



Alaska Village Initiatives

*A Vision for An Integrated Biomass
Energy Program for Rural Alaska*

McGrath Breakfast Club Meeting

Tuesday, July 24, 2007

Develop a Wood Energy Program that Works in Rural Alaska

--Creating a new sustainable industry--

- Stabilize energy costs
- Create sustainable jobs
- Benefit to local economy
- Management of local private lands and resources
- Enhance subsistence resources (moose)

Key Features

1. The wood energy program must be ecologically, socially, and economically sustainable.
2. Local investment, involvement and commitment is required in order to proceed.
3. Fuel wood demand must be developed simultaneously with a reliable fuel wood supply and distribution system.
4. Solutions need to address household, village, and regional challenges.
5. Integration with wildlife and land management efforts produces other benefits.

Programmatic Approach

- Identify existing barriers to biomass utilization in rural Alaska
 - Technical
 - Economic
 - Cultural/social
 - Grass roots need connected with agency resources
- Create business model that overcomes barriers
- Establish program template that can be used in other areas of rural Alaska

Wood Energy Solutions on a Village/Regional Basis

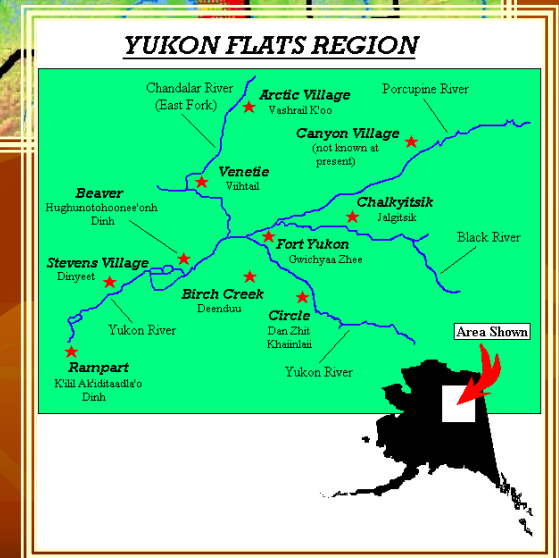
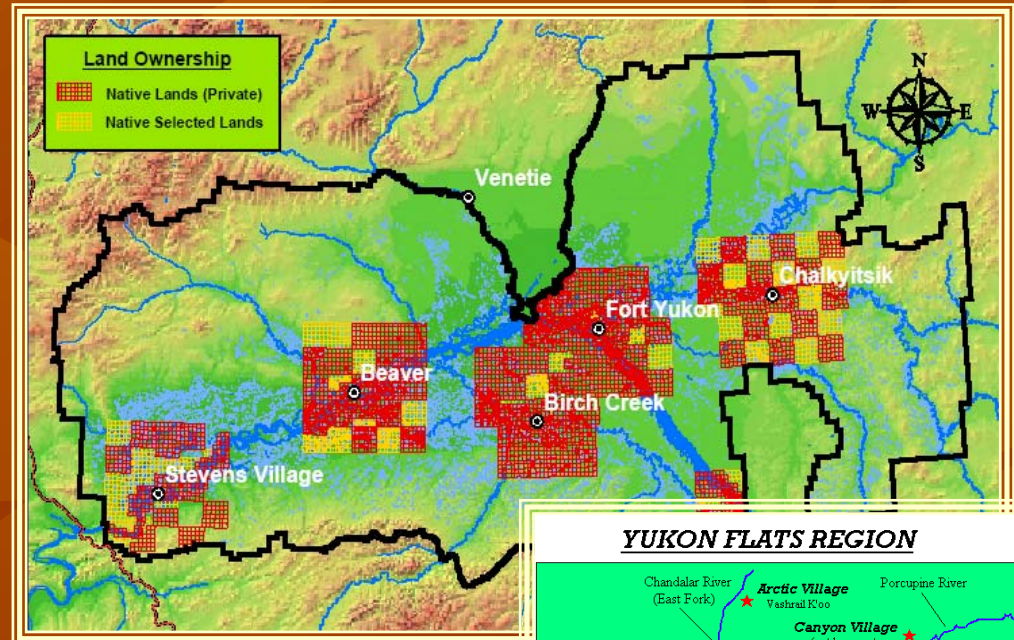
- Wood use for energy becomes most economically efficient for a community when both heat and electrical power can be produced due to economies of scale issues.
- Regional utilization plan will bring added economies of scale for harvesting and lower wood production costs.
- Energy conservation measures must be employed simultaneously with displacement of diesel fuel use.

