

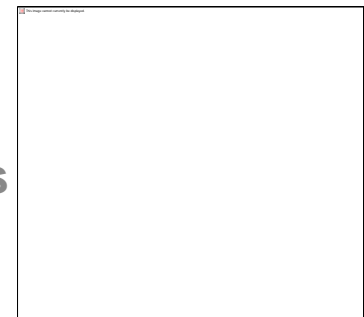


**Meagan Nuss**

Project Development Manager, Wisewood Energy

**NNRG Workshop Series: Solving Woody Biomass  
in the Forest of the San Juan Islands**

June 24, 2017



# OUTLINE

- About Wisewood Energy
- Biomass energy basics
- Biomass energy technologies
- What makes a viable project
- Project examples
- Biomass in the San Juans

# ABOUT WISEWOOD ENERGY

- **Technical Consulting:** Feasibility studies, financial modelling, and project management
- **Design/Build:** Biomass energy installations including complete system engineering, procurement and construction (EPC)
- **Project Development:** Thermal energy supply from investor and community-owned thermal energy generation assets
- **Territory:** OR, WA, AK, CA, ID, MT, CO

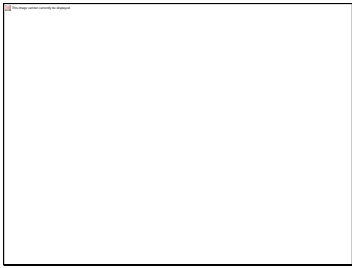
## **Our Mission**

We outfit communities and businesses with state-of-the-art biomass energy systems that strengthen local economies, lower heating costs and promote environmental stewardship

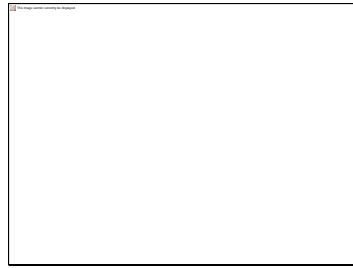
**Technology in Service of Community  
and Environment**



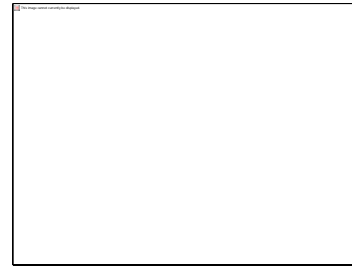
# WHAT IS WOODY BIOMASS?



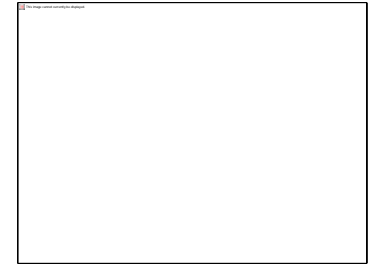
**Cordwood**



**Pellets**



**Clean Chips**



**Hog Fuel**

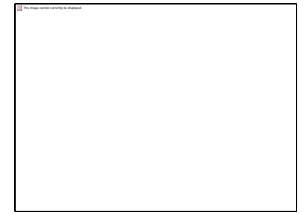
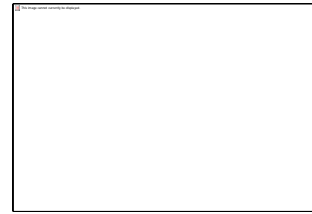
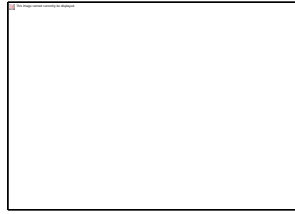
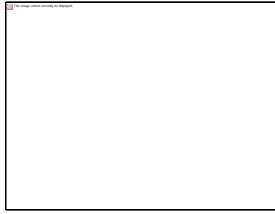
**Construction waste:** untreated wood that has been used in commerce prior to its energetic utilization



**Ag fuels:** straw, grasses, corn stover, purpose-grown feedstocks



# BIOMASS HEATING TECHNOLOGIES



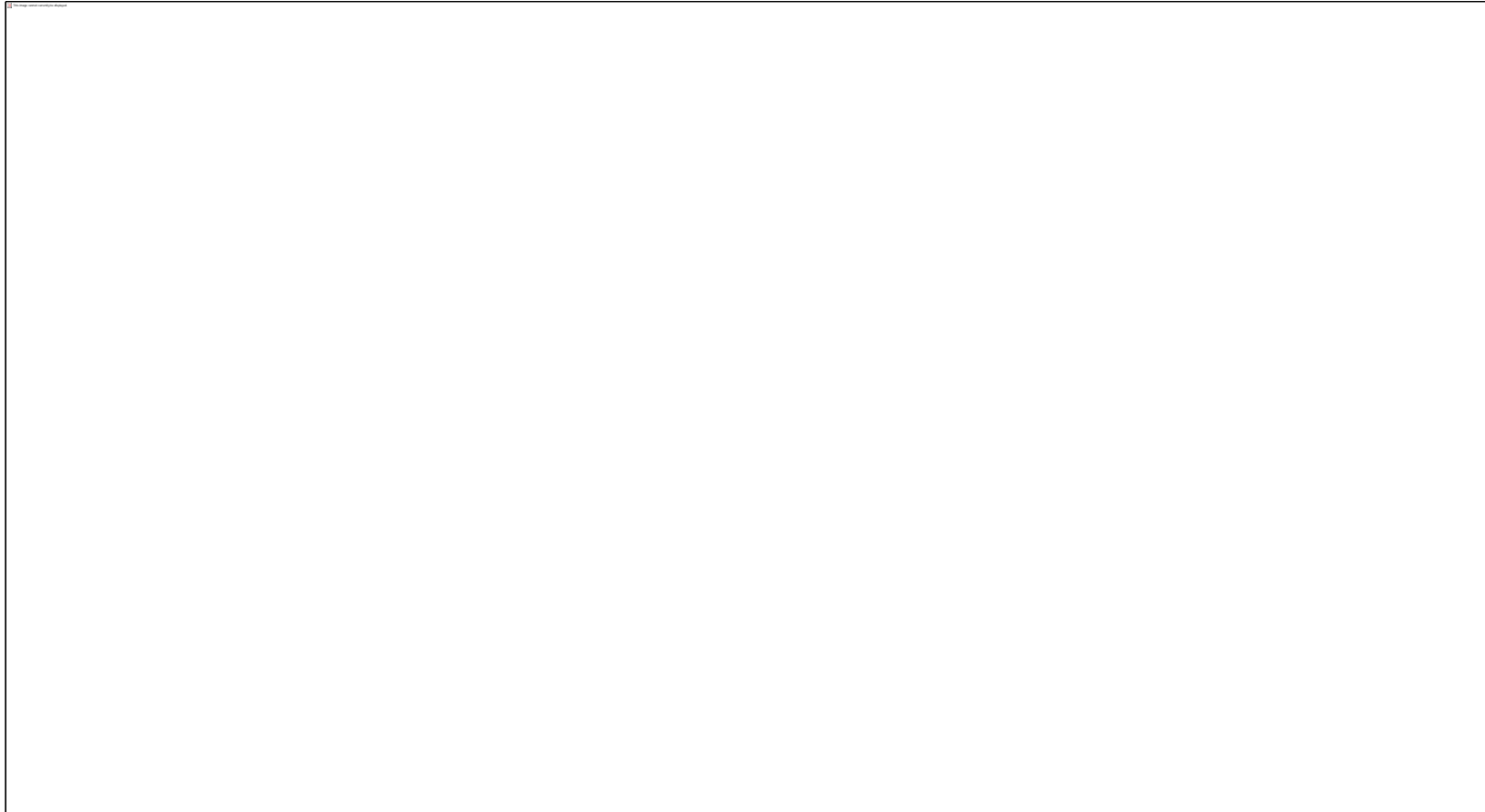
Technology	Pellet/clean chip boiler	Wood chip boiler	District heating	CHP
Fuel	Pellets and/or clean chips	Hog fuel wood chips	Hog fuel wood chips	Hog fuel wood chips
Typical Installed Capacity	< 3 MMBtu	1.5 – 10 MMBtu	2 – 30 MMBtu	>3-300 MMBtu
User	Single-family homes, light commercial, institutional	Commercial, institutional, and light industrial	Commercial, institutional, municipal, industrial	Industrial and district heating

