### OUTLINE

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

### **ABOUT WISEWOOD ENERGY**

- **Technical Consulting:** Feasibility studies, conceptual design, and financial modelling
- **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 stateof-the-art biomass energy systems that strengthen local economies, lower heating costs and promote environmental stewardship

> Technology in Service of Community and Environment

### Self Sufficiency with Modern Wood Energy BIOMASS ENERGY BASICS

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#### WHY WOODY BIOMASS?

# "Energy Resilience"

### 1. Demand Conservation 2. Renewable Energy Generation



The San Juan Islands community is committed to increasing locally generated renewable energy.



### WHAT IS WOODY BIOMASS?



Cordwood



Pellets



Clean Chips



Hog Fuel



C&D Waste



Yard Debris

### **BIOMASS ENERGY TECHNOLOGIES**

Technology	Pellet/clean chip boiler	Hog fuel wood chip boiler	Gasification CHP	Combustion CHP
Fuel Type	Pellets and/or clean chips	Hog fuel wood chips	Pellets and/or wood chips	Hog fuel wood chips
Installed Capacity	< 3 MMBtu/hr	1.5 – 30 MMBtu/hr	65kW – 5MW	5 – 100MW+
Fuel Demand (tons/yr)	<50 – 1,000	500 - 20,000	200 – 10,000	10,000 – 850,000+

### MODERN BIOMASS HEAT & COMBINED HEAT AND POWER (CHP)

- **Efficient:** high conversion efficiency (>85%)
- **Clean:** low particulate, NOx and CO emissions
- Economical: lowers energy 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)



#### **ECONOMICAL**



#### SUSTAINABLE, LOW CARBON

- - Carbon impacts depend on source of feedstock, forest management practices, fuel being displaced, efficiency of technology
  - Diverting the **byproduct** of material that would otherwise be **burned** in piles into a **highly efficient** energy system is among best use of modern wood energy
    - Quick carbon debt payback
    - Immediate reduction in particulate emissions



291. TNEWNOUT Self Sufficiency with Modern Wood Energy **BIOMASS ENERGY TECHNOLOGIES** 

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### **Cordwood & Pellet Stoves**







### Light Commercial & Institutional Cordwood Boiler



## Residential & Light Commercial Pellet Boilers

Windhager

Windhager (



Photo: Windhager

### **Containerized Pellet/Clean Chip Boiler**

KOHLEI





### **Hog Fuel District Heating**

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Photo: Kohlbach

# **Hog Fuel Industrial Process Heat**

### **Gasification Power & Biochar Production**









Image: Syncraft

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### **Gasification Power & Biochar Production**



Image: Syncraft

# Wood Processing



### Wood Storage

Image: Andrew Haden



Self Sufficiency with Modern Wood Energy WHAT MAKES A VIABLE PROJECT

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#### **PROJECT ELEMENTS**



### **CURRENT FUEL TYPE**

- 2017 OPALCO fuel mix: – Hydro: 89.4%
  - -Nuclear: 8.9%
  - -Coal: 0.7%
  - -Natural Gas: 0.9%
  - -Biomass & Waste: 0.1%
- Propane



### SIZE OF ENERGY 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 ENERGY SYSTEM**



### **FUNDING AND INCENTIVES**







Committed to the future of rural communities.









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## **PROJECT CHAMPION**



Self Sufficiency with Modern Wood Energy PROJECT EXAMPLES

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## Coffman Cove and Thorne Bay

Cordwood Boilers in Remote Alaska



#### **Karen Peterson** University of AK Cooperative Extension Service



Southeast Alaska

Prince of Wales Island







Photo: Karen Peterson, University of AK Cooperative Extension Service

**BIOMASS-HEATED GREENHOUSES** A HANDBOOK FOR ALASKAN SCHOOLS AND COMMUNITY ORGANIZATIONS

Thomas Bay School Greening

## Northport School District Containerized Pellet Boiler in Northport, Washington







## Versatile Wood Products Manufacturing Residuals Boiler in Portland, Oregon

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Photo: Dan Bihn

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CARBAGE

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Photo: Dan Bihn

## Ketchikan International Airport Pellet Boiler in Ketchikan, Alaska







## Harney Community Energy District Heating with Wood Chips in Burns, OR











## Yakima Specialties, Inc. Hog fuel steam district energy system in Yakima, WA







#### Plumas Health & Human Services Center Organic Rankine Cycle CHP in Quincy, CA

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Photo: Sierra Institute for Community & Environment

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## Waste Water Treatment Plant Gasification CHP in the Austrian Alps

Photo: Syncraft

Photo: Andrew Haden

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Photo: Andrew Haden

Self Sufficiency with Modern Wood Energy BIOMASS IN THE SAN JUANS

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## INITIAL PROJECT INTEREST Key Questions

What is your local underutilized wood source? Where are your largest energy loads? Where is new construction happening?

Who are your local entrepreneurs? Who are your project champions?

What funding sources might exist?

District heating for Friday Harbor or Eastsound?

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**US Post Office** 

Pizzeria/Pontofino

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Aeroview Ln

#### Gasification CHP with biochar production a light industrial warehouse cluster?

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Orcas Island Cannabis

Lotioncrafter

NAPA Auto Parts -Island Automotive

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Island Hoppin' Brewery

Inter Island Petroleum

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Baker Rd

Territo

Orcas Auto-Tech

### San Juan Islands Energy Plan Empowering Our Island Community for a Resilient Future

#### **GOAL #3 – INCREASE LOCAL RENEWABLE ENERGY GENERATION**

**OBJECTIVE 3.A - INCREASE RENEWABLE ENERGY PORTFOLIO 5 PERCENT ANNUALLY** 

ACTION 3.A.5 - BIOMASS CONVERSION FEASIBILITY STUDY

Action: Conduct a feasibility study to evaluate the costs and benefits of gasification and incineration technology.



## Islands Energy

Empowering Our Island Community for a Resilient Future



# ....AND DON'T FORGET TO THINK BIG!

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## THANK YOU!

Technology in Service of Community and Environment

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