



Biomass Gasification CHP Pilot Project – Lessons Learned

FNSB and ACEP

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OUTLINE

1. FNSB-ACEP Partnership
2. Biomass CHP Pilot Project Motivations
3. Intro to Biomass Gasification CHP
4. Pilot Project Outcome
5. Lessons Learned

FNSB-ACEP Partnership

Objective

Provide coordination of programs and projects involving the development, implementation, and evaluation of energy efficiency, energy delivery, and alternative and renewable energy systems in FNSB.

Biomass Pilot Project Motivations

**Fairbanks
Comprehensive
Economic Development
Strategy (CEDS)**

COMMUNITY PRIORITY #1:

“Lower and stabilize FNSB energy costs by expanding the energy portfolio with a focus on local resources.”



ACEP
Alaska Center for Energy and Power

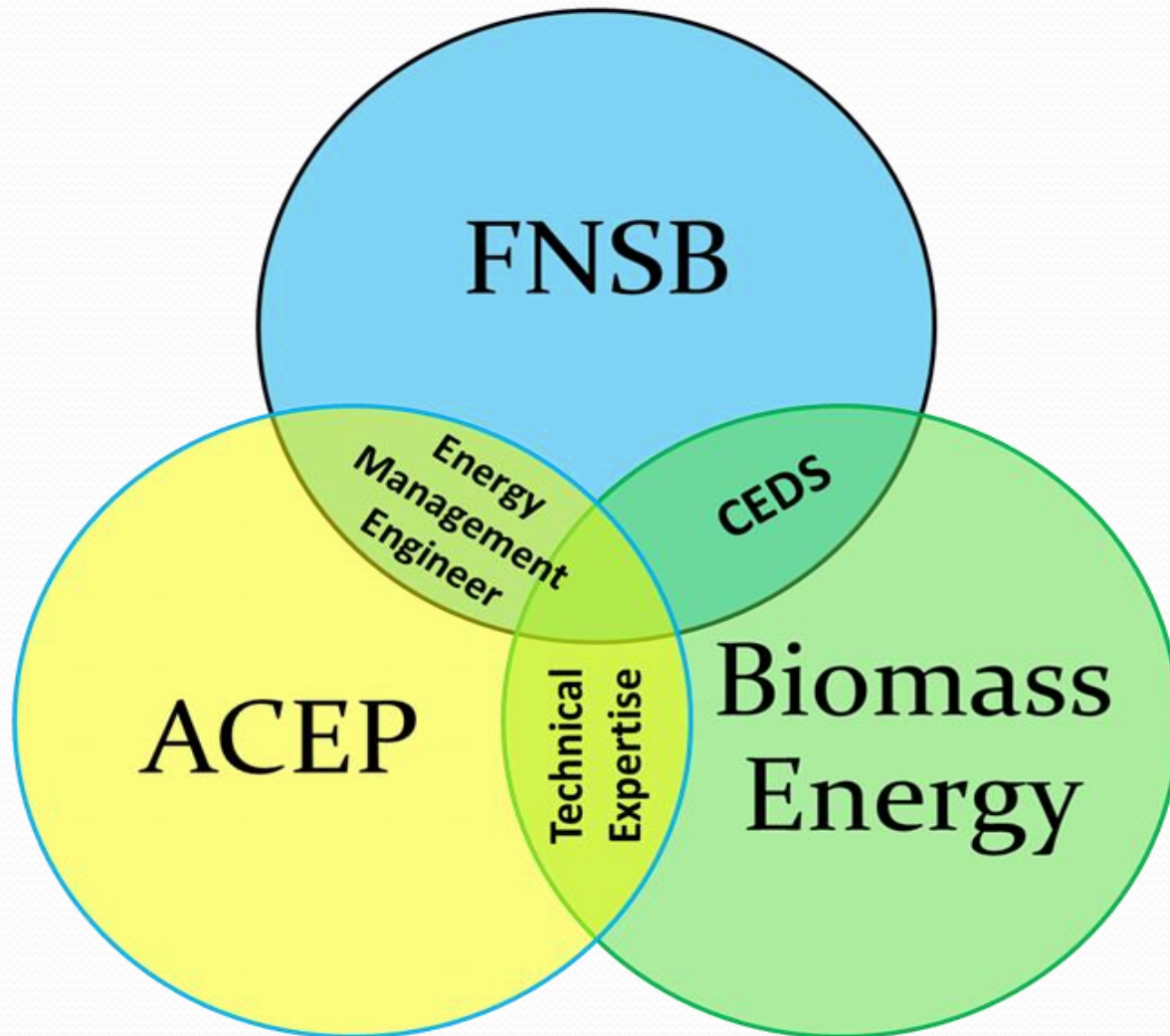
Mission: “Develop and disseminate practical, cost-effective, and innovative energy solutions for Alaska and beyond”

Vision: “Alaska leading the way in innovative production, distribution, and management of energy”