# 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, low carbon fuel, locally abundant

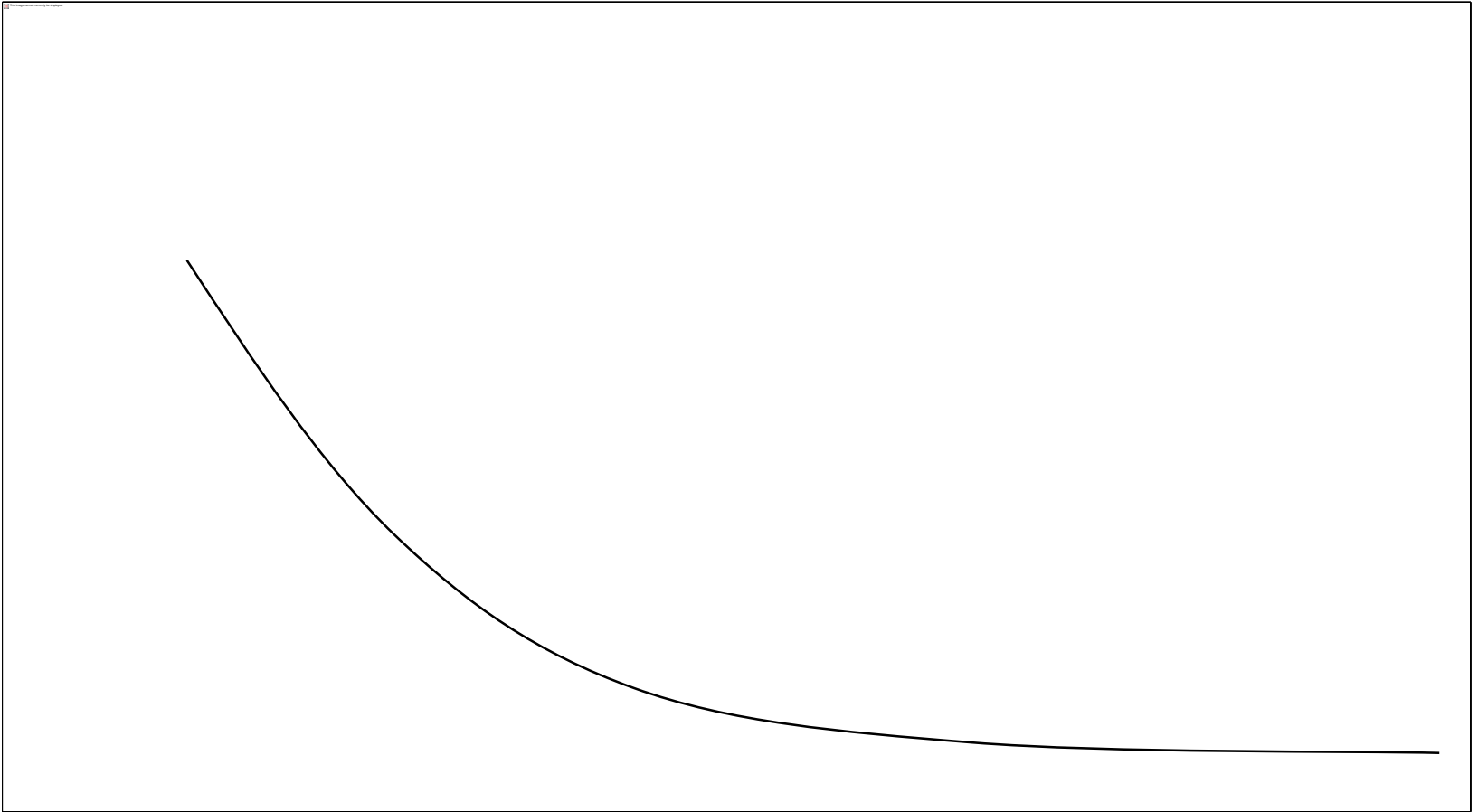


# EFFICIENT



Development of emissions of Austrian Biomass Boilers, measured by the federal agency for agricultural engineering Wieselburg (BLT)

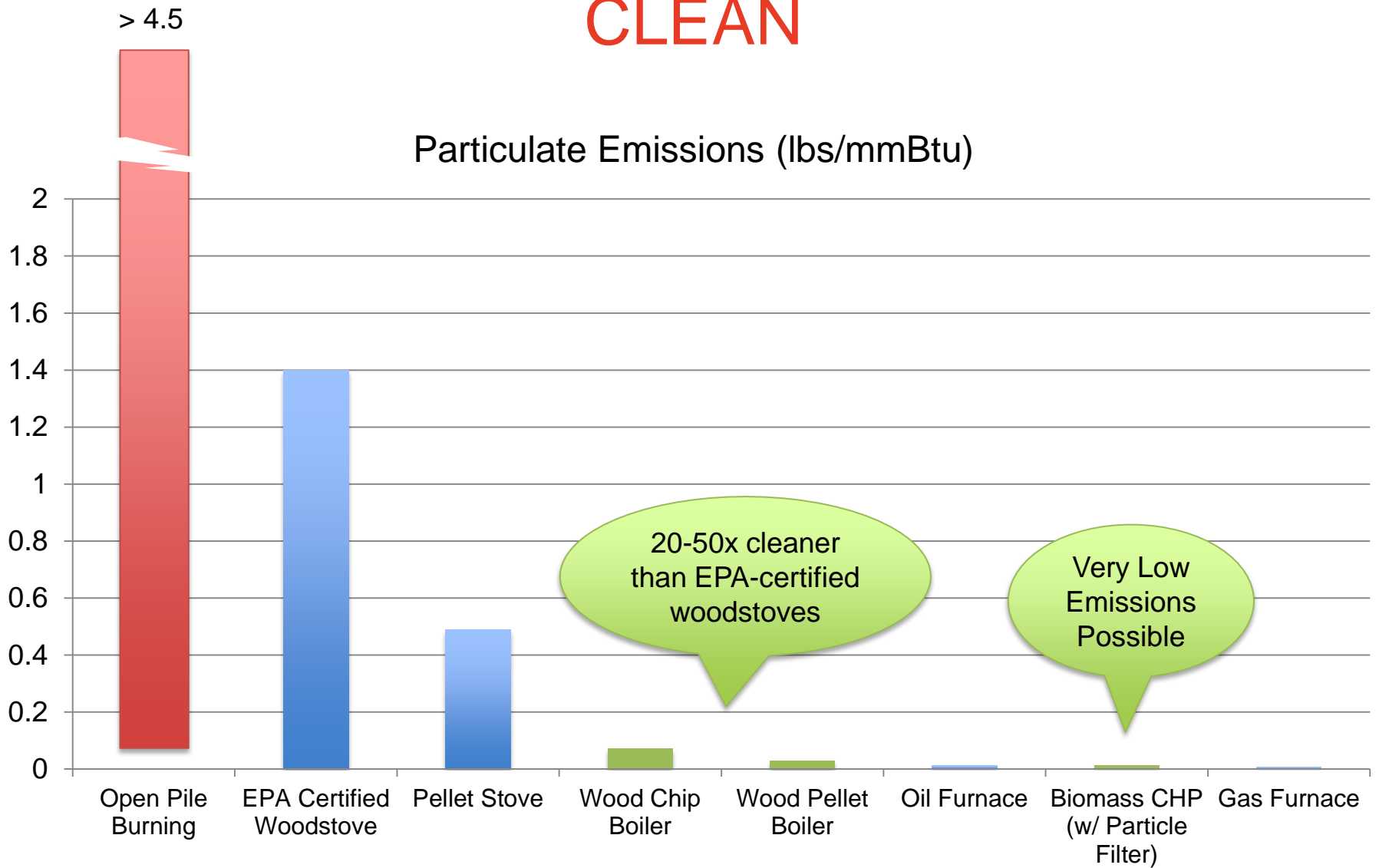
# CLEAN



Development of emissions of Austrian Biomass Boilers, measured by the federal agency for agricultural engineering Wieselburg (BLT)

# CLEAN

Particulate Emissions (lbs/mmBtu)