Supply/Demand for Wood Developed Simultaneously

- No commercial supply or demand for wood fuels currently exist in rural Alaskan villages.
- The high cost of wood burning equipment discourages investment in these types of installations.
- Investment in wood burning hardware can only happen if a reliable supply of wood fuel is available at a reasonable cost.
- Conversely, the investment in wood production will not happen until a market for wood fuel is established.

Regional Supply Plan

- Harvest assumed to come from private native lands
- Summer and winter harvest is possible, but will begin with summer operations first.
- Employ known silvicultural practices for interior AK



Economic Sustainability

For Profit Model

- Long term (~10 yrs) wood fuel commitments for power companies, schools, federal, and commercial buildings.
- Professionally operated harvest program insures reliable fuel wood supply.
- Establish locally owned and operated fuel wood distribution business.
- Wood harvest and distribution activities produce economic development in financially depressed communities.

Business Model Development & Demonstration

- Design wood harvest systems
- Refine production cost model as better information becomes available
- Facilitate installation of wood burning equipment
- Develop harvesting company
- Develop local distribution company
- Village engagement & capacity building



Forest and land management plan



Contractual agreements with timber owners



Contractual agreement with distribution companies



Village Wood Distribution Company



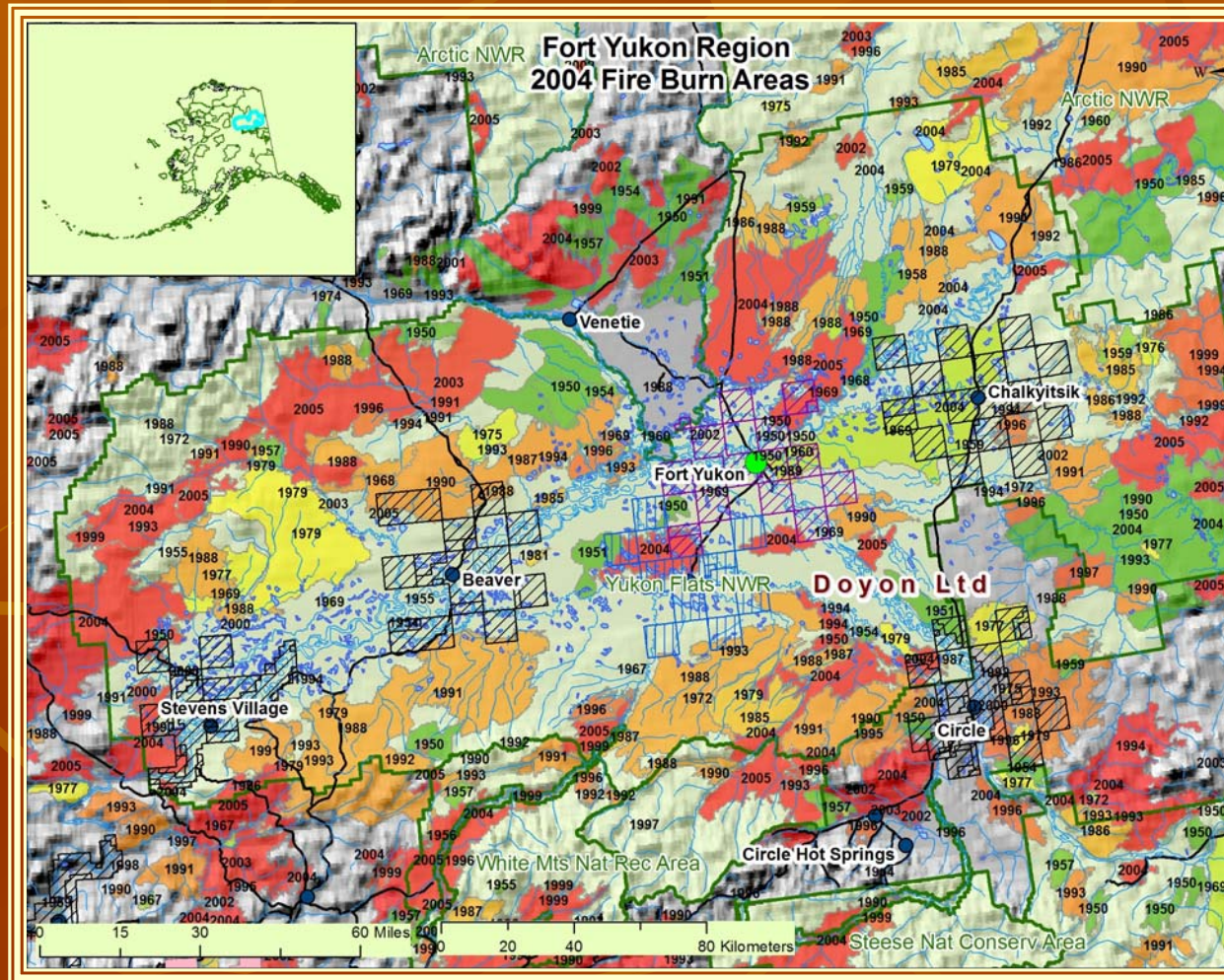
Contractual agreements with wood consumers



