



DISTRICT HEATING WITH MODERN WOOD ENERGY IN THE AMERICAN WEST

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IDEA 2018: Local Solutions, Global Impact

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Vancouver, British Columbia





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MODERN WOOD ENERGY BASICS

WHAT IS WOODY BIOMASS?



Cordwood



Pellets



C&D Waste



Clean Chips



Hog Fuel



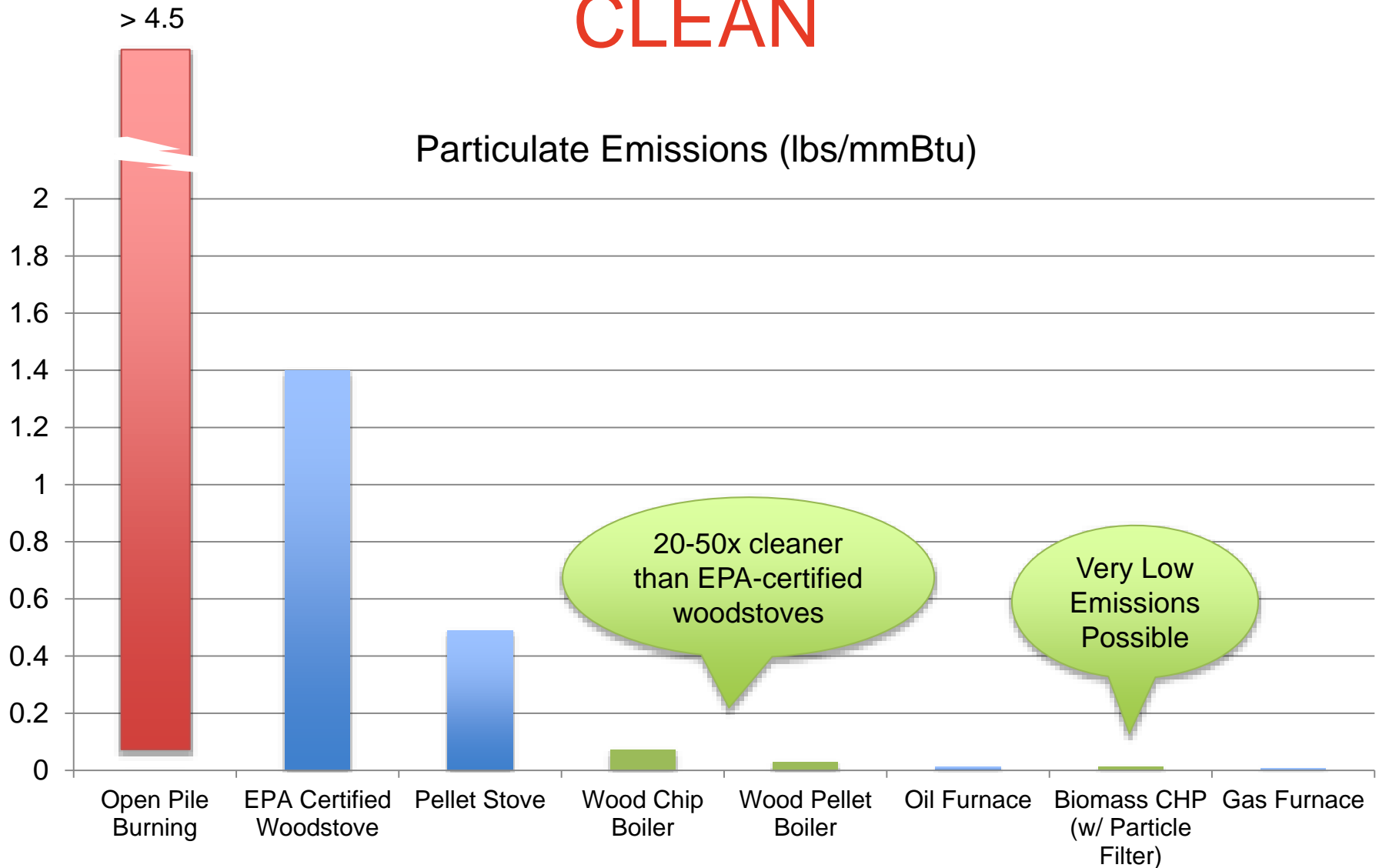
Yard Debris

MODERN BIOMASS HEAT & COMBINED HEAT AND POWER (CHP)