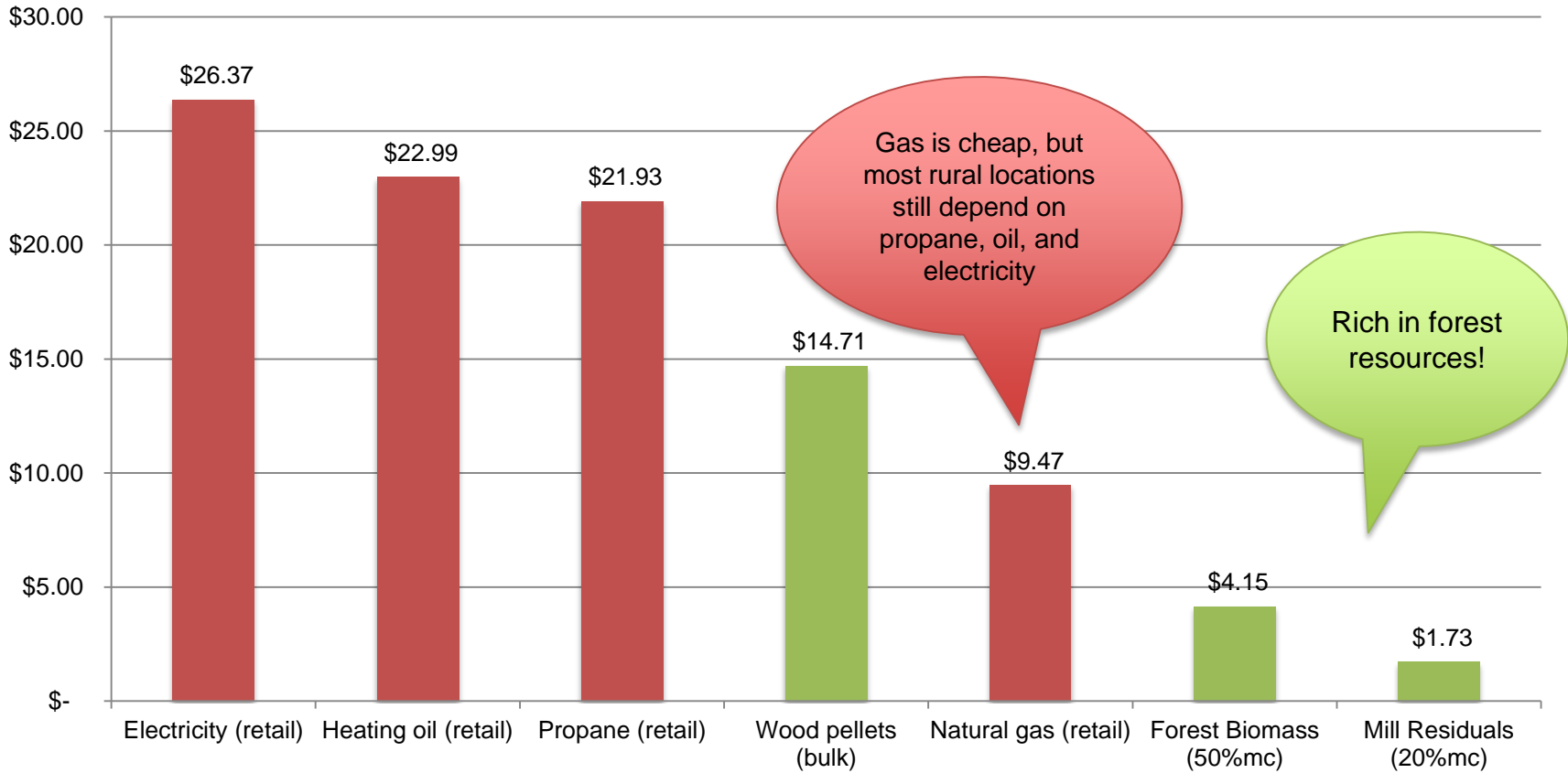


20-50x cleaner than EPA-certified woodstoves

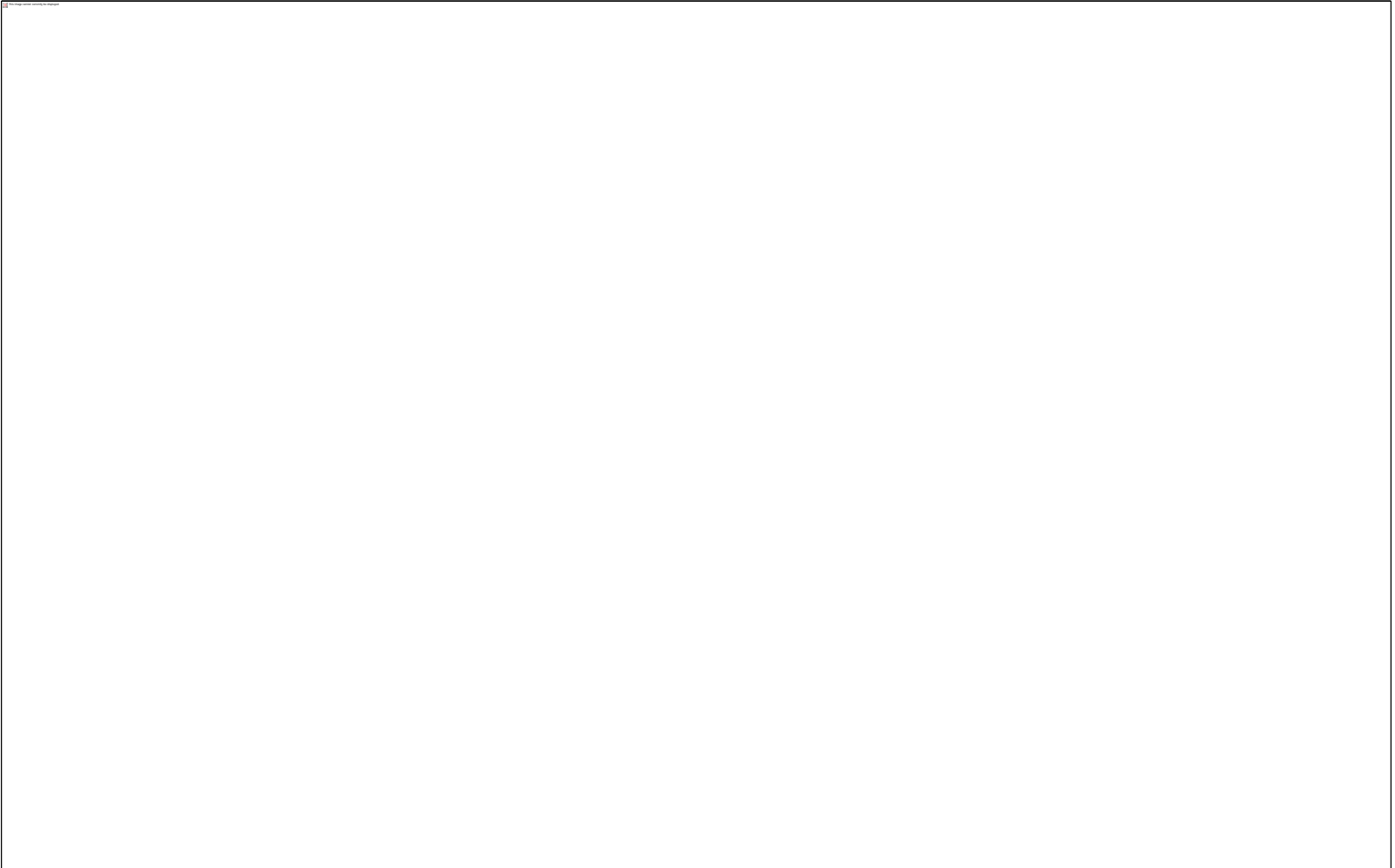
Very Low Emissions Possible

# ECONOMICAL

## Energy Cost \$/mmBTU (2016)

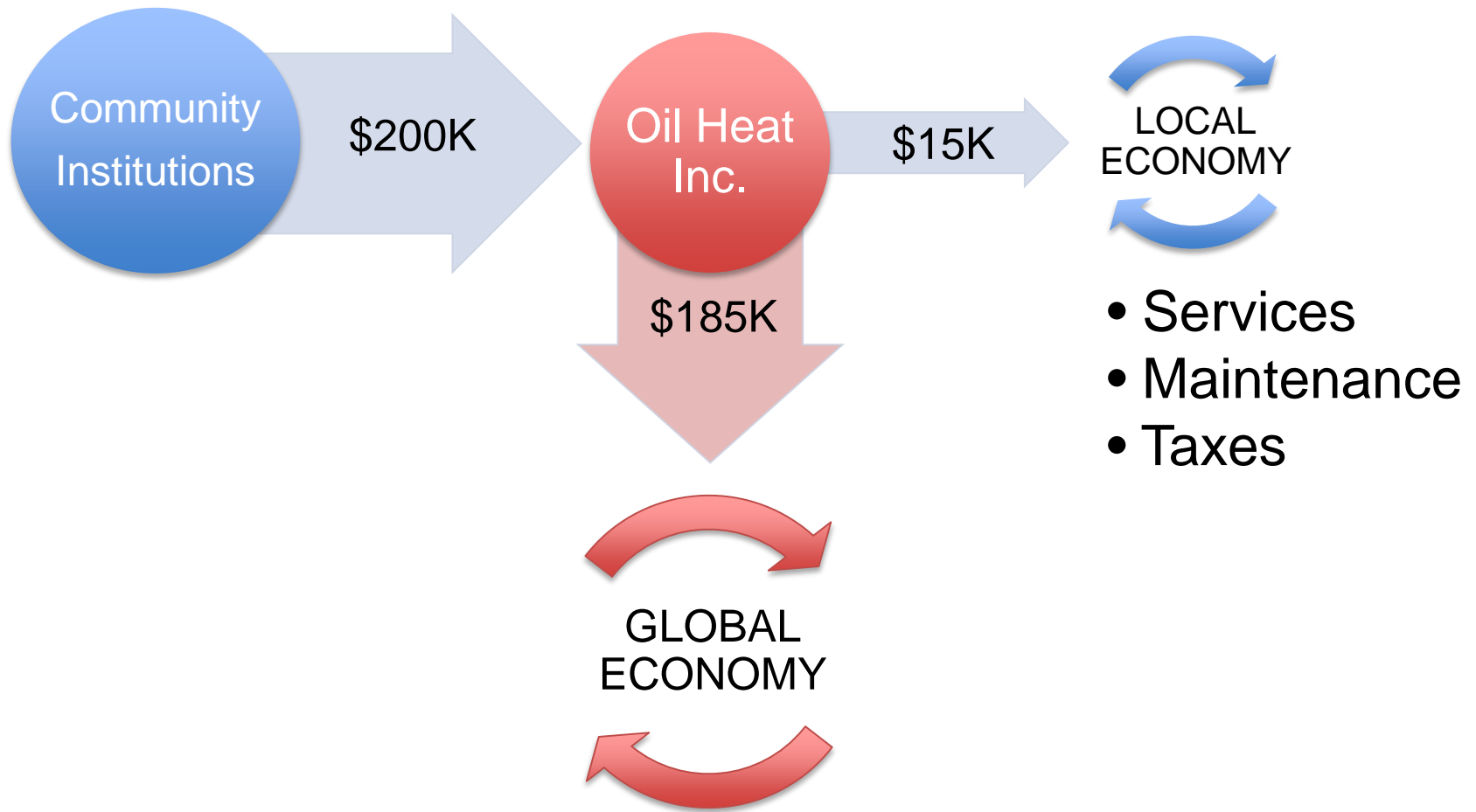


