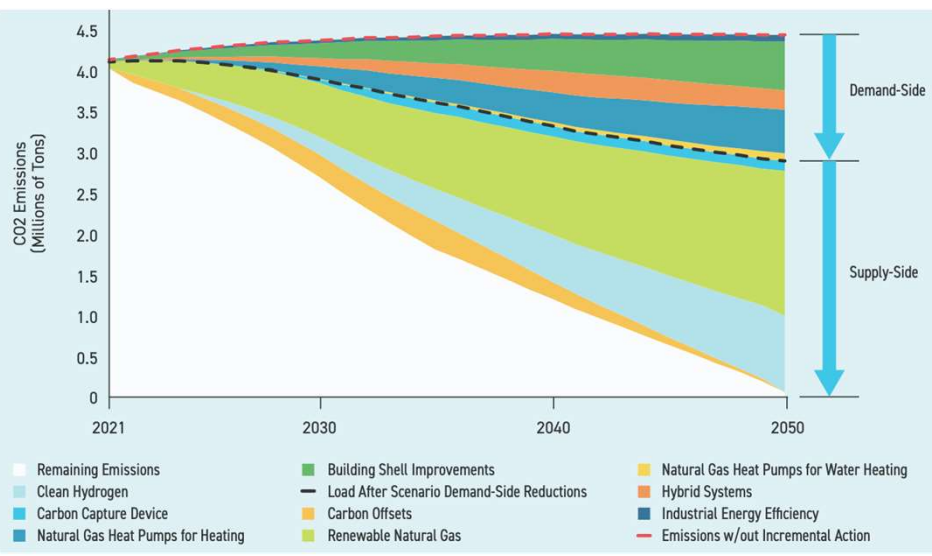


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Best Practice: Renewable Fuels

Northwest Natural Gas – Vision 2050



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Best Practice: Renewable Fuels

Context and Implementation Costs

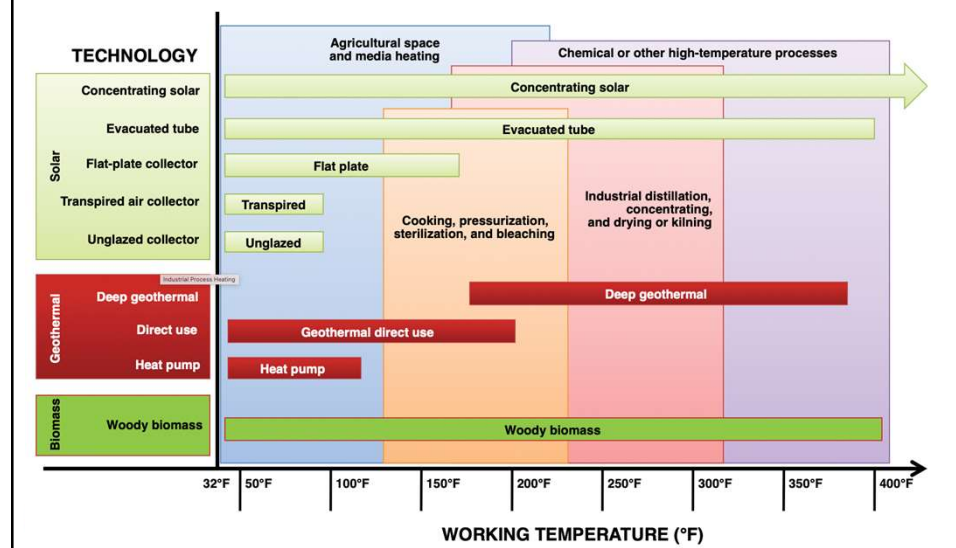
- ▶ Renewable natural gas (RNG) offers benefits, but supply limits
- ▶ Clean hydrogen can scale via renewable electrolysis
 - Blending with NG limited to about 20% (in pipelines and equipment)
 - Direct use of hydrogen is preferable. Storage add GHGs and cost
 - Site based equipment exists, but is not deployed at scale
- ▶ Fuel cost estimates
 - Historic conventional gas: \$2 - \$4 per MMBTU
 - RNG = \$14 - \$19 / MMBTU
 - Clean Hydrogen = \$15 - \$20 / MMBTU (to 2030); \$3 - \$9 (by 2050)

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Best Practice: Other Renewables

EPA's suggested options for process heat



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Best Practice: Electrification

Industrial boilers

- ▶ As with the commercial sector, boiler electrification is challenging
- ▶ Report by Lawrence Berkely National Lab on boiler electrification found cost effectiveness (dollars per metric tonne CO₂e reduced):
 - Forest products: \$128 / MT CO₂e reduced
 - Food and beverage: \$130 / MT CO₂e reduced
 - Chemicals: \$147 / MT CO₂e
 - Price Benchmark, Oregon Climate Protection Program, Community Climate Investment: \$107 (2023) and \$134 (2050)
- ▶ Not cost effective now, but is forecast to be before 2050



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Emerging Practice: Carbon Capture & Storage

Context and Implementation Costs

- ▶ Technologies are still developing – currently about 20 facilities globally
- ▶ International Energy Agency states that without CCS, achieving net-zero targets will be nearly impossible to achieve
- ▶ IEA cost estimates (dollars per metric ton CO₂e reduced)
 - Concentrated CO₂: \$15 - \$20 / 1 MT CO₂e reduced
 - Dilute CO₂: \$40 - \$120 / MT CO₂e
 - Direct air capture: \$147 / MT CO₂e
 - Price Benchmark, Regulatory grade forestry carbon offsets: \$25 / MT CO₂e
 - Price Benchmark, Oregon Climate Protection Program, Community Climate Investment: \$107 (2023) and \$134 (2050)



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Funding

Available Options

► State Incentives and Resources

- Alternative Fuel Loans are administered by the Oregon DOE
- Business Oregon has a program to aid in upgrading public infrastructure for compliance

► Federal Incentives and Resources

- USDOE - \$8 billion of program funding to create networks of hydrogen suppliers, consumers, and local infrastructure
- USDOE - \$2.6 billion to advance carbon capture demonstration projects. Focus on industrial sources for energy generation, paper and pulp and certain types of chemical production facilities
- Inflation Reduction Act - hydrogen production hubs and carbon capture \$



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Recommendations

Industrial Sector

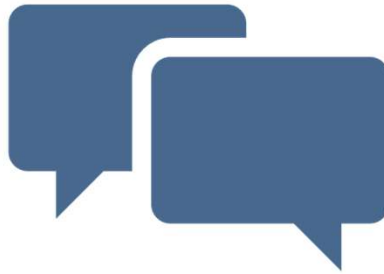
- For industrial operations, in particular wood products, perform additional outreach and engagement to better understand what technology, financial support and timeframes are reasonable
- Amplify existing Energy Trust of Oregon programs and incentives with City-led outreach
- Partner to support local development of renewable natural gas and clean hydrogen
- Lobby for alignment of State programming and funding to support decarbonization



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Questions



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