- **Efficient:** high conversion efficiency (>85%)
- **Clean:** low particulate, NOx and CO emissions
- **Economical:** lowers costs, supports local jobs
- **Sustainable:** supports sustainable forest management, diverts waste streams, low carbon fuel, locally abundant
- **Scale:** renewable energy system appropriately scaled for the resource and demand

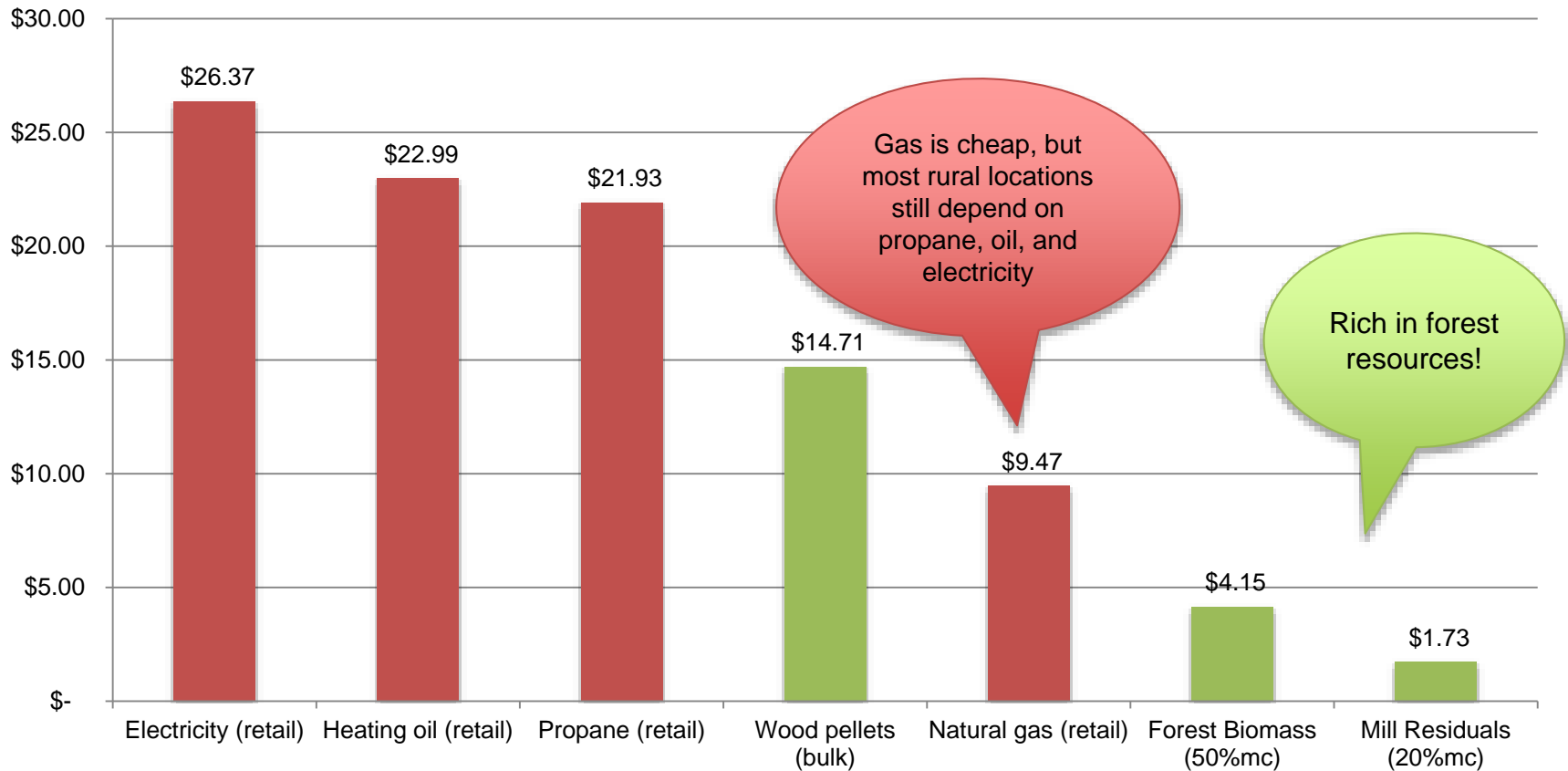
CLEAN

Particulate Emissions (lbs/mmBtu)



ECONOMICAL

Energy Cost \$/mmBTU (2018)