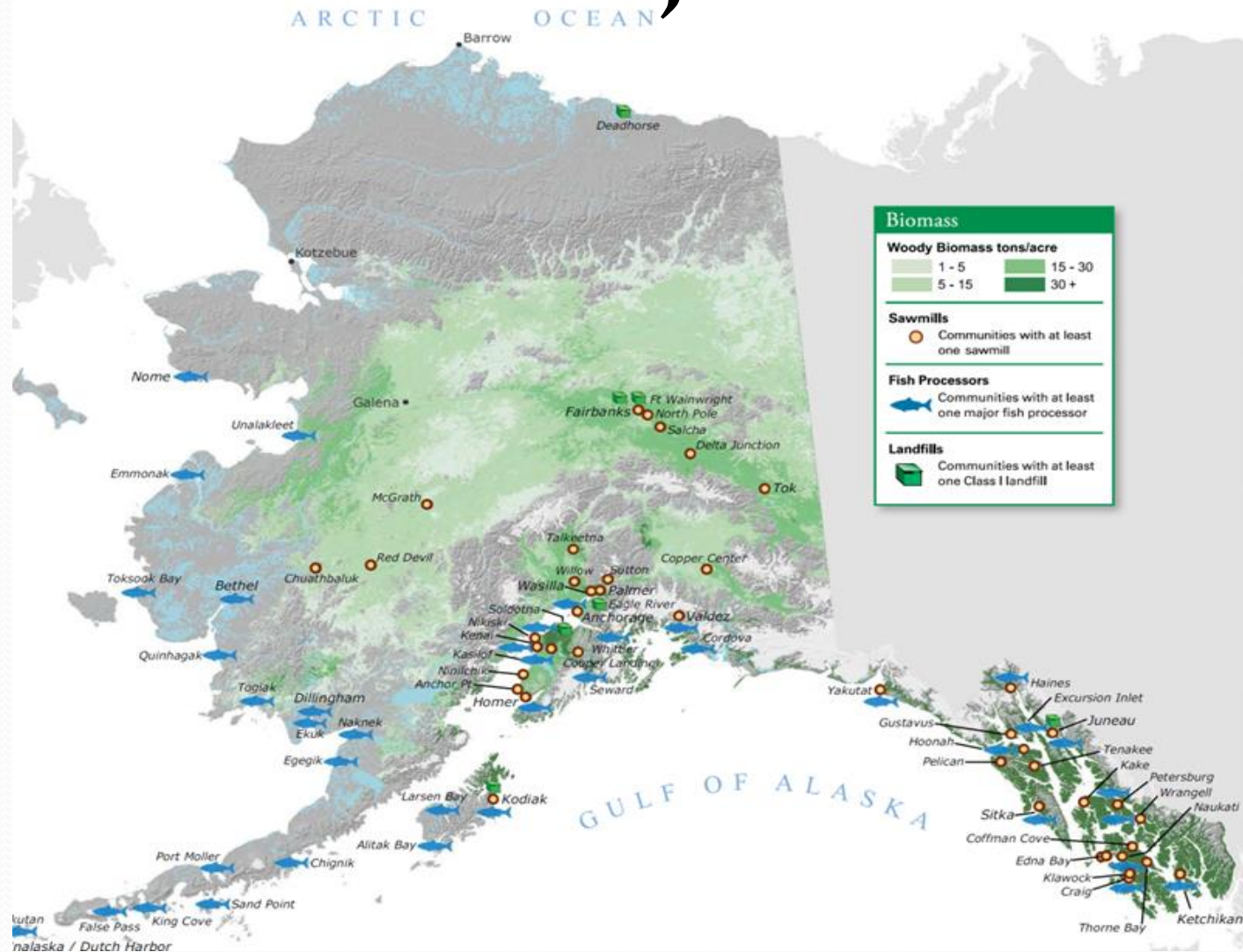
Energy Management Engineer

“Work with Borough stakeholders and ACEP researchers to evaluate emerging and existing energy efficient technologies relevant to the Borough.”

