

Sustainable Energy Opportunities

Best Practices for Alaska Tribes

Background

- Overwhelming dependence on diesel for energy in rural Alaska
- Motivations for change
 - Skyrocketing fuel prices
 - Energy independence
 - Reduced environmental impacts



Objective

- Provide a starting point for communities looking to develop new energy sources
 - Technical assistance
 - Planning information
 - Funding resources
- Make planning of renewable energy projects more accessible



What Does This Guide Cover?

Layout

- Organized according to project/technology type
- Provide contact information resources for further research
- Short descriptions of regional appropriateness
- Ends with funding resource suggestions

Subject Areas

- Efficiency
- Biomass and Waste-to-Energy
- Wind
- Solar
- Geothermal
- Hydrokinetic



Energy Efficiency

The easiest way to save

Efficiency: Housing

- CCHRC high efficiency homes
- Weatherization
 - RurAL CAP
 - Department of Energy
 - Local housing authorities
- Efficient habits and easy fixes
 - VISTA Program
 - Energy Wise
 - Efficient lighting

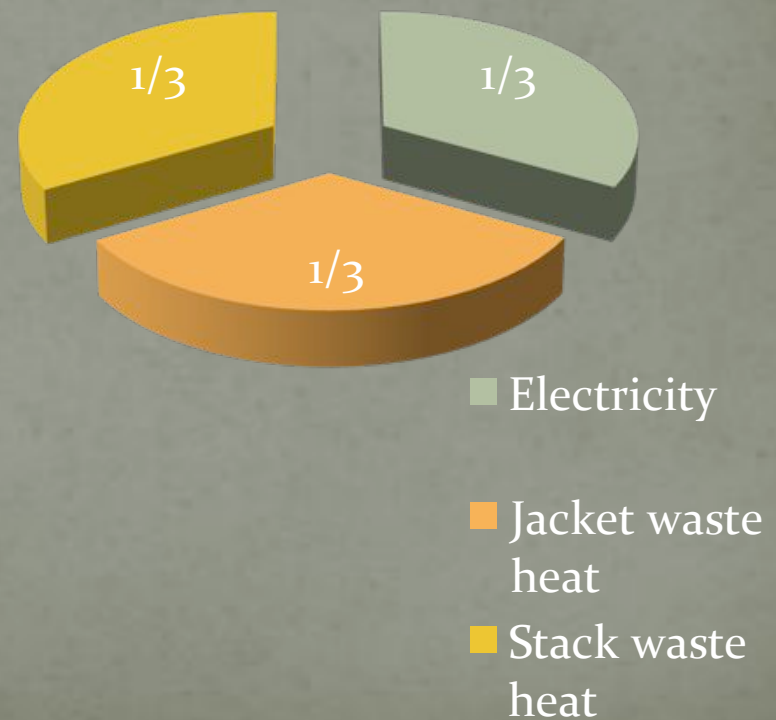


Insulation for Anaktuvuk Pass store (above). LED tube lighting (left).

Efficiency: Waste Heat Capture

- Get the most out of every gallon of fuel
- A majority of energy escapes diesel systems as heat
- Goal: capture as much otherwise wasted heat as possible
 - Jacket water system
 - Exhaust heat collection
- Works like the radiator on a car
- Kotzebue as well as a number of smaller villages assisted by ANTHC