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**IN PRACTICE: HARNEY
COMMUNITY ENERGY**

OREGON

POPULATED PLACES

- 500,000 – 999,999 • Portland
- 100,000 – 499,999 • Eugene
- 25,000 – 99,999 • Springfield
- 24,999 and less • Grants Pass
- State capital ★ Salem

TRANSPORTATION

Interstate; limited access highway

Other principal highway

Railroad

PHYSICAL FEATURES

Streams: perennial; intermittent

Lakes: perennial; intermittent

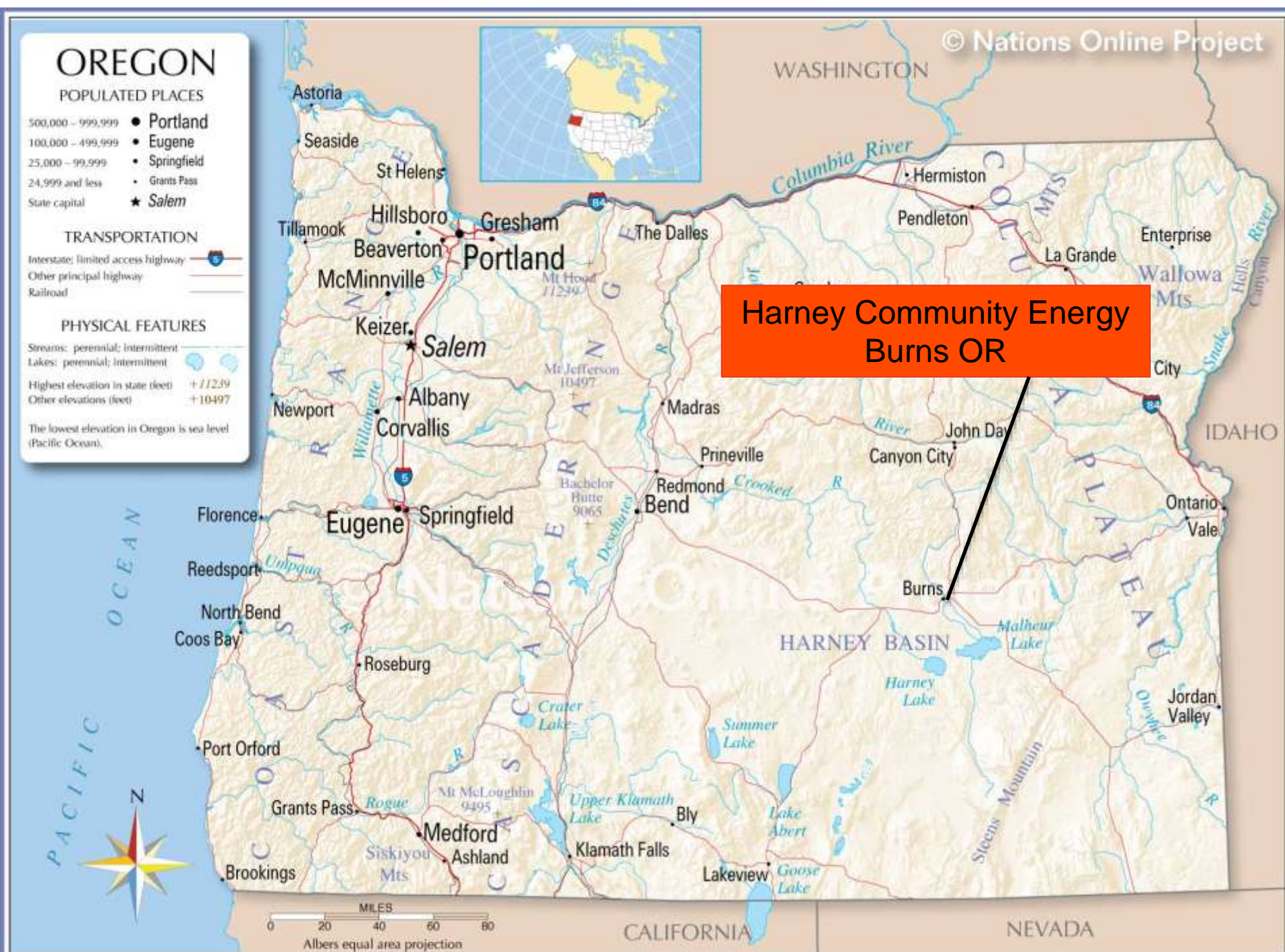
Highest elevation in state (feet) +11249