# SUSTAINABLE

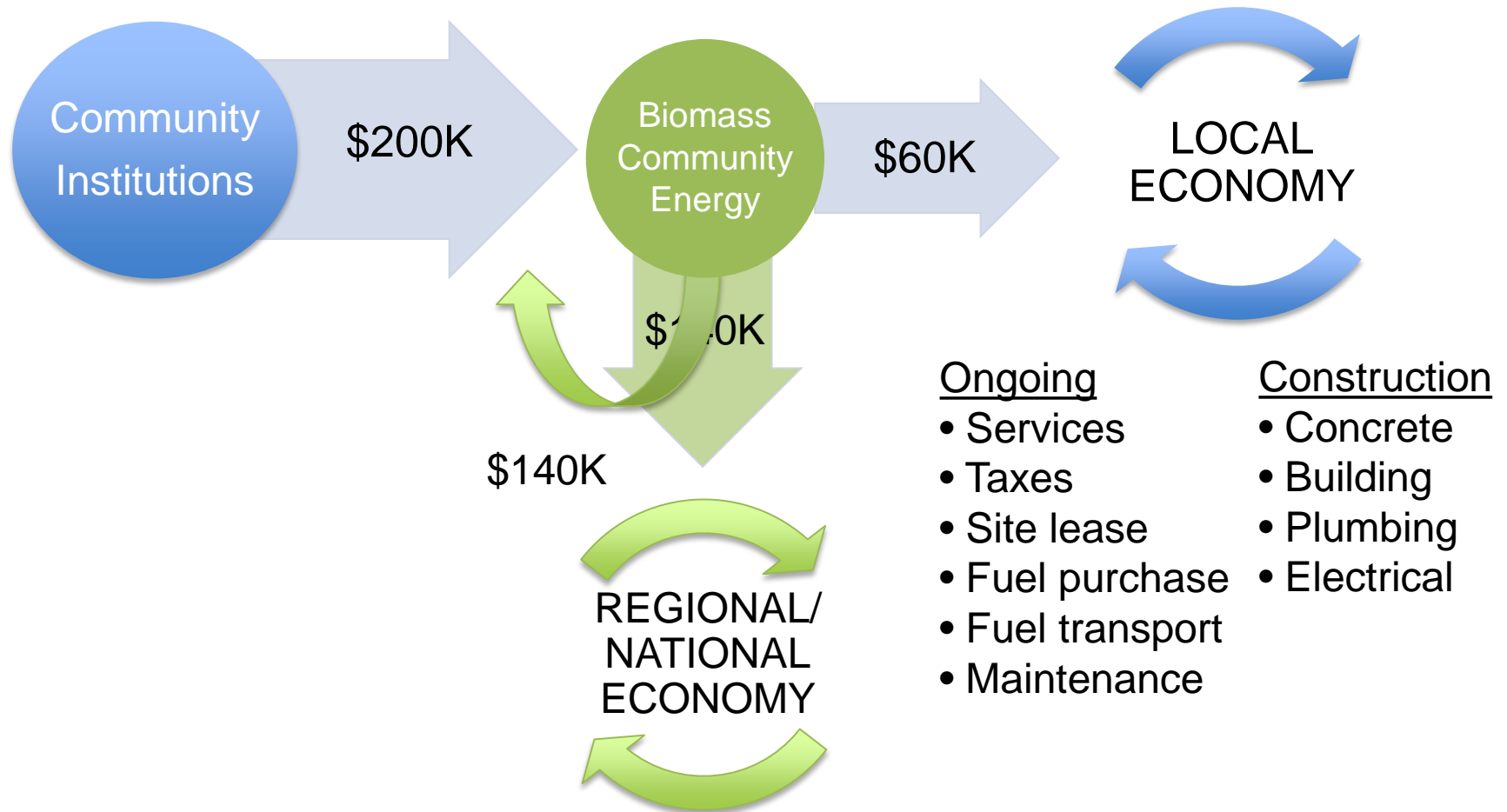


**WE**

# FOSSIL FUEL MODEL



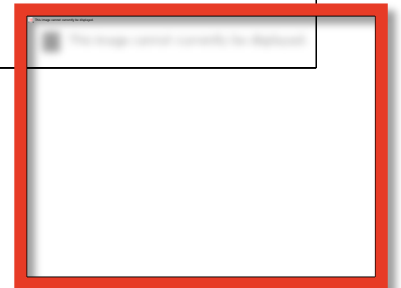
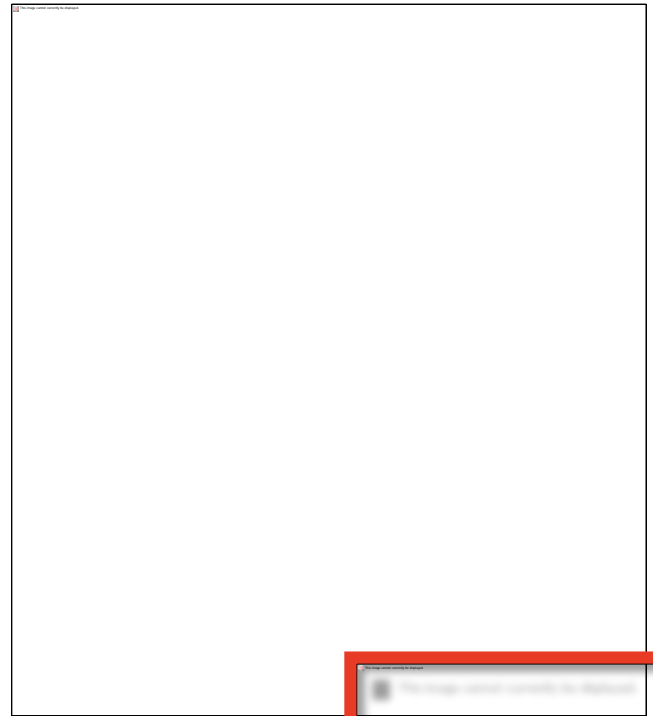
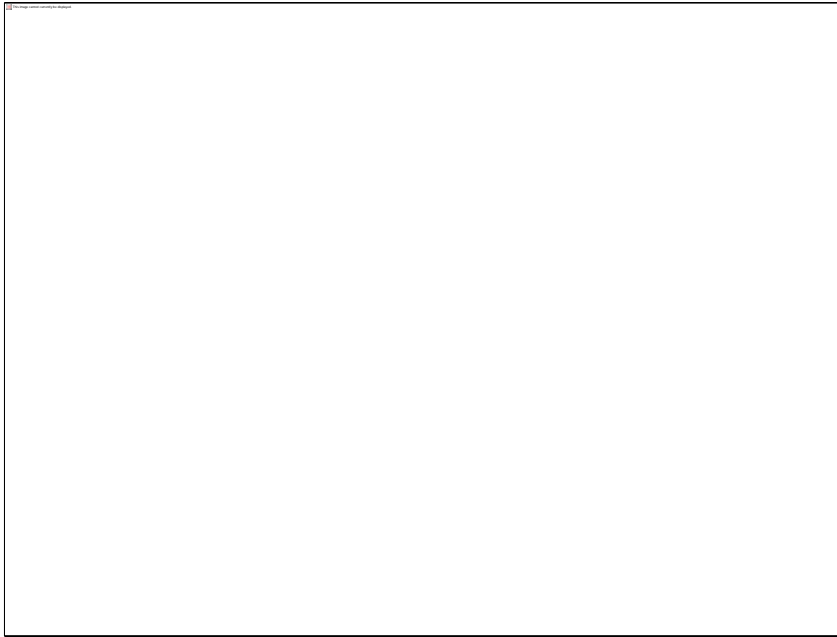
# COMMUNITY ENERGY MODEL