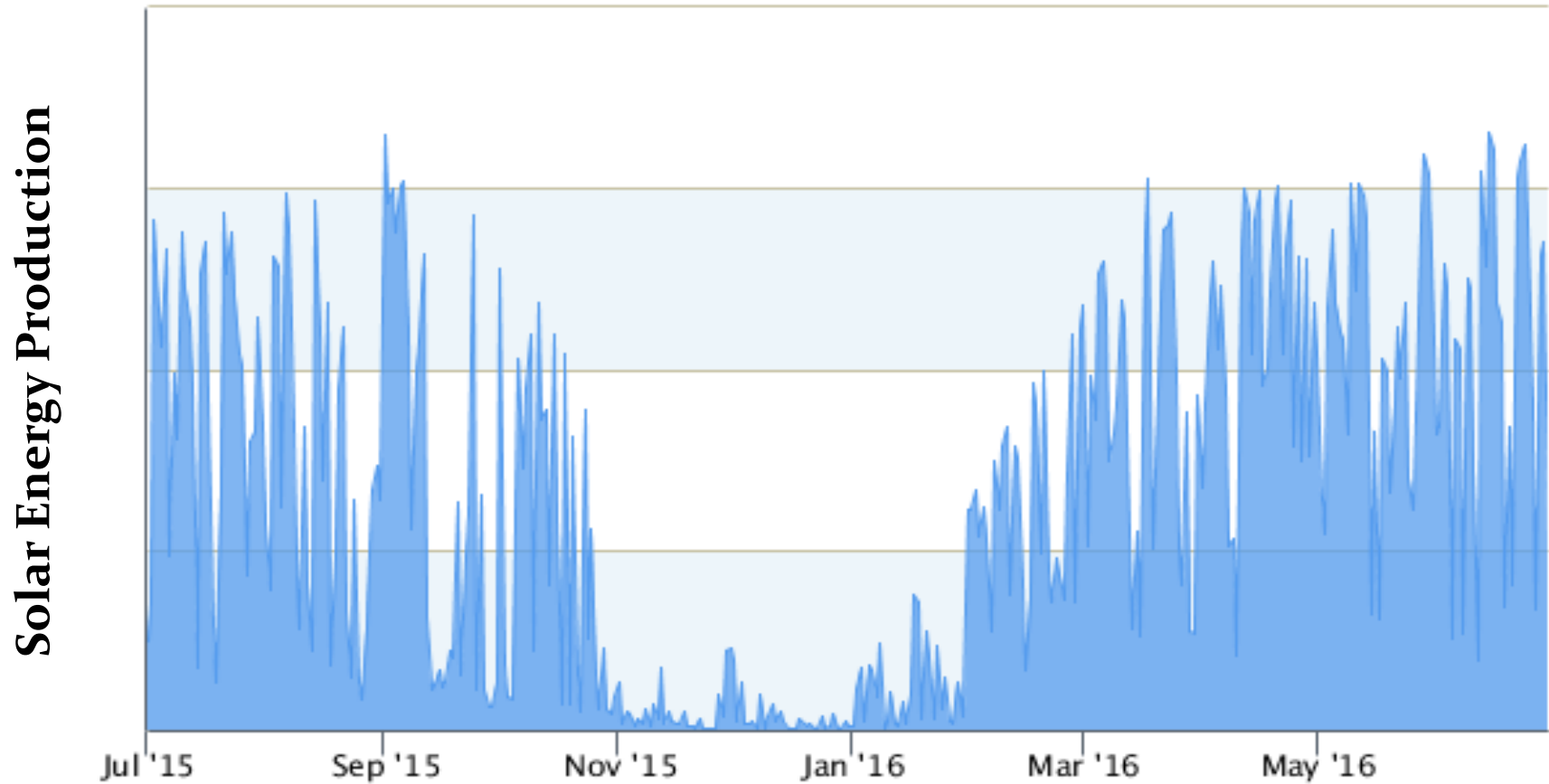
Biomass Pilot Project Motivations



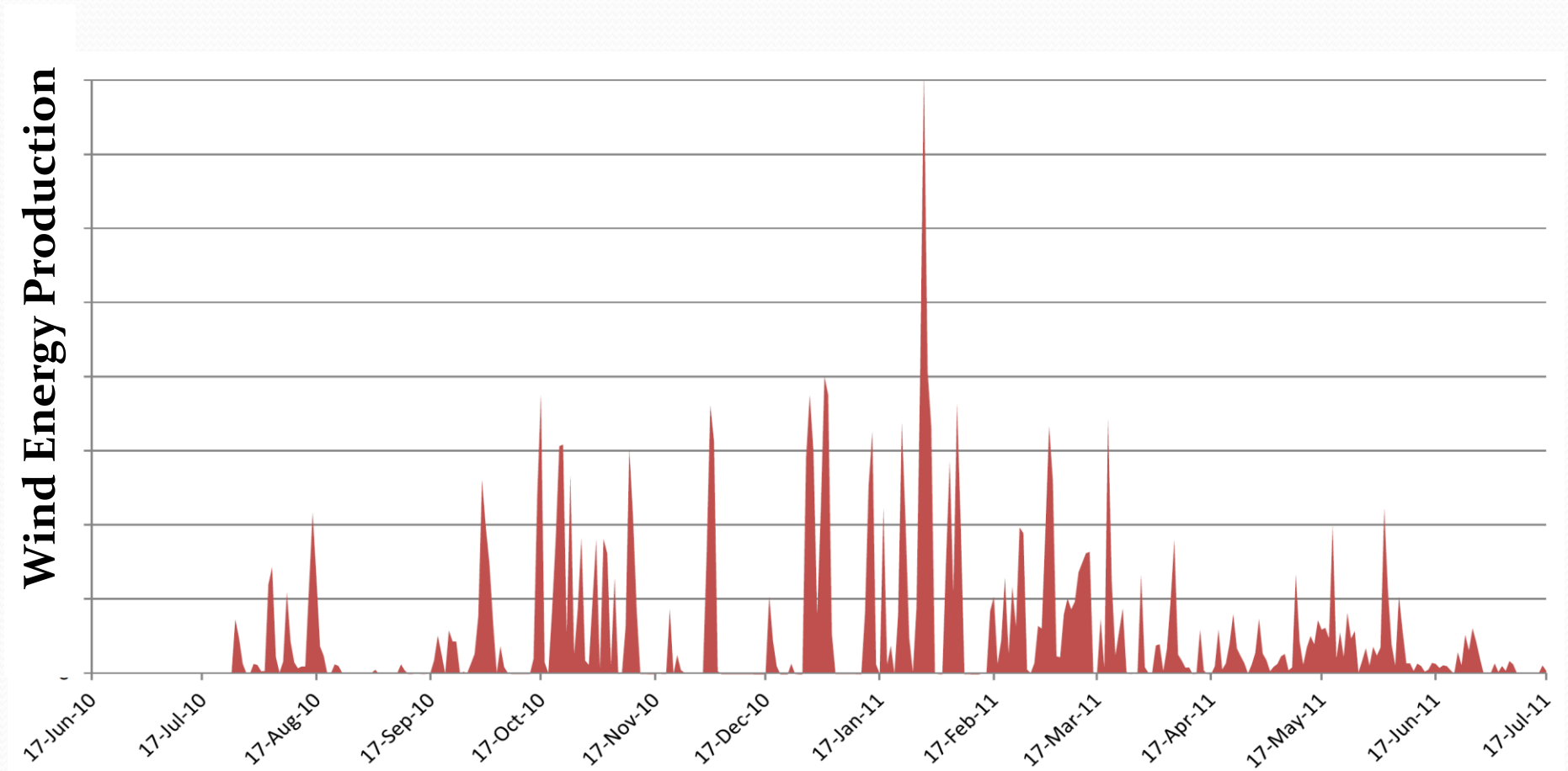
Biomass Pilot Project Motivations



Biomass Pilot Project Motivations

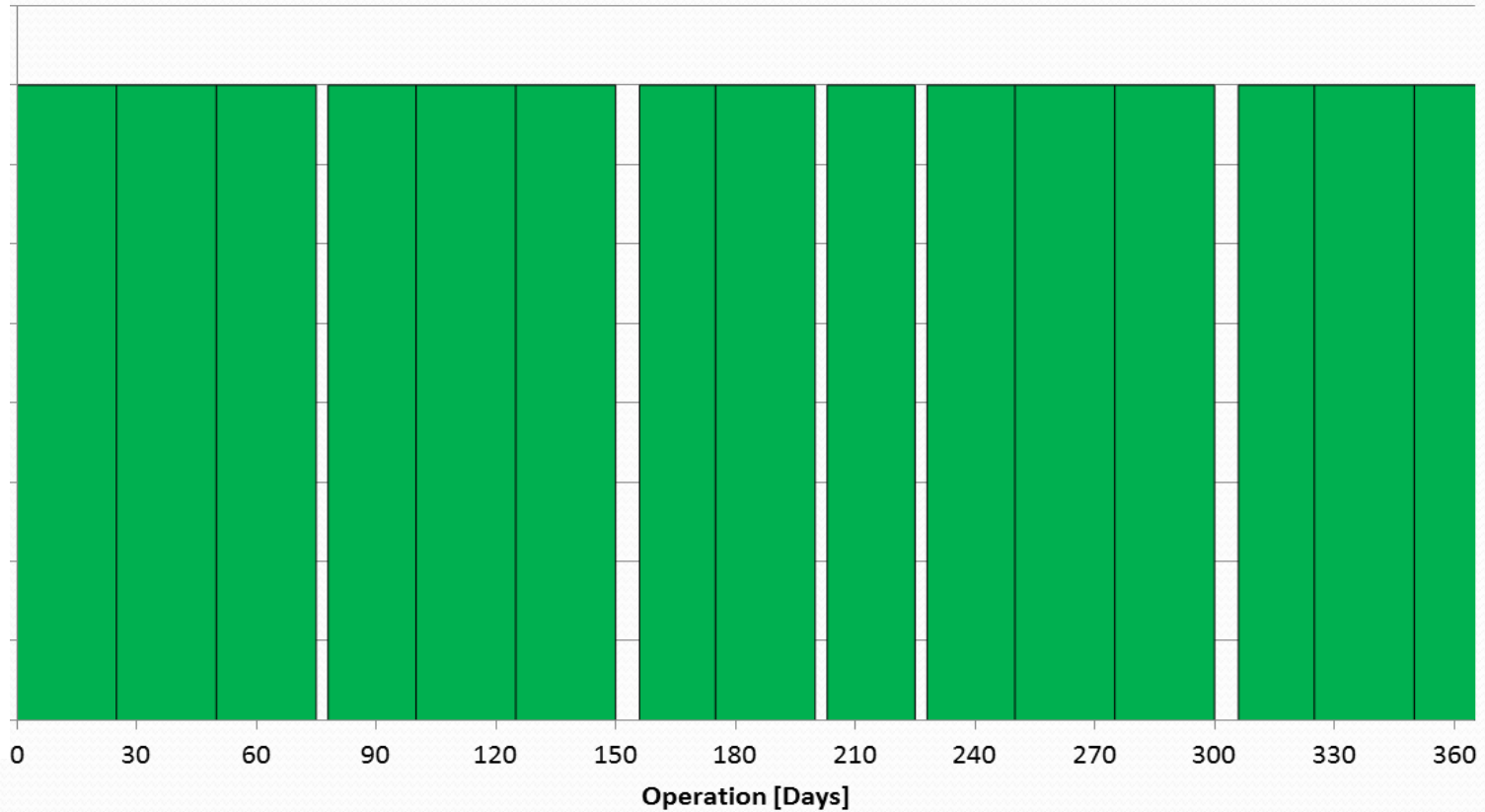


Biomass Pilot Project Motivations



Biomass Pilot Project Motivations

Biomass Energy Production



Biomass Pilot Project Motivations

		Fairbanks	Galena
Electricity Cost	\$/kWh	\$0.20	\$0.67
Fuel Cost	\$/Gallon	\$2.20	\$5.76
Value of 280,000 kWh	\$	\$56,000	\$164,000
Value of 2,380 MMBTU	\$	\$45,000	\$102,000
Cost of 370 tons Wood Chips	\$	-\$32,000	-\$37,000
Cost of Maintenance	\$	-\$30,000	-\$40,000
Annual Savings	\$	\$39,000	\$187,000
Annual Local Impact	\$	\$64,000	\$77,000

Biomass CHP Pilot Project Goals

- Evaluate and Disseminate:
 - Fuel Suitability
 - Performance
 - Reliability
 - Maintenance Costs
 - Emissions
 - Islanded-grid Compatibility