Other elevations (feet) +10497

The lowest elevation in Oregon is sea level (Pacific Ocean).



Harney Community Energy
Burns OR



PROJECT STATS

- **Constructed 2016**, owned and operated by Wisewood Energy's subsidiary for two years
- **~\$2M** funded by philanthropic foundation, community equity, state tax incentive, credit enhancement
- Local community formed the High Desert Biomass Cooperative and purchased asset for **local long-term ownership and operations**
- **600 kW steam biomass boiler**, steam propane boiler for backup and peak/shoulder seasons
- 460 ft **steam piping** to heat exchangers, 2,329 ft Kevlar-wrapped **PEX piping** to district customers
- **~500 tons/yr** hog fuel wood chips, designed to handle **wet coarse fuel** (4" minus, 55%mc)
- Providing heat to 4 buildings, 1 planned this summer, additional plans for **further expansion**
- **>90% reduction in fossil fuels**, saving **\$95k – 140k per year**

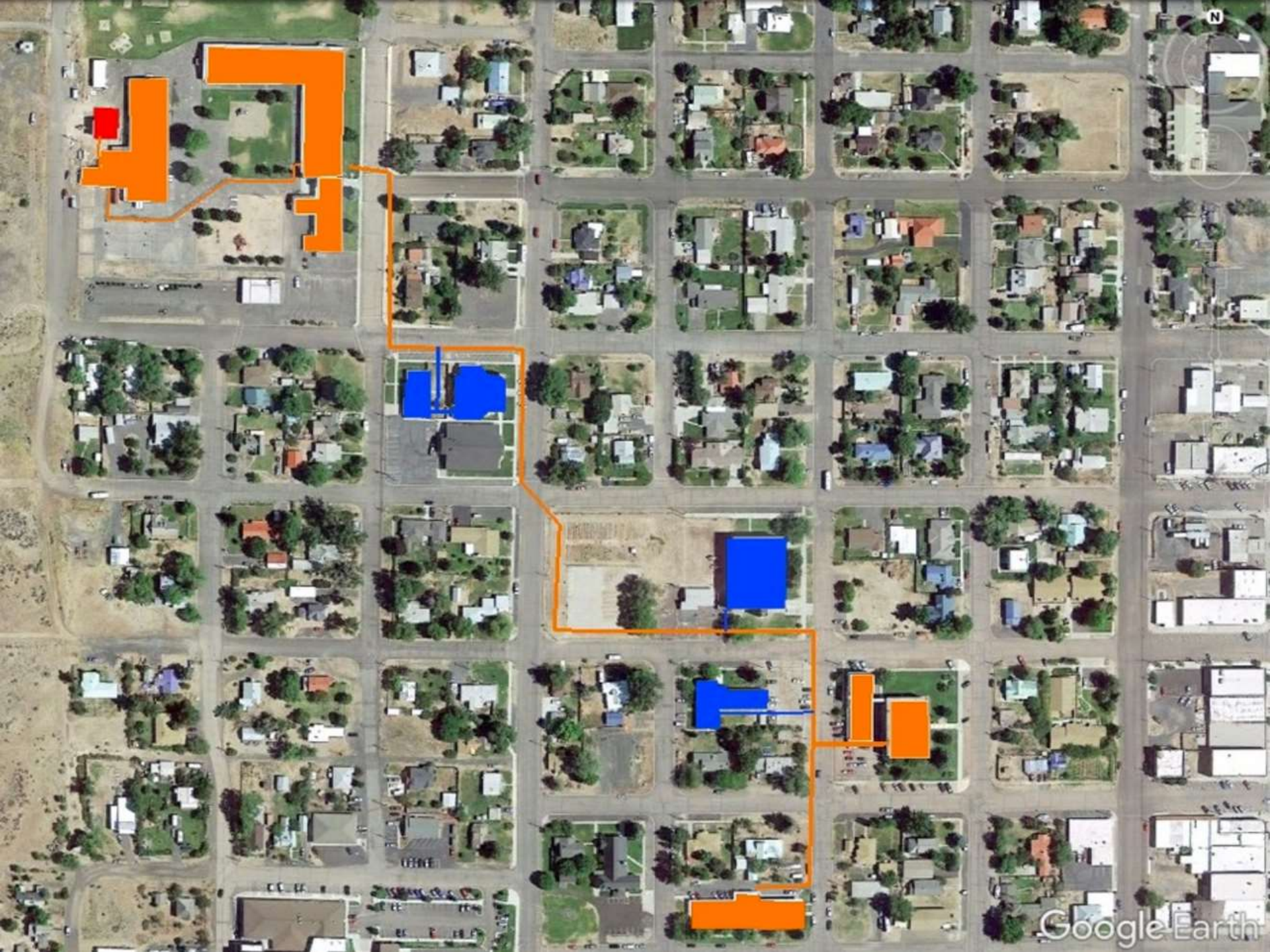




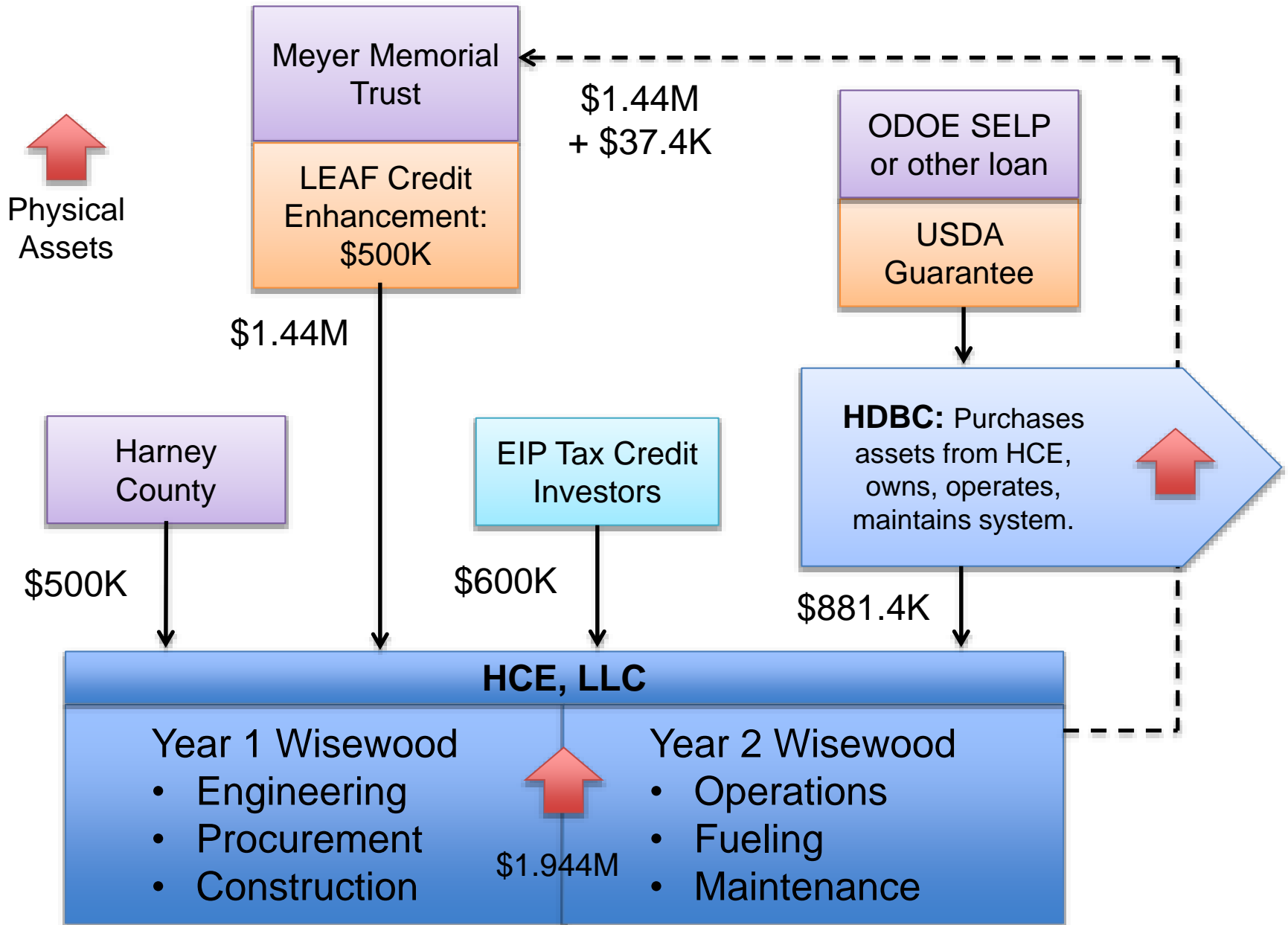






Photo: Marcus Kauffman

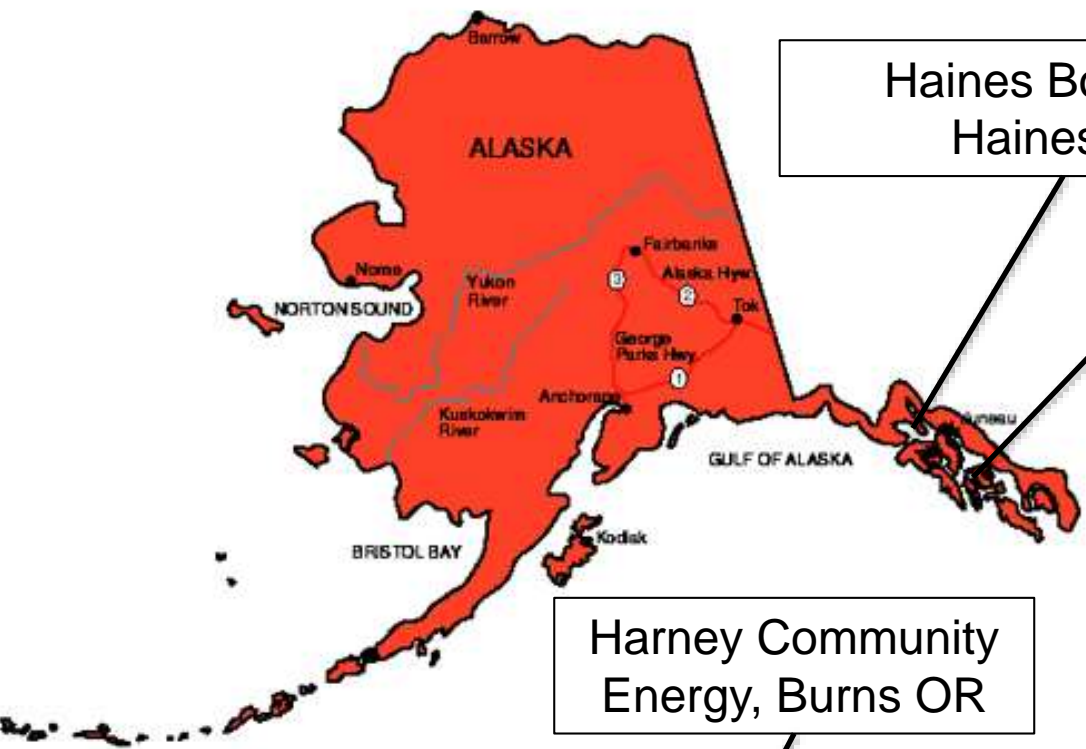






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THE POTENTIAL: RURAL AND TRIBAL COMMUNITY ENERGY



Haines Borough,
Haines AK

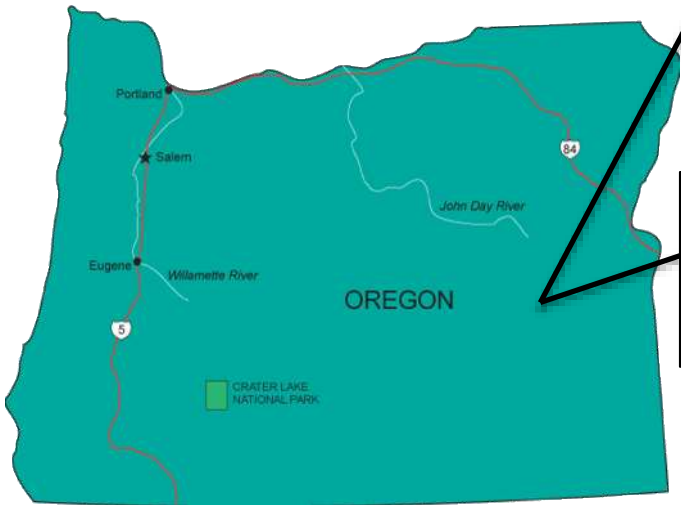
Spokane Tribe,
Wellpinit WA

Organized Village of
Kake, Kake AK

Quinault Indian Nation,
Taholah WA

Harney Community
Energy, Burns OR

Hines District
Energy,
Hines OR