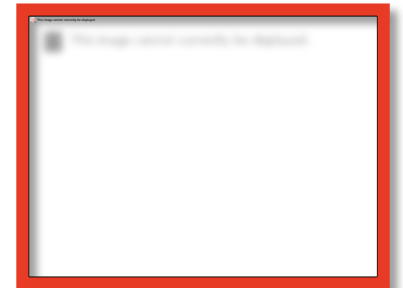
# Wood Stoves



# Residential Heating

Upper Austria

## Residential Cordwood Boiler



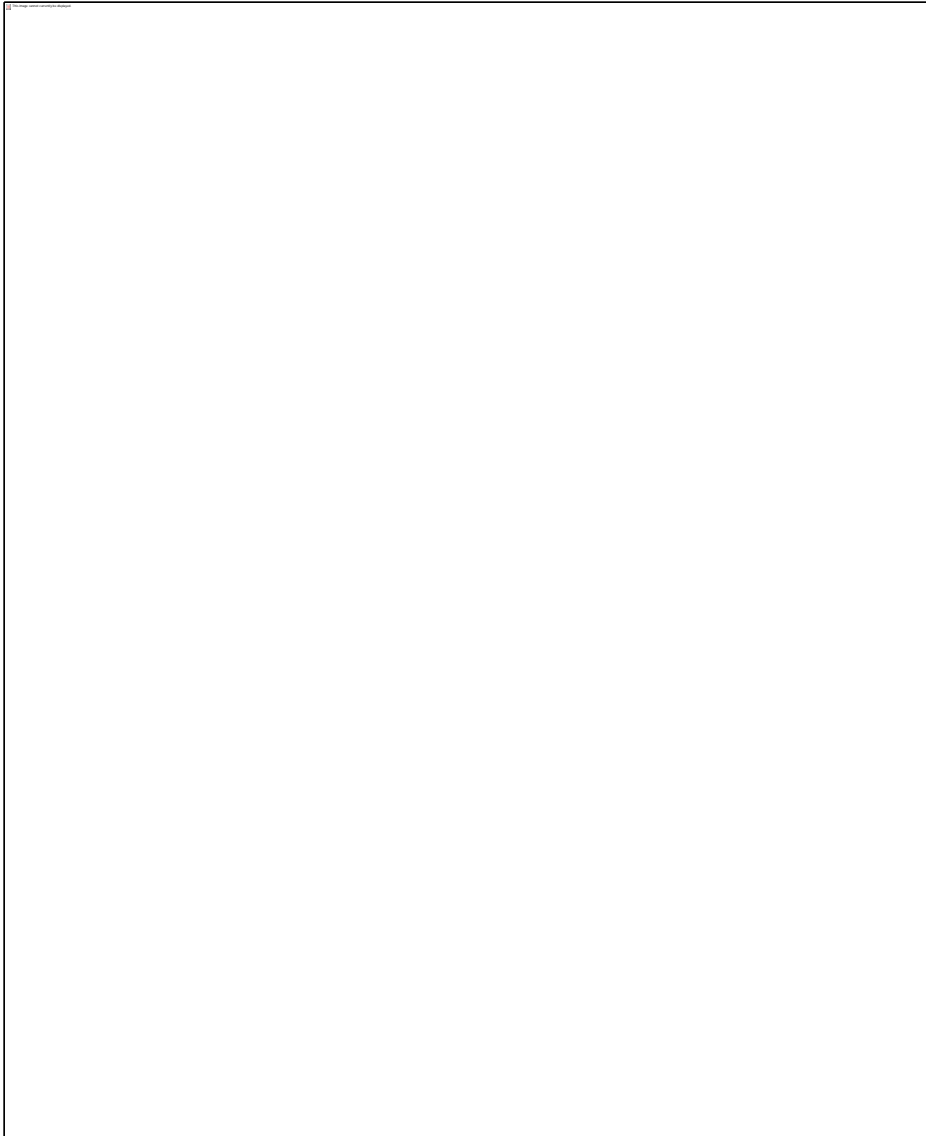
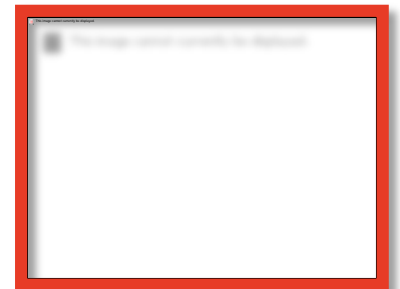


Photo: Windhager

# Residential and Light Commercial Pellet Boilers





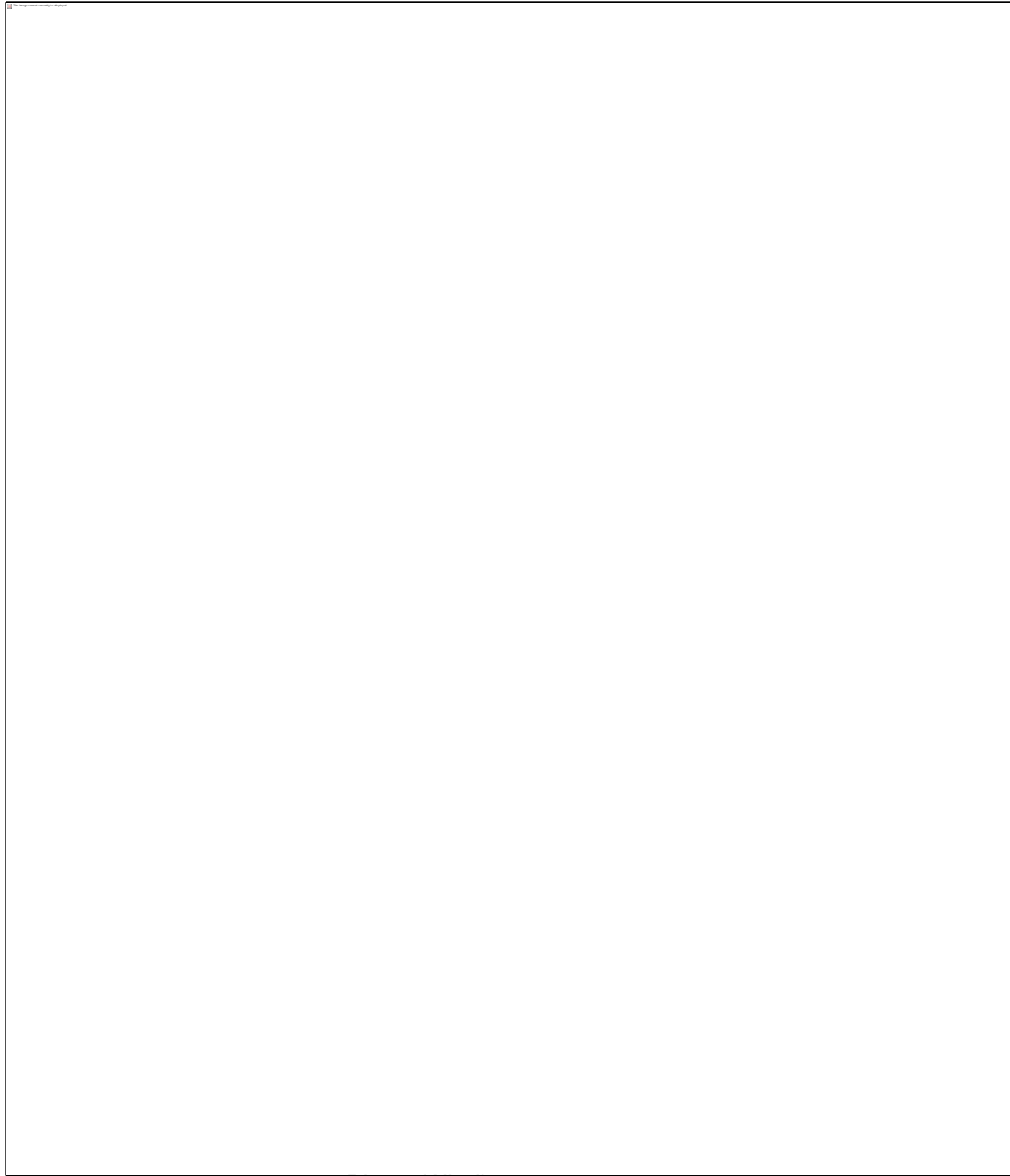
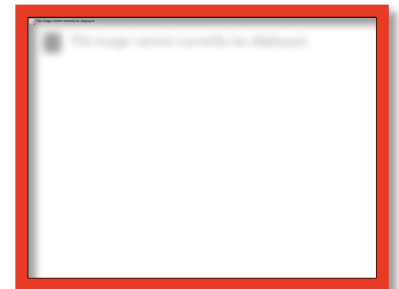
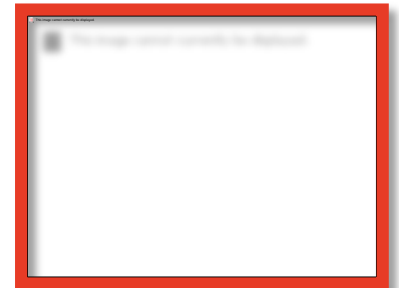