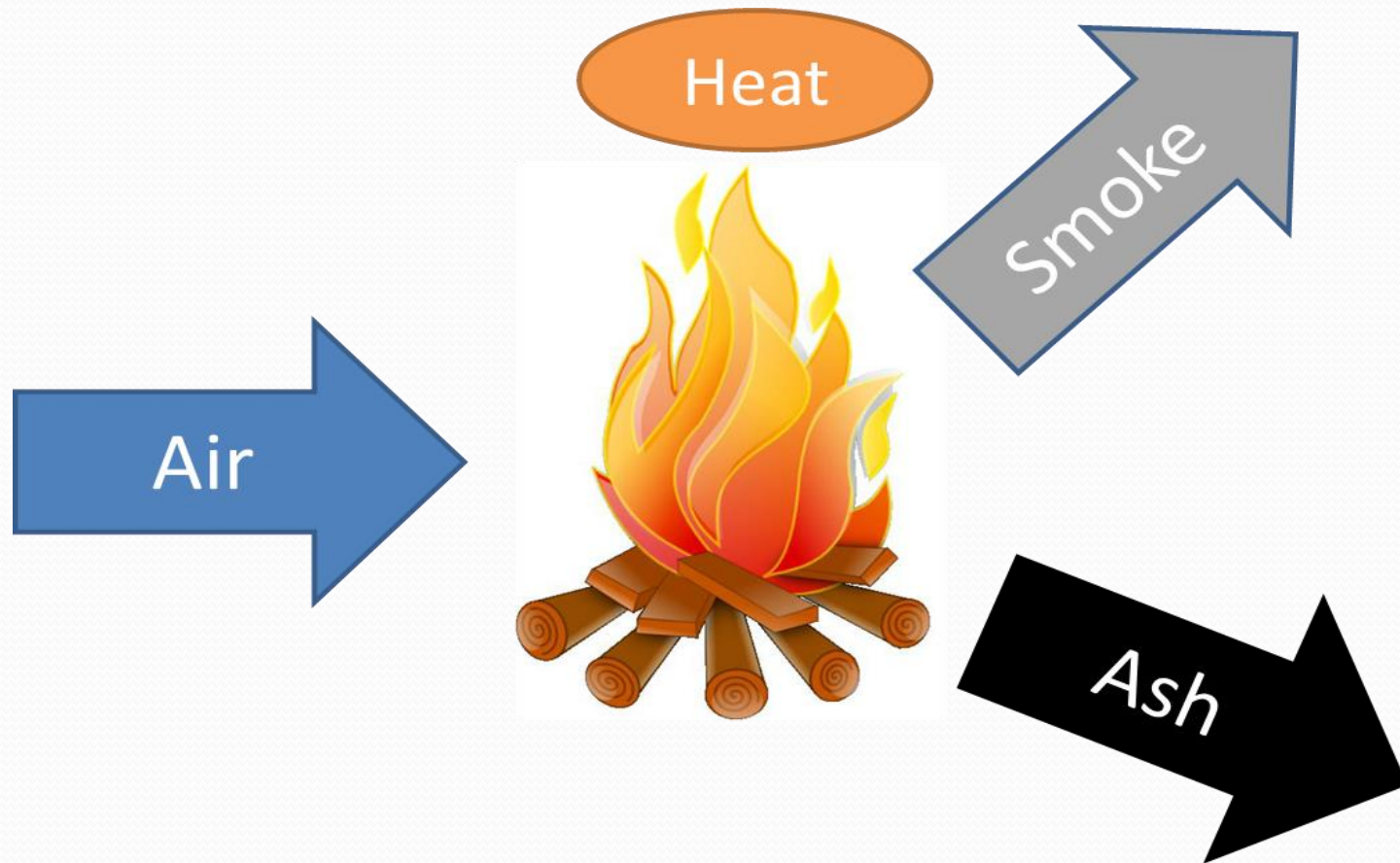
FNSB Testing Objectives

- Fuel Consumption
- Ash Production
- Integration with Building
- System Reliability
 - Track every fault event and system downtime
- O&M Costs
 - Track all consumables and parts
 - Track all labor hours

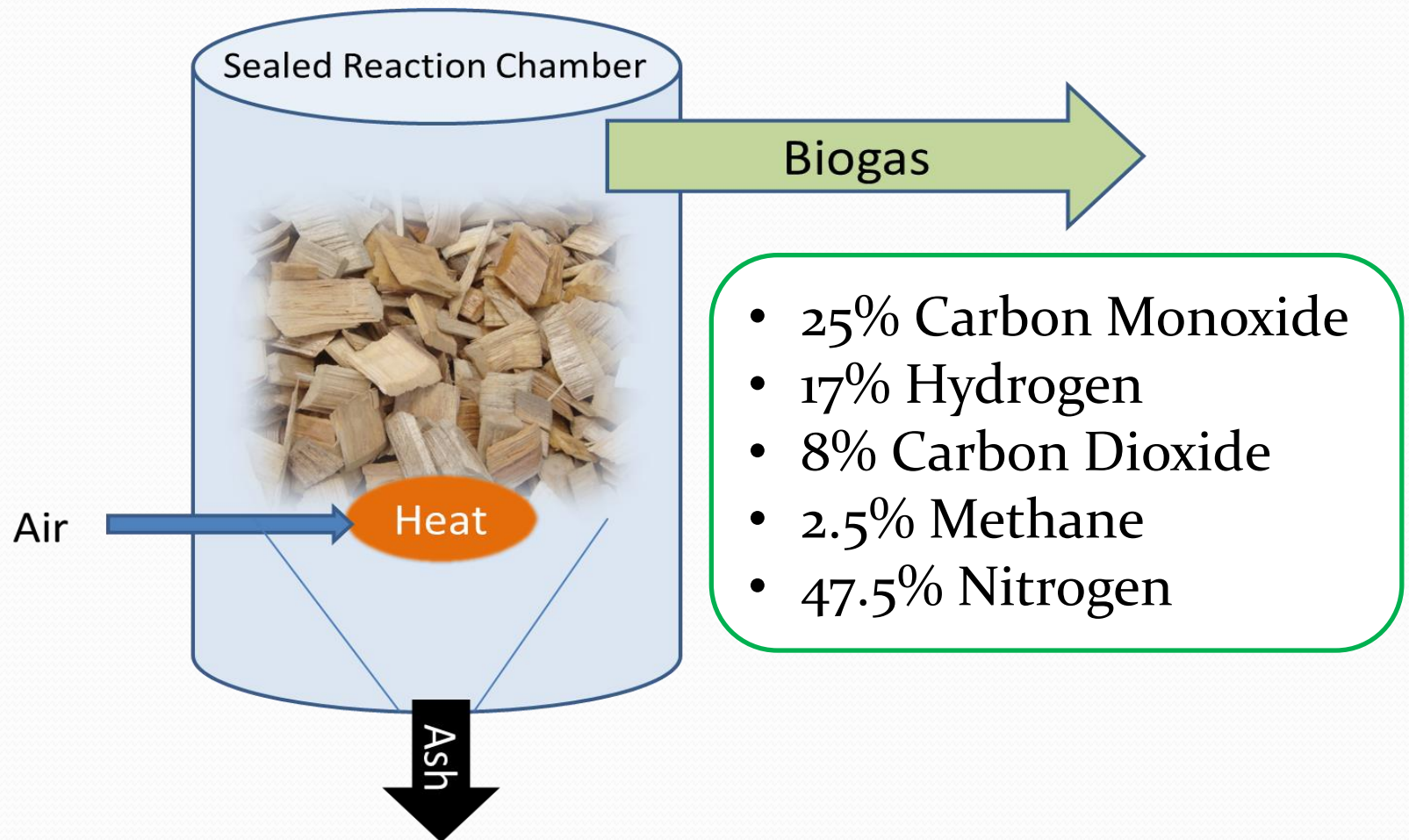
ACEP Testing Objectives

- Instrumentation of Heat and Power
 - Grid-Connected Monitoring
- Islanded Mode Performance Testing
 - Disconnect from Grid
 - Operate in Parallel with Diesel Genset and Load Bank
- Data Processing and Analysis