Wood consumed for energy for heat and power generation

Fire Driven Ecosystem

12MM acres statewide in 2003-2005



Fires 1950-2004

Biological Sustainability

- **Forest Stewardship**
 - Determine harvest sites
 - Grow as much wood as is consumed
 - Protect forest values--community identifies
 - Wildlife habitat enhancement
 - Reforestation and silviculture strategies
 - Fire mitigation - fuels reduction



2005 Burn-Porcupine River

Wildlife and Land Management

- Integration of wildlife population and habitat management to improve subsistence resources.
- Increase habitat quality for moose



Social Sustainability

- Ensure culturally correct utilization of local resources
- Mentoring for enhanced tribal and corporate business capacity
- Technical training for forestry and wildlife technicians
- Technical training for harvesting operations
- Technical training for sawmill and/or wood distribution operators
- Technical training for power plant and wood boiler operators

Community Involvement

- Community must understand program and embrace it fully.
- Local communication is critical



**Rural
Economic
Development**

**Energy
Cost
Reduction**

**Community
Biomass
Utilization
Program**

**Environmental
Improvement**

**Habitat
Enhancement**

**Wildfire
Mitigation**

Draft Regional Heat Analysis

Regional Heating Analysis @ \$4.10 per gal.

Village Wood Heating based on Houses, District Heat, Major Buildings	Equipment and Installation Costs	Annual Fuel Oil Consumption (gal)	Fuel Cost \$/Gallon	Annual Fuel Cost	Annual Cord Wood Use Equivalent @70% Displacement	Cord Wood Cost Delivered and Boiler Fed	Total Annual Wood Costs	Total Annual Savings	Annual Savings as % Capital Cost
7 Schools	\$560,000	140000	\$4.10	\$574,000	1000.00	\$164	\$164,000	\$237,800	42%
14 District System	\$1,200,000	134000	\$4.10	\$549,400	957.14	\$164	\$156,971	\$227,609	19%
147 Houses	\$176,400	117600	\$4.10	\$482,160	840.00	\$164	\$137,760	\$199,752	113%
Washateria & water	\$320,000	32000	\$4.10	\$131,200	228.57	\$164	\$37,486	\$54,354	17%
Total	\$2,256,400	423600	\$4.10	\$1,736,760	3025.71		\$496,217	\$719,515	32%