Photo: Windhager

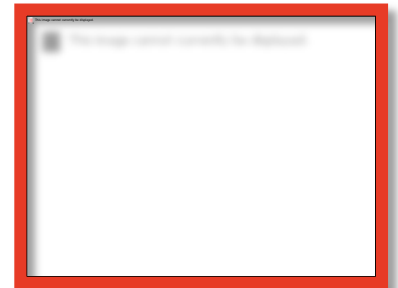
# Containerized Pellet/Clean Chip Boiler



# Containerized Pellet/Clean Chip Boiler

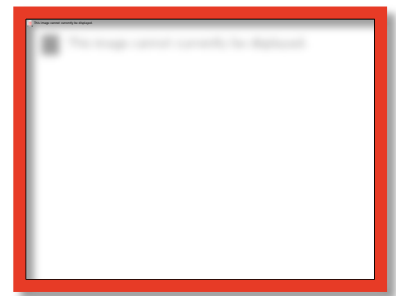


# Hog Fuel District Heating





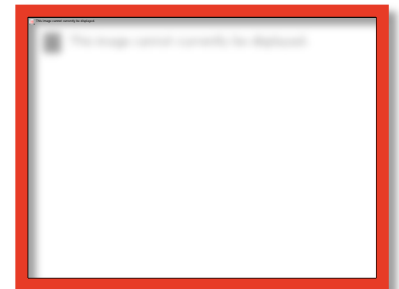
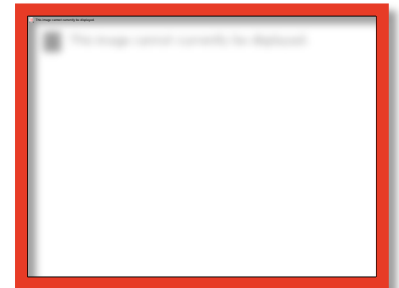
# Hog Fuel Industrial Process Heat



# Gasification Power Production

Image: Andrew Haden

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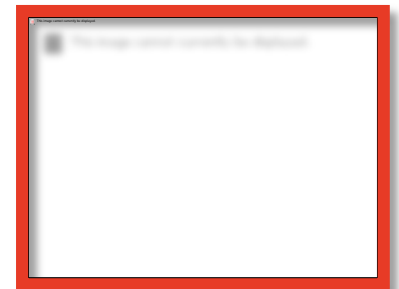


© 2019 Volter

Photo: Volter

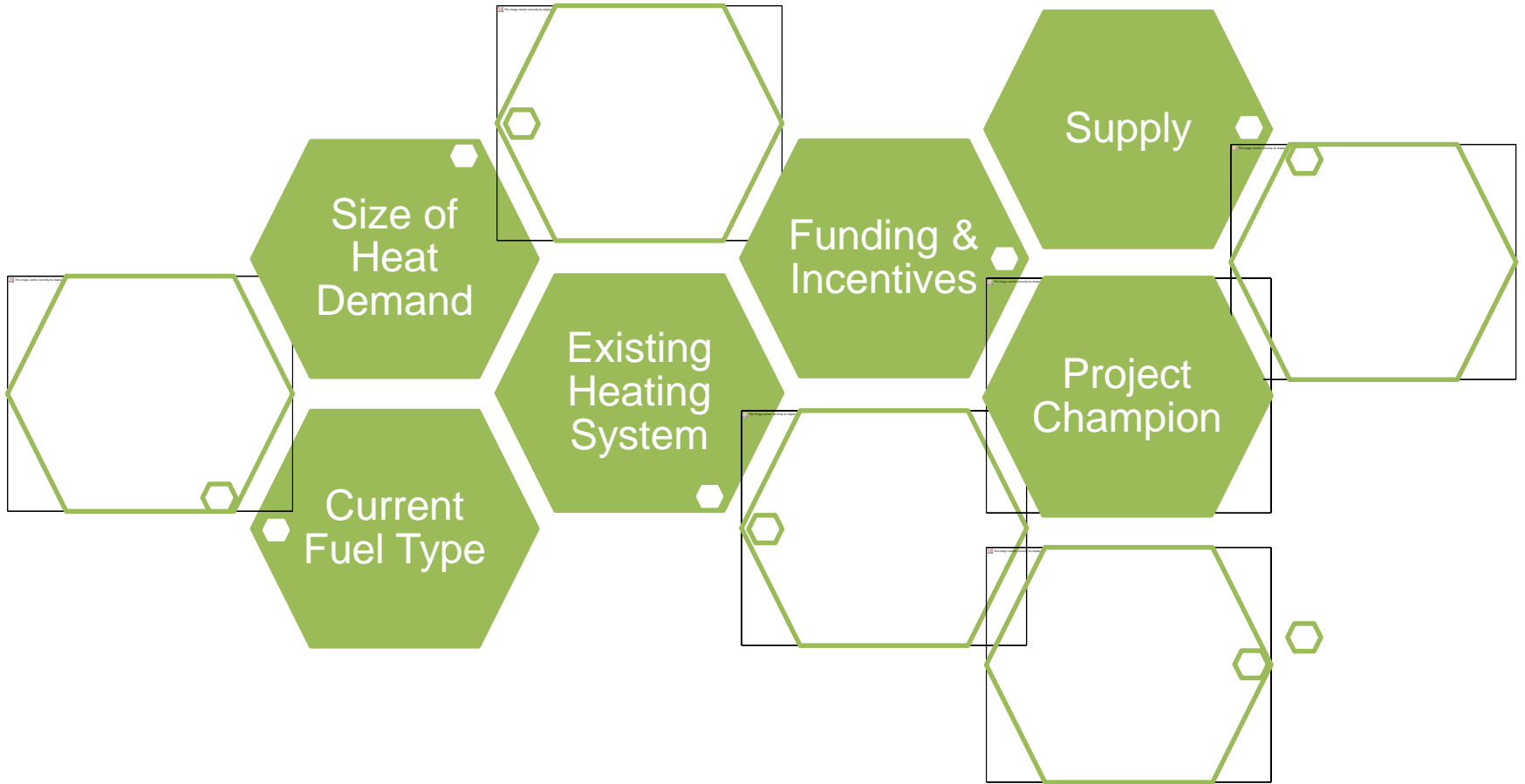
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# Wood Pellet Production