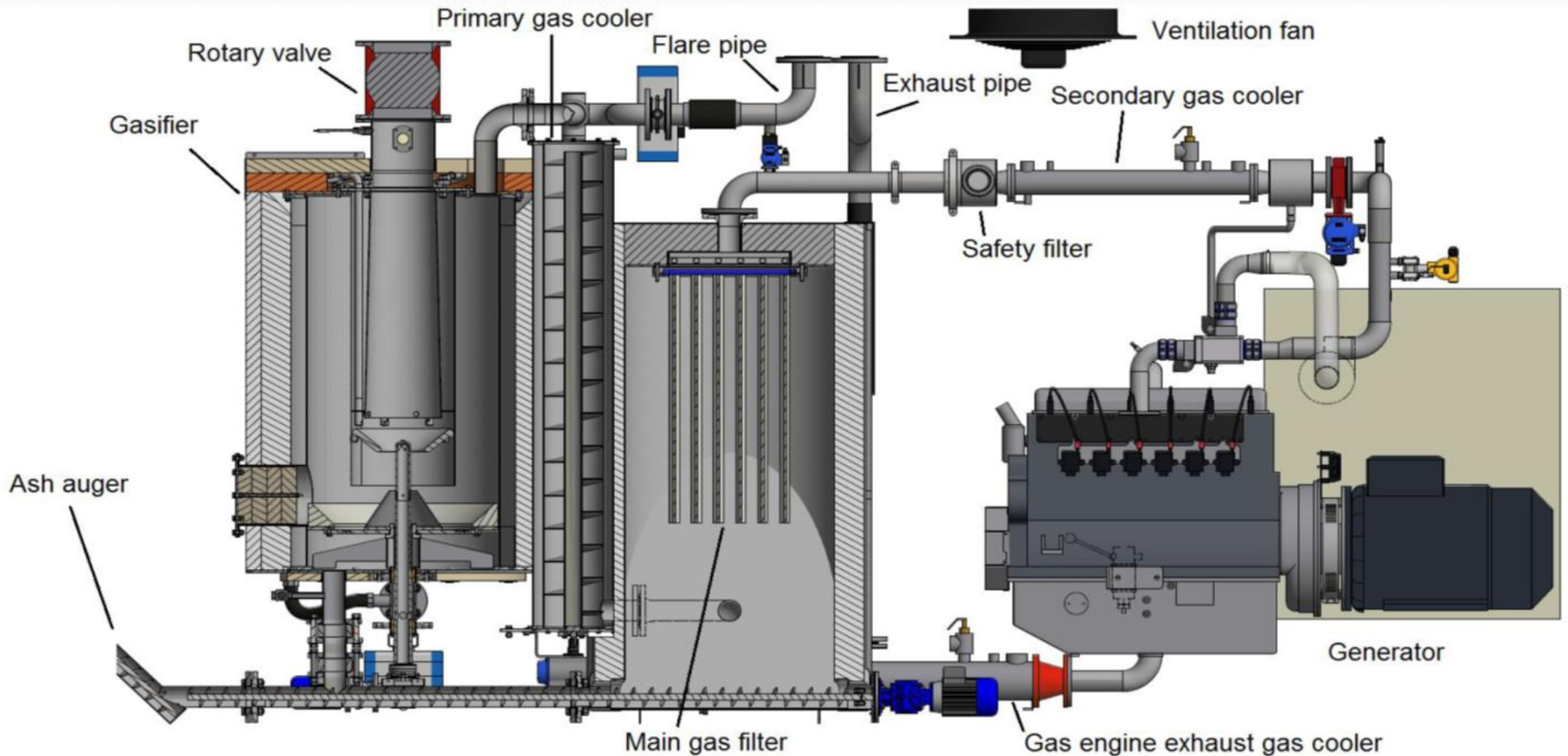
Intro to Biomass Gasification CHP



Intro to Biomass Gasification CHP



Intro to Biomass Gasification CHP

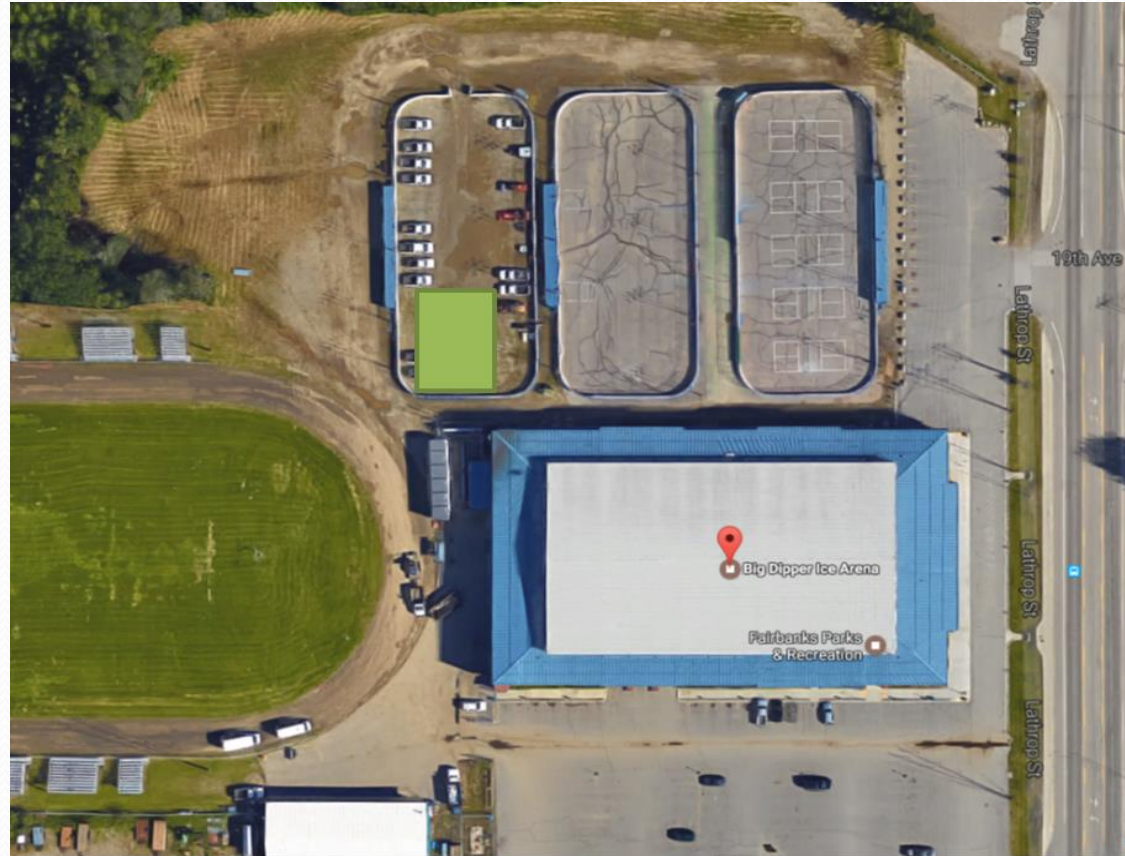


Pilot Project Progress and Plan

- Identify potential pilot project sites
- Select an appropriate system
- Secure external funding to support pilot installation
- Design and build installation
- Purchase and install equipment
- Operate system and collect data
- Analyze performance data, disseminate results