Energy from Diesel Generation



Biomass and Waste-to-Energy

Burning local resources for energy

Wood Biomass

Chip Burners

- Waste chips



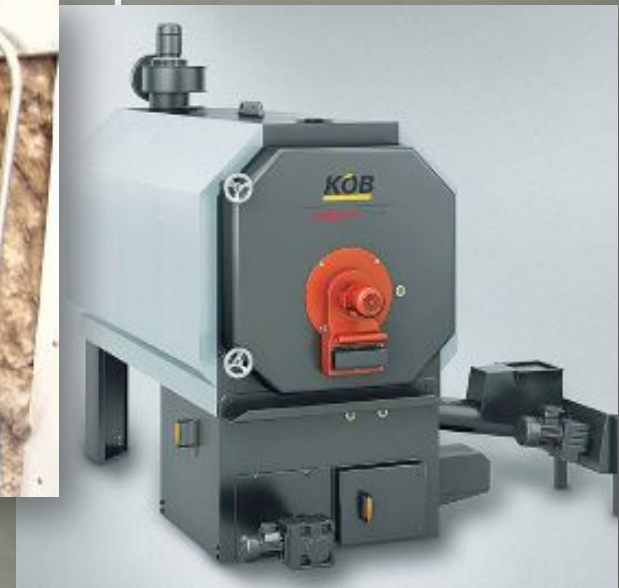
Cordwood

- Energy from burning logs



Pellet Furnaces

- Manufactured wood waste pellets



Waste-to-Energy

Plasma Gasification

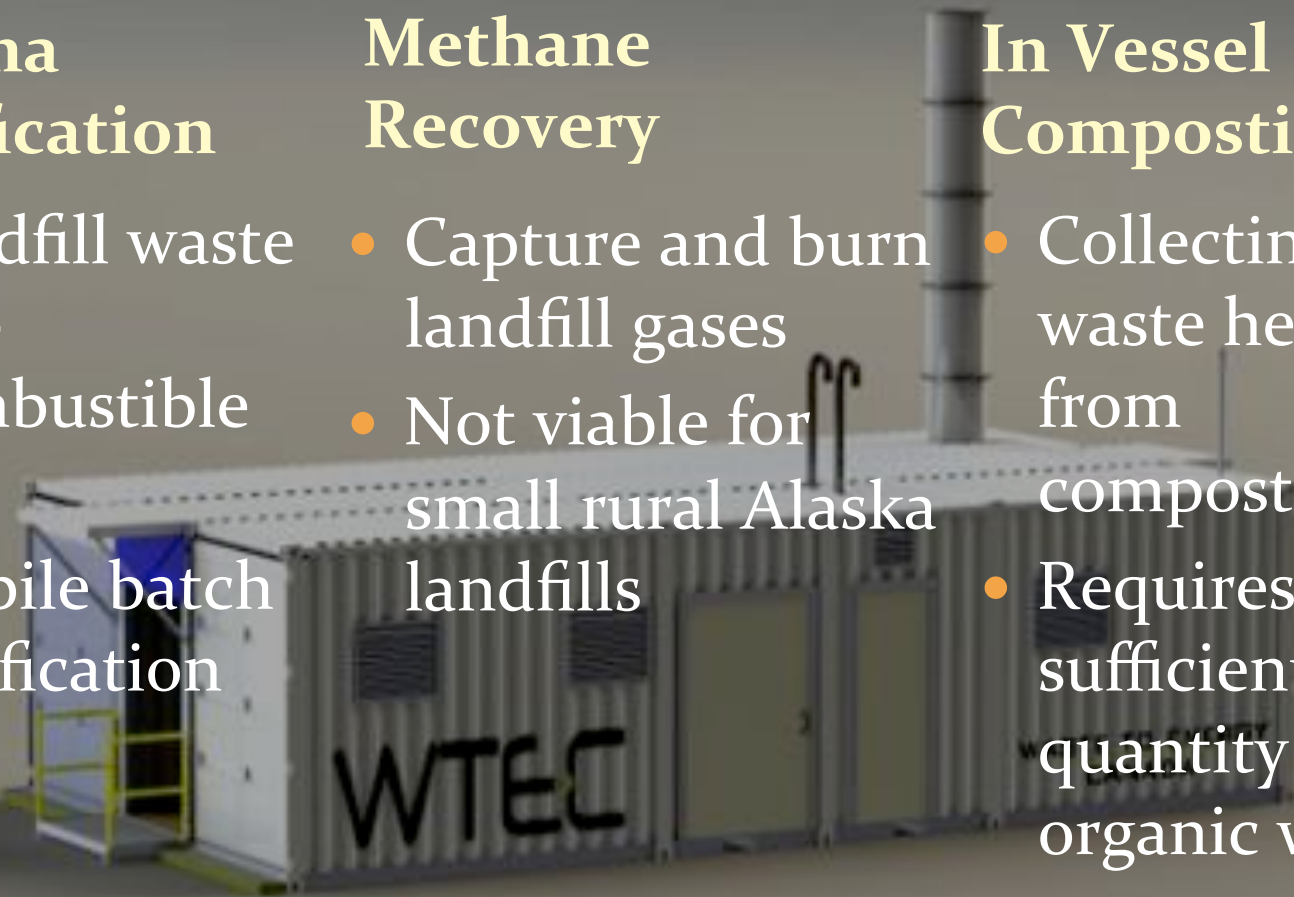
- Landfill waste into combustible gas
- Mobile batch gasification

Methane Recovery

- Capture and burn landfill gases
- Not viable for small rural Alaska landfills

In Vessel Composting

- Collecting waste heat from composting
- Requires sufficient quantity of organic waste



WTEC mobile gasification system

A photograph of three white wind turbines standing in a flat, snow-covered landscape under a clear blue sky. The turbines are of varying heights and are positioned at different angles. The image is framed by a dark green border with a torn paper effect.

Wind Energy

Turning wind into electricity

Wind Background

- One of the oldest renewable energy sources
- High potential along coastal Alaska
- Complications:
 - Energy production variability
- Wind-diesel hybrid systems



Unalakleet wind turbines

Wind Implementation

- Alaska Village Electric Cooperative (AVEC)
 - Leader in installed wind capacity
- Siting and Technical training
 - AEA Anemometer loan program
 - Wind energy training courses





Solar Energy

Making the most of the midnight sun

Types of Solar Energy

- Photovoltaic (PV)
 - Making electricity from the sun's rays
- Solar Thermal
 - The solar version of a waste heat collection system
- Passive Solar
 - Building designs for solar heat use



Solar thermal panels in
Nenana



Geothermal Energy

Energy from the Earth's interior

Types of Geothermal

Geothermal Electricity

- Requires volcanic “hot spots”
 - Much more geographically limited
- Chena Hot Springs generator

Ground Source Heat Pumps (GSHP)

- Use ground as a heat source and sink
- Use a fluid medium to absorb and transport heat to and from ground
 - Combination solar thermal and GSHP (Canada)
- Provides otherwise free space heating
- Juneau Airport



Hydrokinetic Energy

Energy from moving water

Types of Hydrokinetic

In-Stream/Tidal/Wave

- All in early developing stages
 - Will be viable energy source in 10-15 years
- All are self-contained systems that will require little surrounding infrastructure development
- Various studies: Yukon and Kuskokwim Rivers and St. George Island



Prototype in-stream turbine installed in Yukon River.

Another Option for Hydrokinetic

Run-of-the-River Hydro

- Older hydrokinetic technology
- Requires more infrastructure investment
- Involves diverting stream flow through a man-made channel and through a turbine



Falls Creek hydrokinetic project in Gustavus, AK.

Questions?