BIOMASS DISTRICT ENERGY IN A NUTSHELL

- **Candidate communities:** Abundant underutilized wood resources, high heating costs, committed anchor tenants, and interest in energy independence
- **Technology is key:** Must match combustion technology to available wood fuels
- **It takes time:** Complexity due to multiple ownerships, potential future development, and securing financing
- **Financing is tricky:** Few incentives for thermal energy, lack of education in conventional banking industry, low alternative energy costs
- **Ownership question:** Communities may lack capacity, 3rd party owner is possible but margins are low



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COMBINED HEAT AND POWER IN CALIFORNIA

PROJECT STATS

- **Constructed 2018**, owned by **local non-profit** for one year; County will take over system for **long-term ownership and operations**
- Funded by **California Energy Commission**
- **400 kW** biomass boiler (heat), **35 kW** Organic Rankine Cycle (power), propane boiler for backup and peak/shoulder seasons
- Housed in **first CLT mass timber structure** in CA
- **160-500 tons/yr** hog fuel wood chips, designed to handle **wet coarse fuel** (4" minus, 55%mc)
- Supplementing **insufficient geothermal loop** and displacing electric heating
- Saving **~\$30k per year** in fuel costs compared to previous years









THANK YOU!

**Technology in Service of
Community and
Environment**