Proposed Site – Big Dipper Ice Rink

- Demand Charges
- Year round heat load
- Chip Access

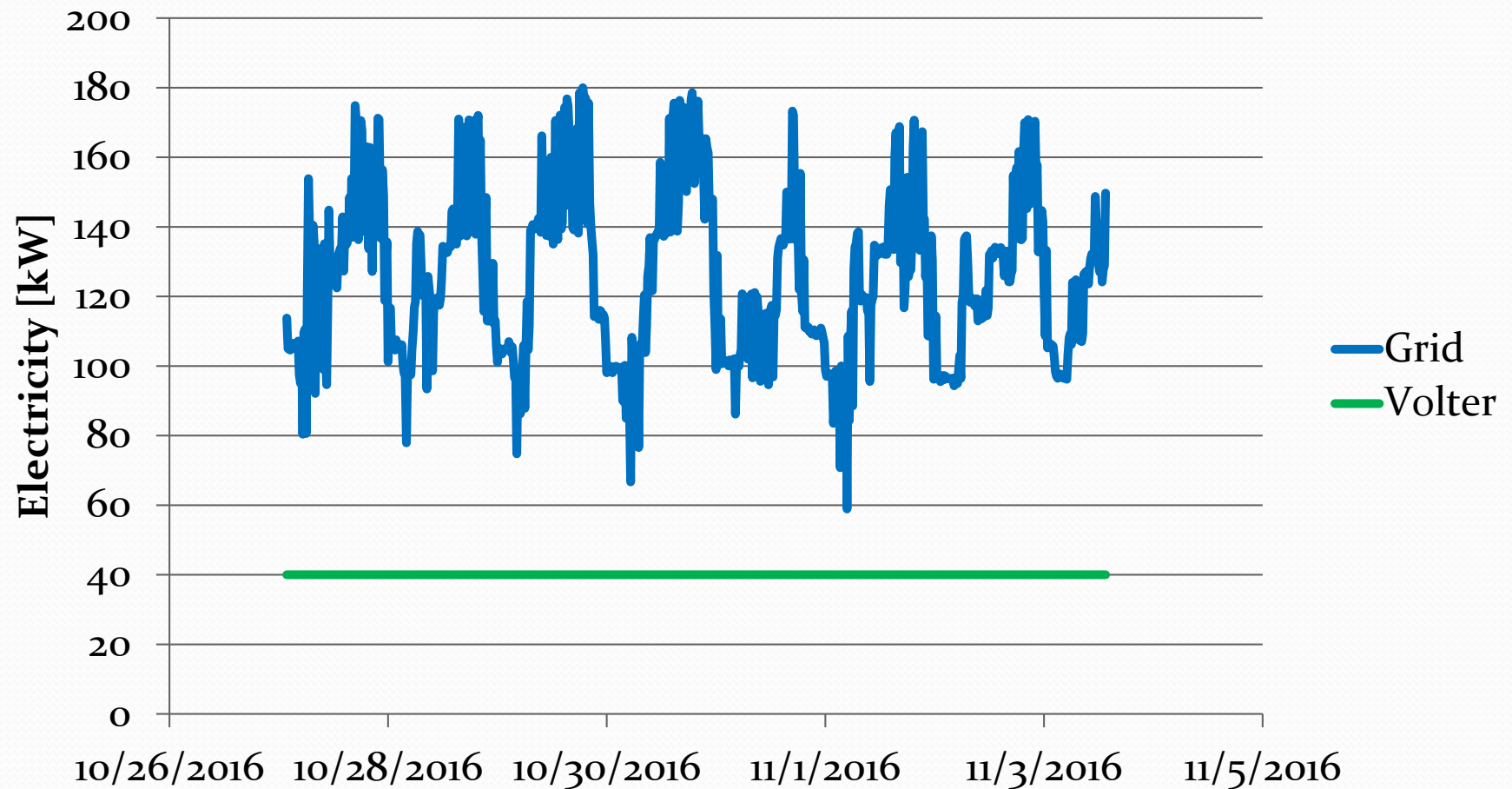


Proposed Technology – Volter 40

- Operates on wood chips (spruce and aspen)
- 40kW Electric
- 340,000 BTU/hr Thermal
- Small-scale, packaged unit suited for both railbelt and rural installations
- Load-following, but *not* grid-forming