# PROJECT ELEMENTS





# CURRENT FUEL TYPE



# SIZE OF HEAT DEMAND

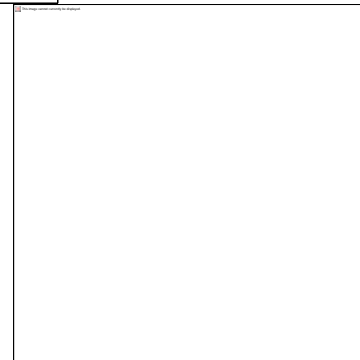
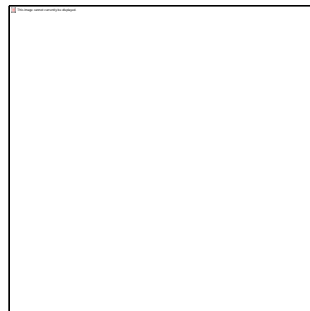
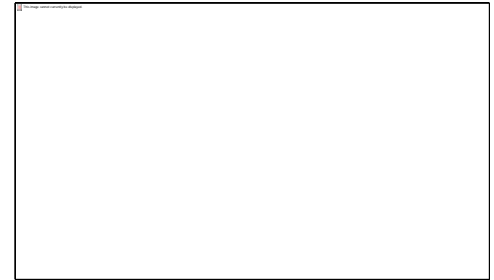
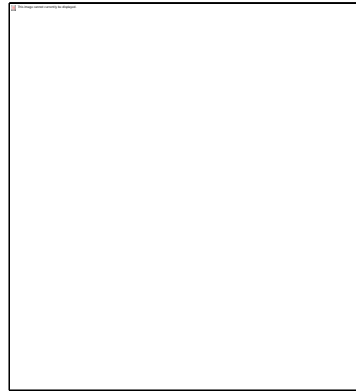
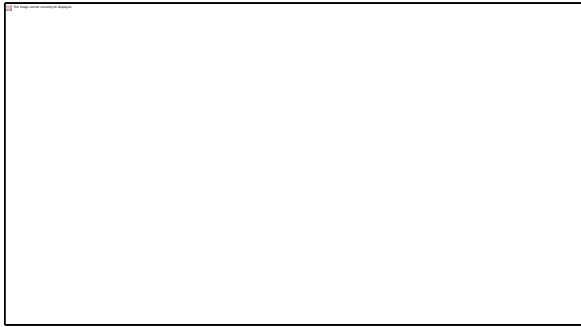
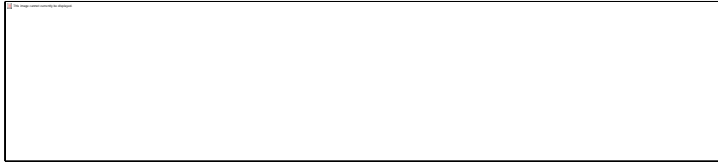
- Larger demand = larger cost savings
- Cold climates = higher heat demand
- Good candidates:
  - Process heating for industry: breweries, food processing, manufacturing
  - Resorts and hotels: 24/7, swimming pools, etc.
  - Healthcare: 24/7, lots of fresh air requirements
  - Schools, community centers, municipal buildings

# EXISTING HEATING SYSTEM

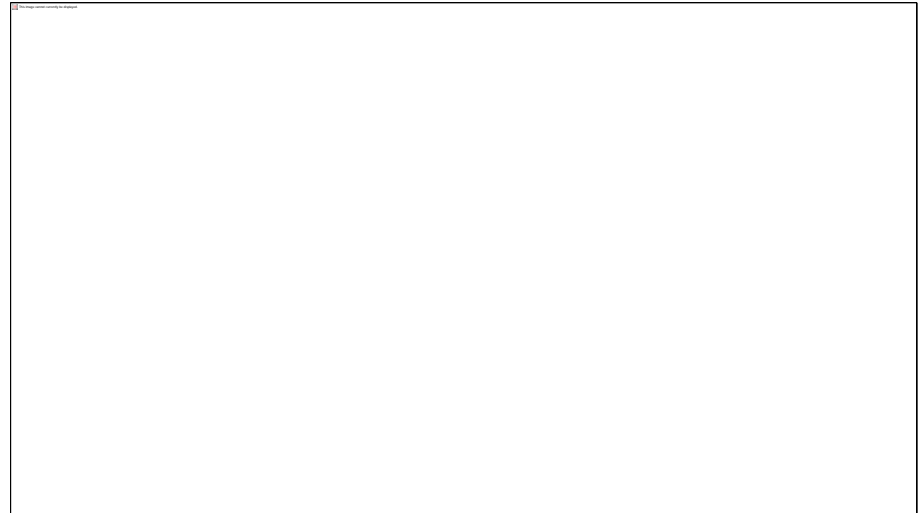
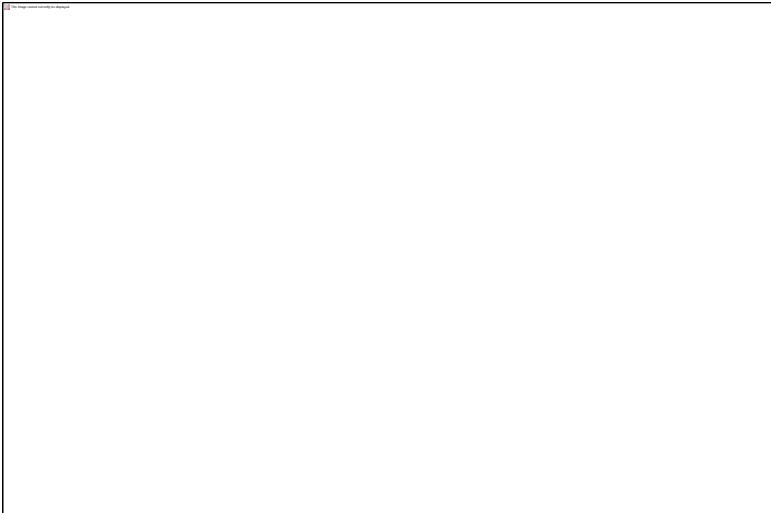
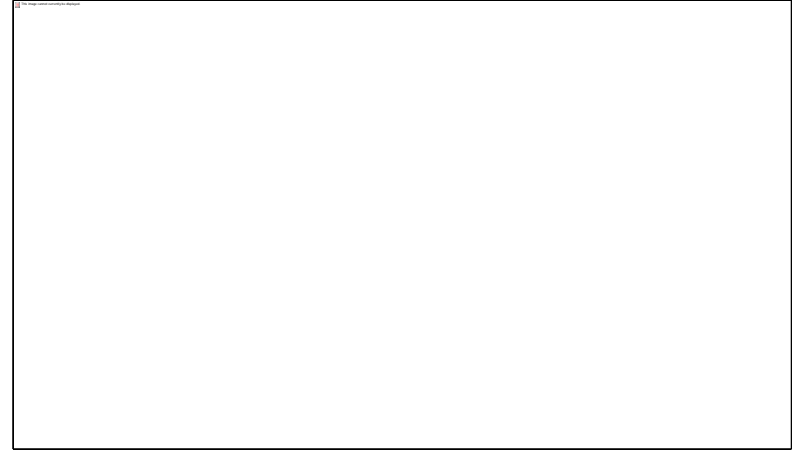