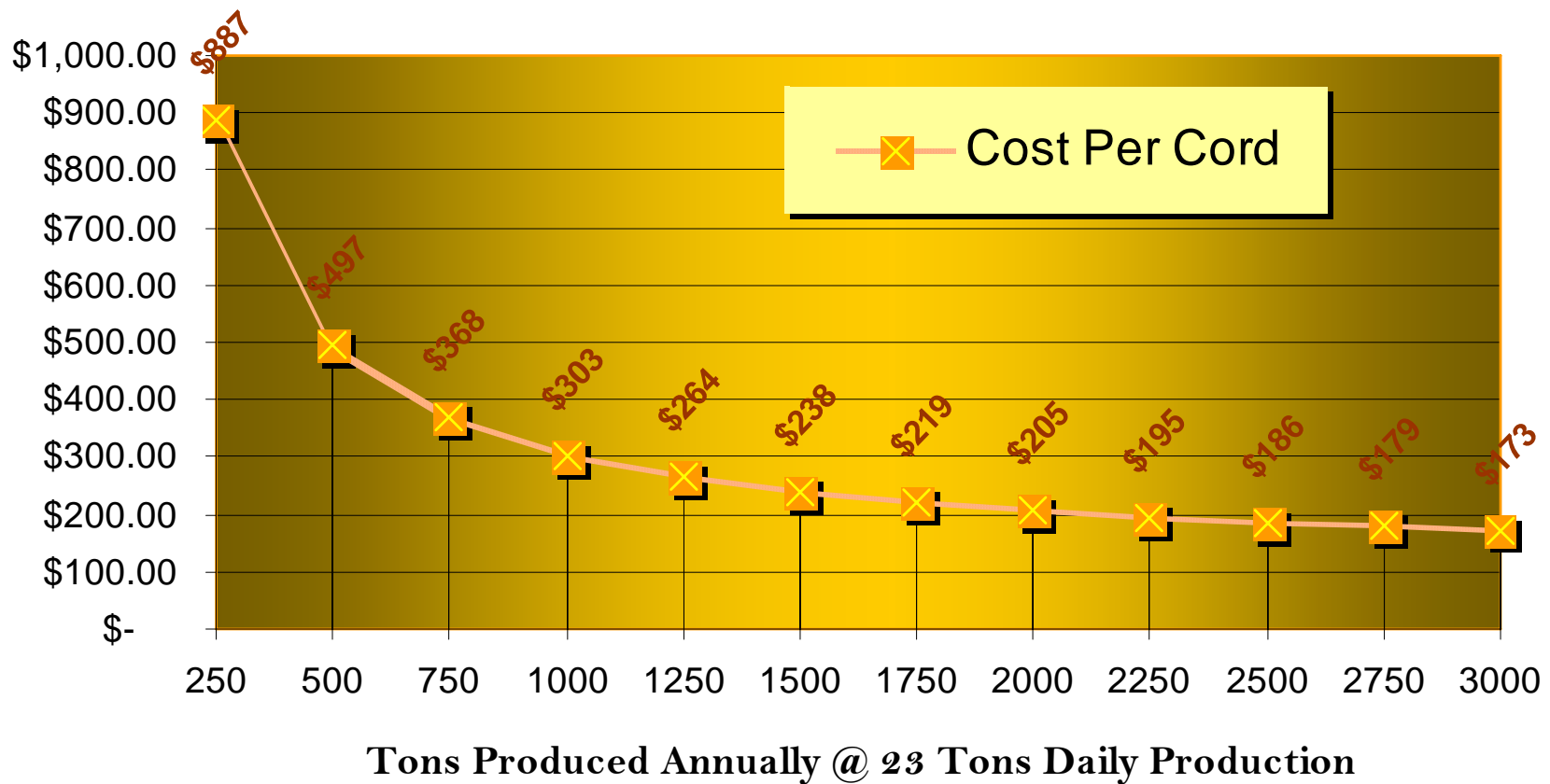
Regional Heating Analysis @ \$5.00 per gal.