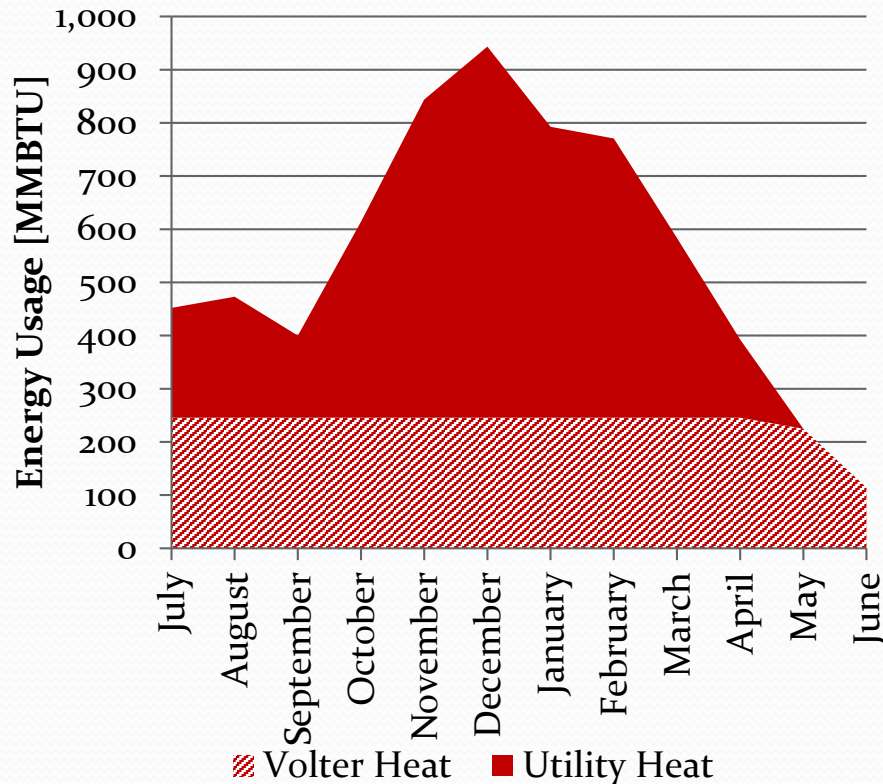


Proposed Site – Big Dipper Ice Rink

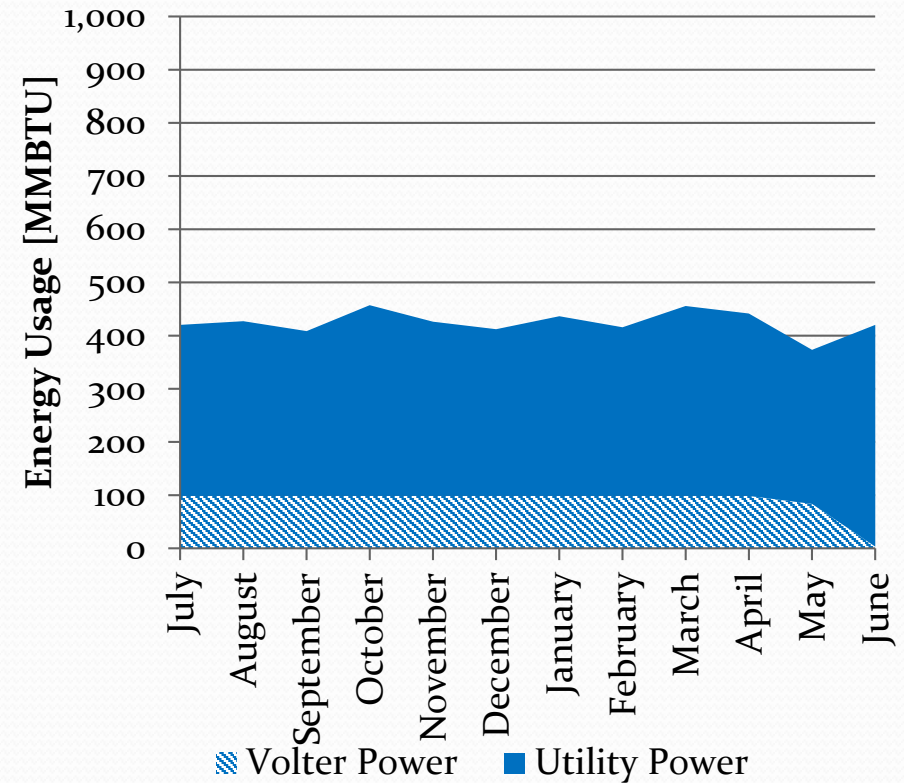


Proposed Site – Big Dipper Ice Rink

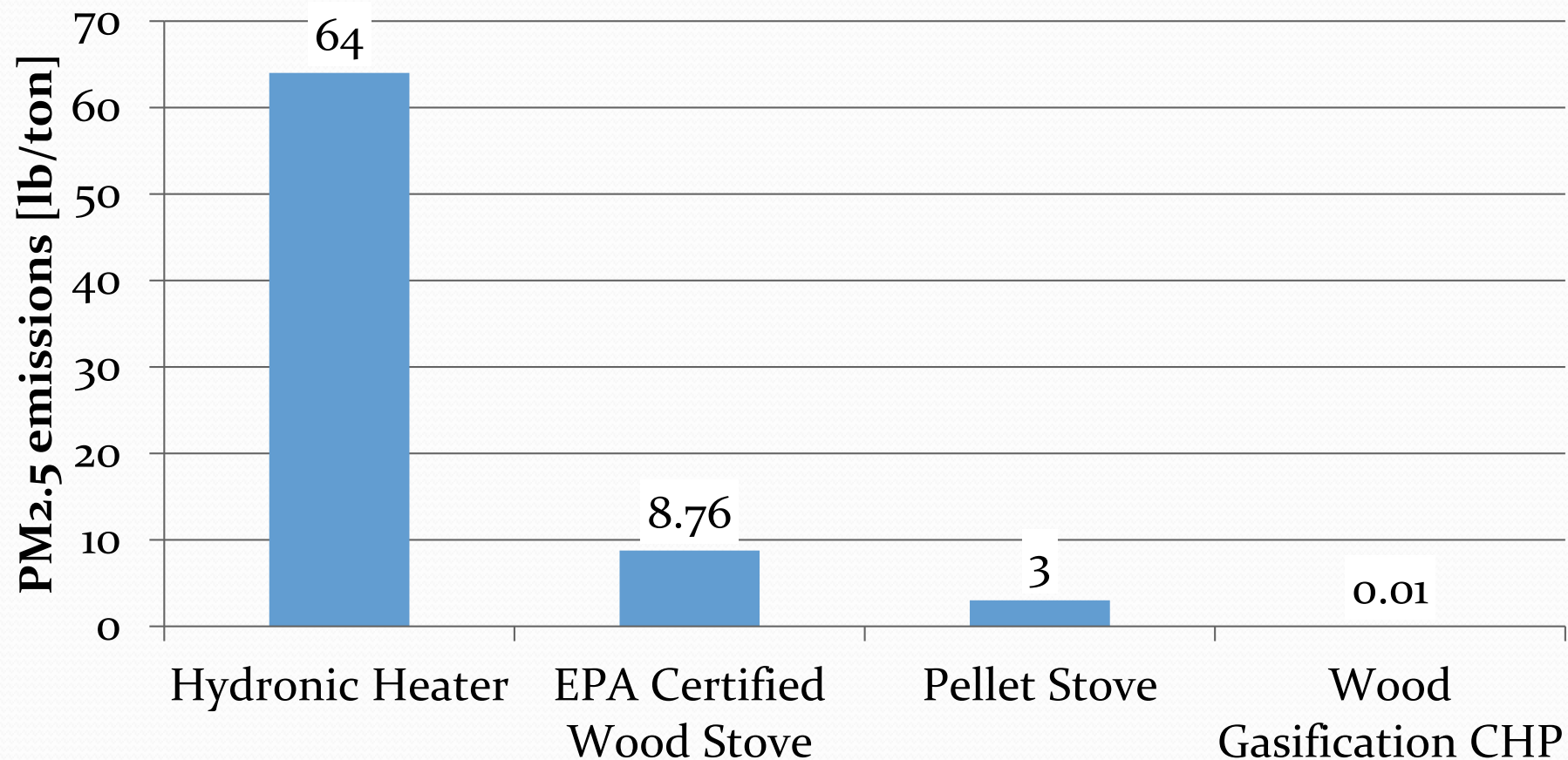
Estimated Heat Usage with Volter



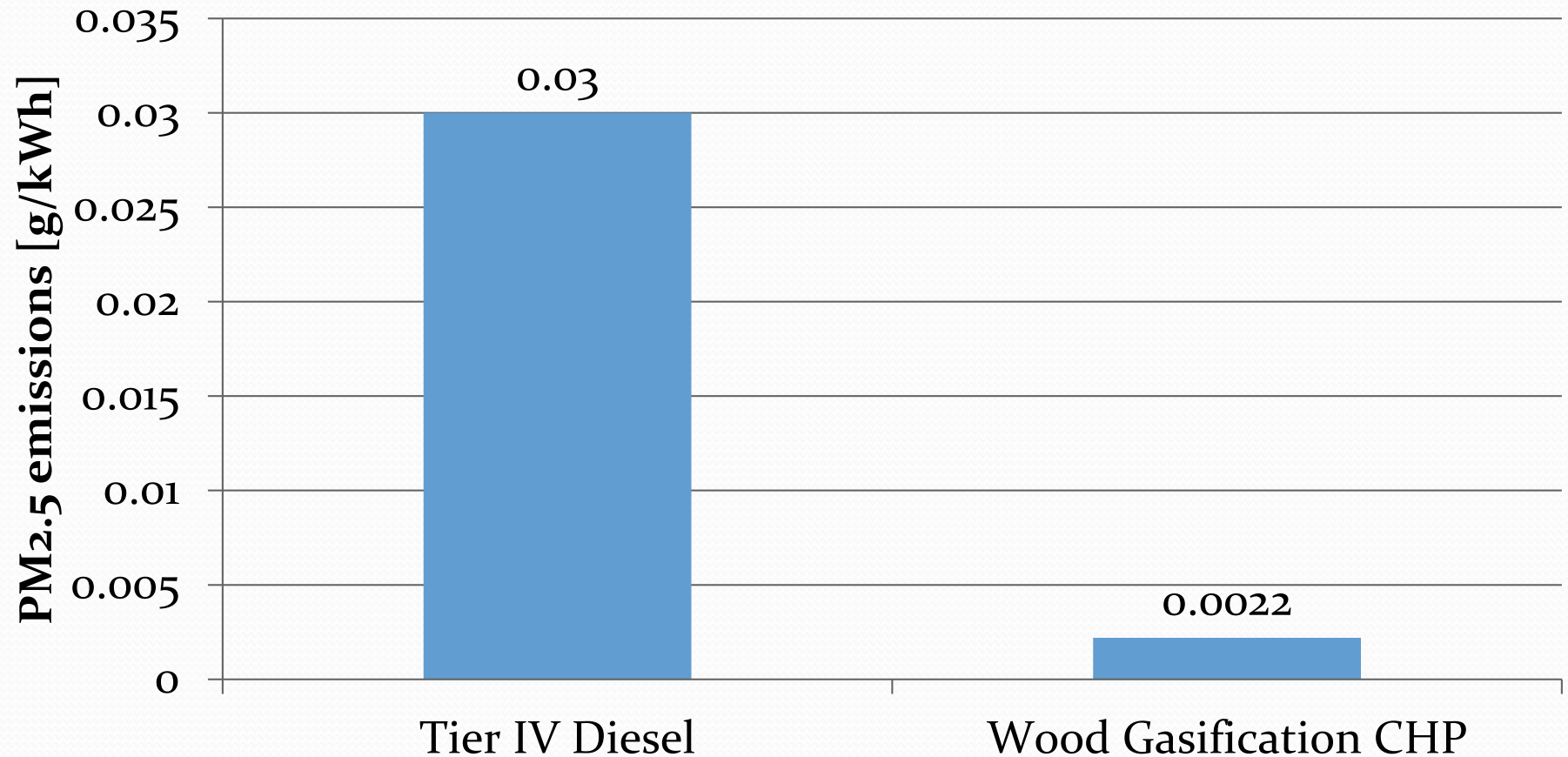
Estimated Electricity Usage with Volter



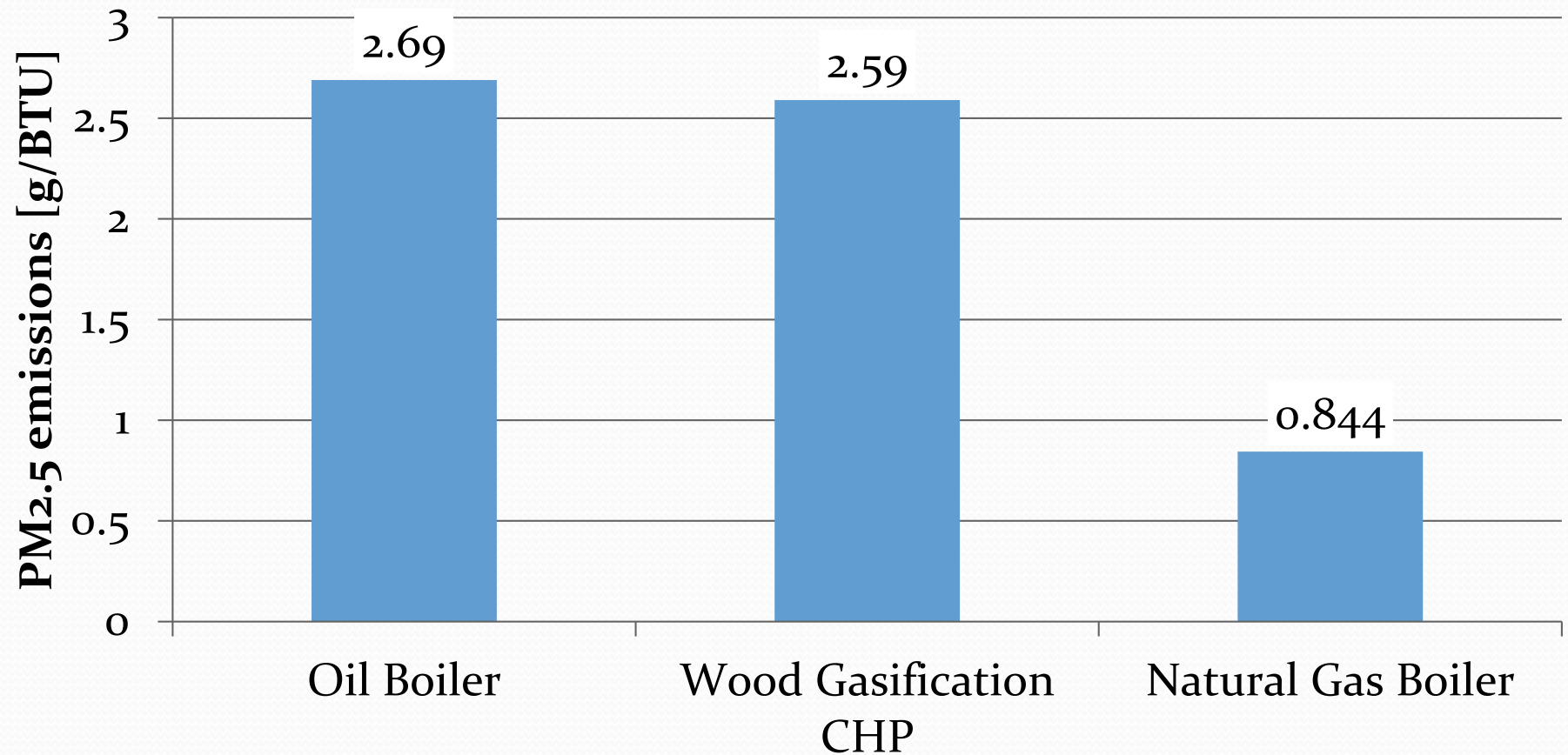
PM_{2.5} Emissions



PM_{2.5} Emissions



PM_{2.5} Emissions



Pilot Project Progress and Plan

- Funding Sources:
 - \$290,000 in EETF Grant + \$290,000 required FNSB Match = \$580,000
 - \$218,000 USFS Wood Innovations Grant award
 - \$120,000 FNSB Energy Reductions Projects Fund

Pilot Project – What Happened

- Things that we did right:
 - Identified site and technology and testing plan.
 - Funding awarded and appropriated.
 - EPA, DEC, UL, GVEA Electrical Interconnection, Customs, compliance plans.
 - Assembly approval of non-competitive procurement to meet grant scope of work.
- Project discontinued by FNSB:
 - Original Scope of Work exceeded budget, FNSB procurement standards limited ability to negotiate.
 - Equipment provider not comfortable with standard contract language.

Pilot Project – Lessons Learned

- Evaluate internal structure for suitability for research type project. Look for cost drivers.
- If partnering, carefully consider which entity can best serve as lead.
- Stress consensus on legal terms and conditions as early as possible in project.

Why a Pilot Project should still be pursued

- Alaska energy costs are high
- Biomass is plentiful and sustainable
- New technology to produce commercial scale electricity from wood
- Reduced costs to building operators
- Commercial economic activity
- Reduce impact of biomass energy on air quality

Questions?

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