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# FUNDING AND INCENTIVES



# SUPPLY

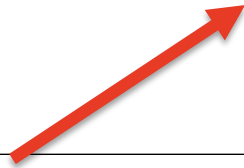


# PROJECT CHAMPION



# Coffman Cove and Thorne Bay

Cordwood Boilers in Remote Alaska



**Karen Peterson**

University of AK Cooperative  
Extension Service



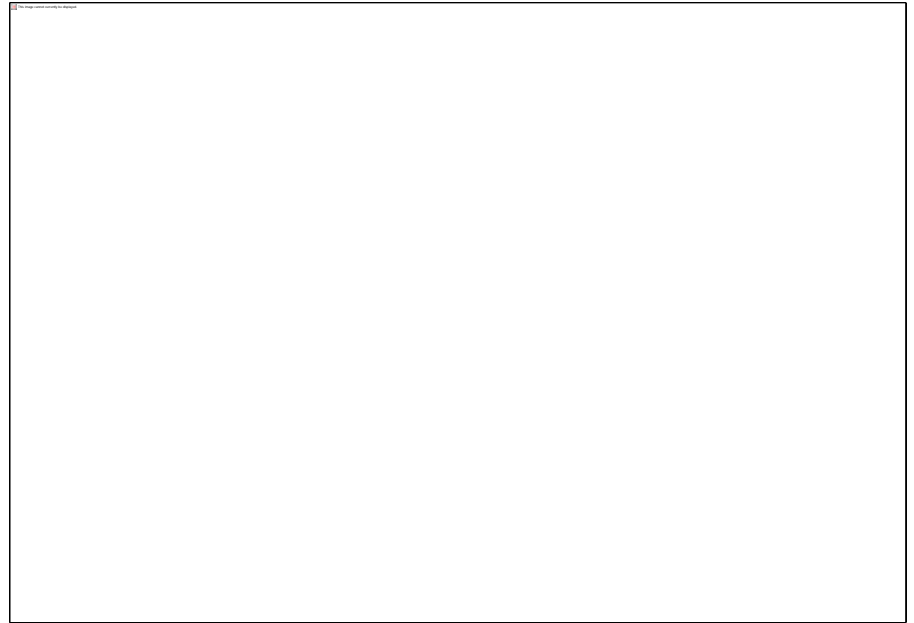
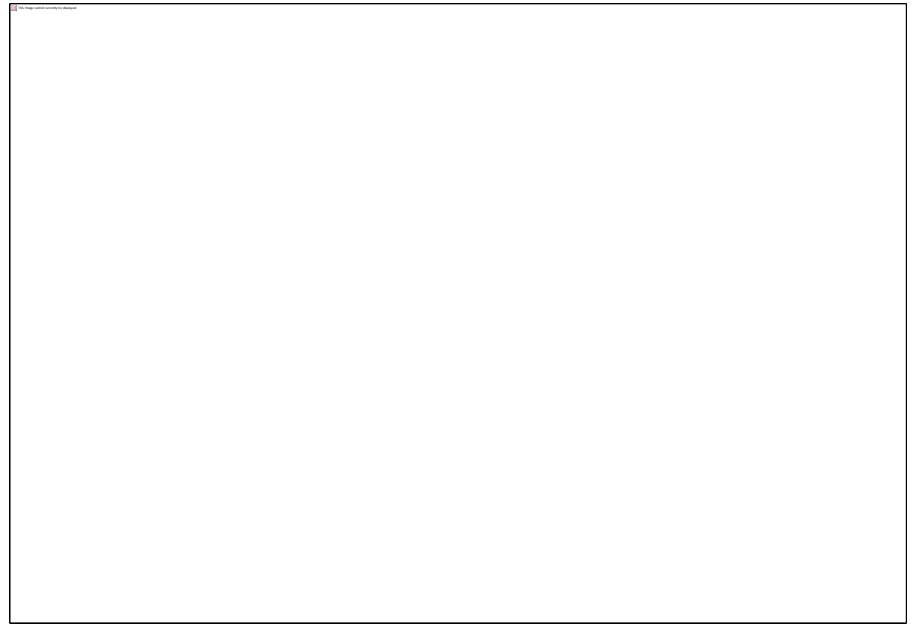
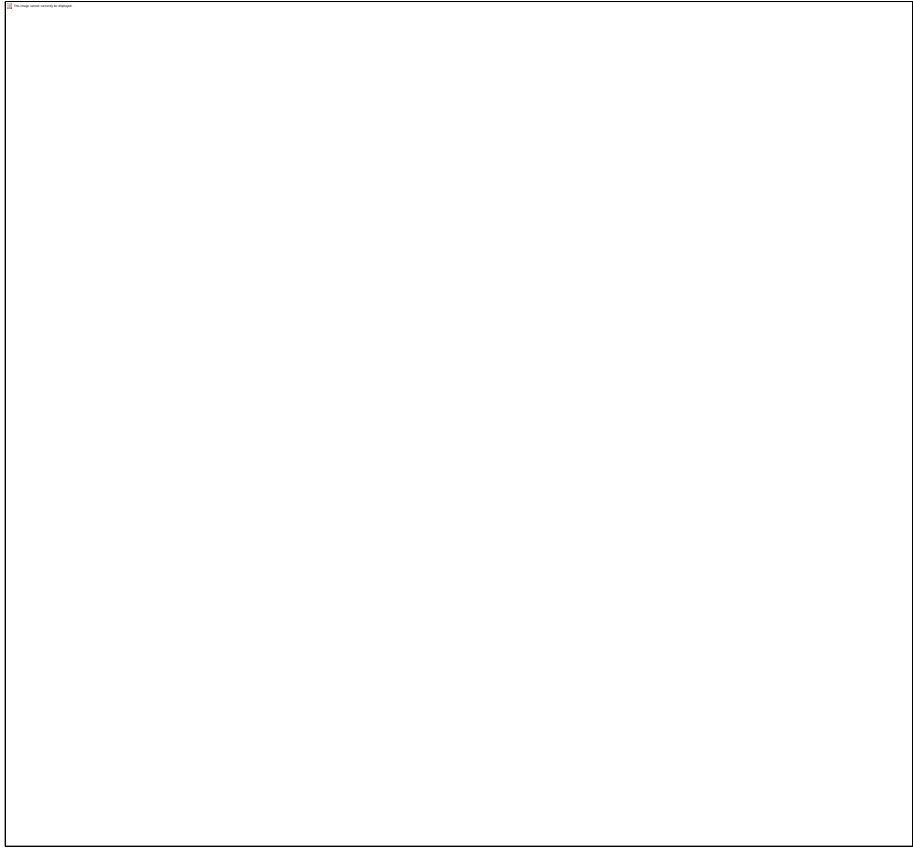


Photo: Karen Peterson, University of AK  
Cooperative Extension Service



# BIOMASS-HEATED GREENHOUSES

A HANDBOOK FOR ALASKAN SCHOOLS AND COMMUNITY ORGANIZATIONS

# Pierce Community Center

Containerized Pellet Boiler in Pierce, Idaho



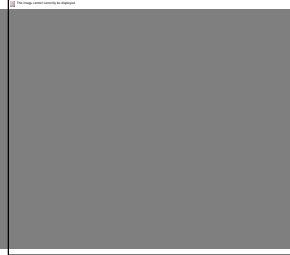






# Versatile Wood Products

Manufacturing Residuals Boiler in Portland, Oregon









# Ketchikan International Airport

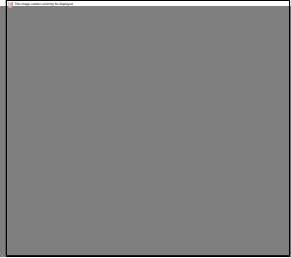
Pellet Boiler in Ketchikan, Alaska





# Harney Community Energy

District Heating with Wood Chips in Burns, OR



# ABOUT HCE

- **Technology:** Boiler can efficiently and cleanly utilize hog fuel biomass (4" minus, 55% MC)
- **District Heating:** Heating multiple buildings on one common loop
- **Third Party Development Model:** Developer financed construction and assures successful operations
- **Local Ownership:** Community will own the system for long-term operations

























# Yakima Specialties, Inc.

Hog fuel steam district energy system in Yakima, WA







# Plumas Health & Human Services Center - Small-Scale CHP in Quincy, CA





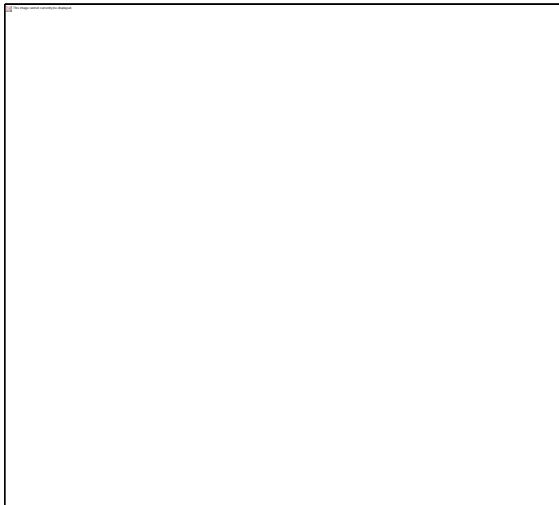
**Small-scale combined heat-  
and-power for the Lopez  
Island Pool and the Lopez  
Middle/High School?**

**District heating  
for Friday Harbor  
or Eastsound?**



# KEY QUESTIONS

- **What is your local underutilized wood source?**
- **Where are your largest heat loads?**
- **Where is new construction happening?**
- **Who are your local entrepreneurs?**
- **Who are your project champions?**



**MEAGAN NUSS**  
PROJECT DEVELOPMENT  
MANAGER

meagan@wisewoodenergy.com  
503.545.8685

**ADDRESS**

2409 N Kerby Avenue  
Portland, OR 97227

**WEBSITE**

wisewoodenergy.com