Village Wood Heating based on Houses, District Heat, Major Buildings	Equipment and Installation Costs	Annual Fuel Oil Consumption (gal)	Fuel Cost \$/Gallon	Annual Fuel Cost	Annual Cord Wood Use Equivalent @70% Displacement	Cord Wood Cost Delivered and Boiler Fed	Total Annual Wood Costs	Total Annual Savings	Annual Savings as % Capital Cost
7 Schools	\$560,000	140000	\$5.00	\$700,000	1000.00	\$164	\$164,000	\$326,000	58%
14 District System	\$1,200,000	134000	\$5.00	\$670,000	957.14	\$164	\$156,971	\$312,029	26%
147 Houses	\$176,400	117600	\$5.00	\$588,000	840.00	\$164	\$137,760	\$273,840	155%
Washateria & water	\$320,000	32000	\$5.00	\$160,000	228.57	\$164	\$37,486	\$74,514	23%
Total	\$2,256,400	423600	\$5.00	\$2,118,000	3025.71		\$496,217	\$986,383	44%

Economies of Scale

Annual Production Influence on Cost

Annual Cordwood Production Effect on Cost



Yukon Flats Annual Consumption

- We estimate that the Yukon Flats Region will require more than 10,000 tons of wood annually to fuel their heat and electrical power consumption



Acreage Harvested

- 10,000 tons / year
- 18 tons/acre
- 60 year rotation
- 555 acres / year
- 33,300 acres / rotation
- Moose habitat for 20 years
- Historical wildfire events have burned several times this amount in a single year

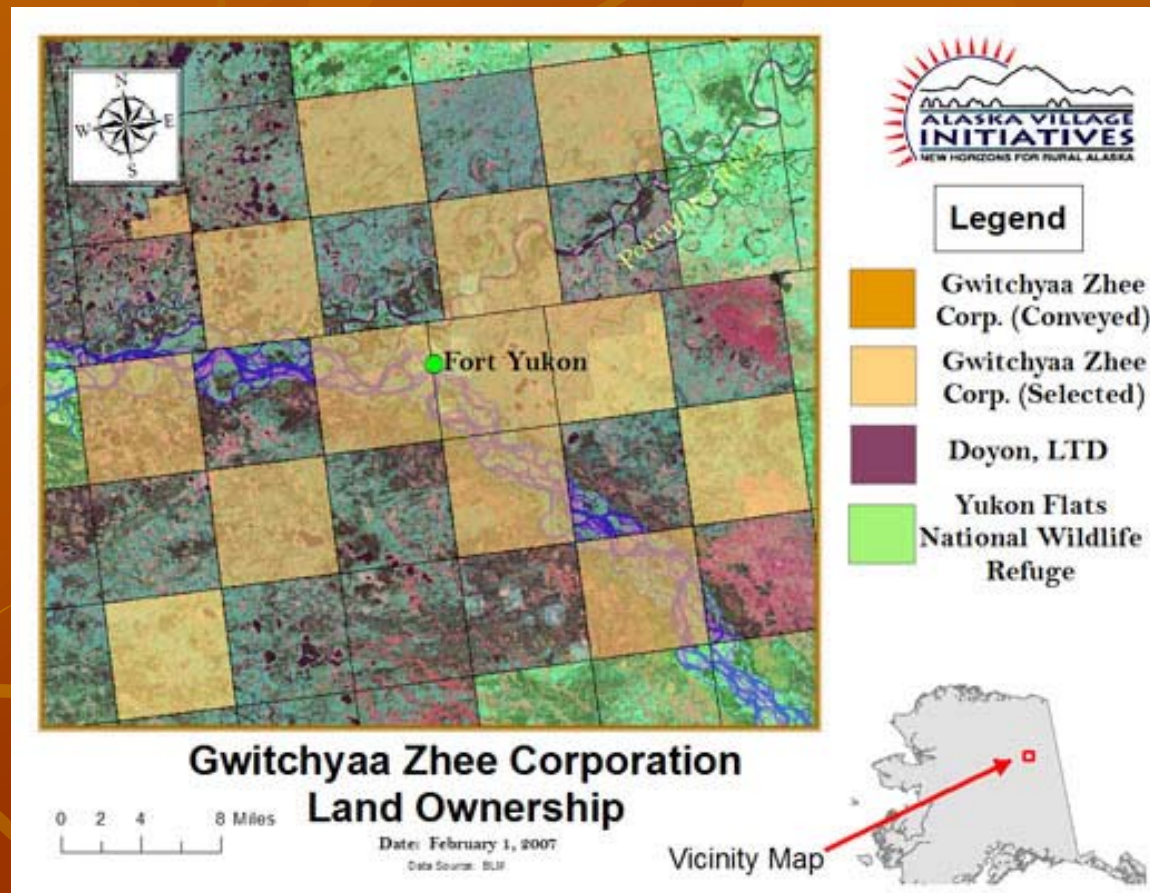


Harvest System Capital Costs

- A complete harvest system capable of producing 10,000 or more tons of woody biomass annually will cost approximately \$835,000



Harvest Implementation



- Harvesting activities will occur along carefully selected locations with river access

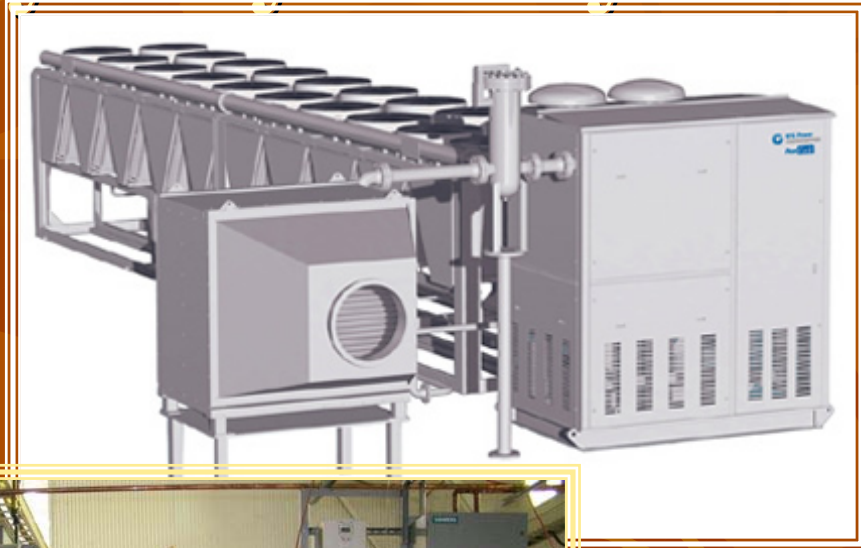
What Works Today Heat Production



What works Tomorrow Heat to Electricity – Hybrid Systems



1.5 MW



200KW



200KW

Charting the Course-Wood Use

- Community and Regional Energy Consumption
- Start with simple heating systems
 - -Garn boilers and wood stoves-collaborate with Alaska Wood Energy Group - AEA
- More complex chip systems for larger buildings-schools, commercial buildings, Gov't buildings
- Ultimately electrical power generation

Charting the Course- Beginning Wood Production in Fort Yukon

- Purchase harvest equipment and mobilize in 2008
- Field trials and train operators
- Produce ~600 cords of firewood for fueling wood boilers-Fort Yukon
- Increase production as demand increases
- Produce 10,000 tons or more biomass annually

Partners

- Denali Commission
- Economic Development Administration
- CATG & Gwitchyaa Zhee Native Corporation
- Alaska Energy Authority
- USDA: NRCS and Rural Development
- State and Private Forestry - USFS
- Division of Forestry – DNR
- Alaska Wood Energy Development Task Group
- Nat'l Renewable Energy Lab