Gwitchyaa Zhee Corporation

CATG – AWEA

A Collaborative Integrated Wood Energy Program for Fort Yukon

Implementation

DOE Tribal Energy Program

2 0 November 2008

For-Profit Wood Energy Business Model Fort Yukon

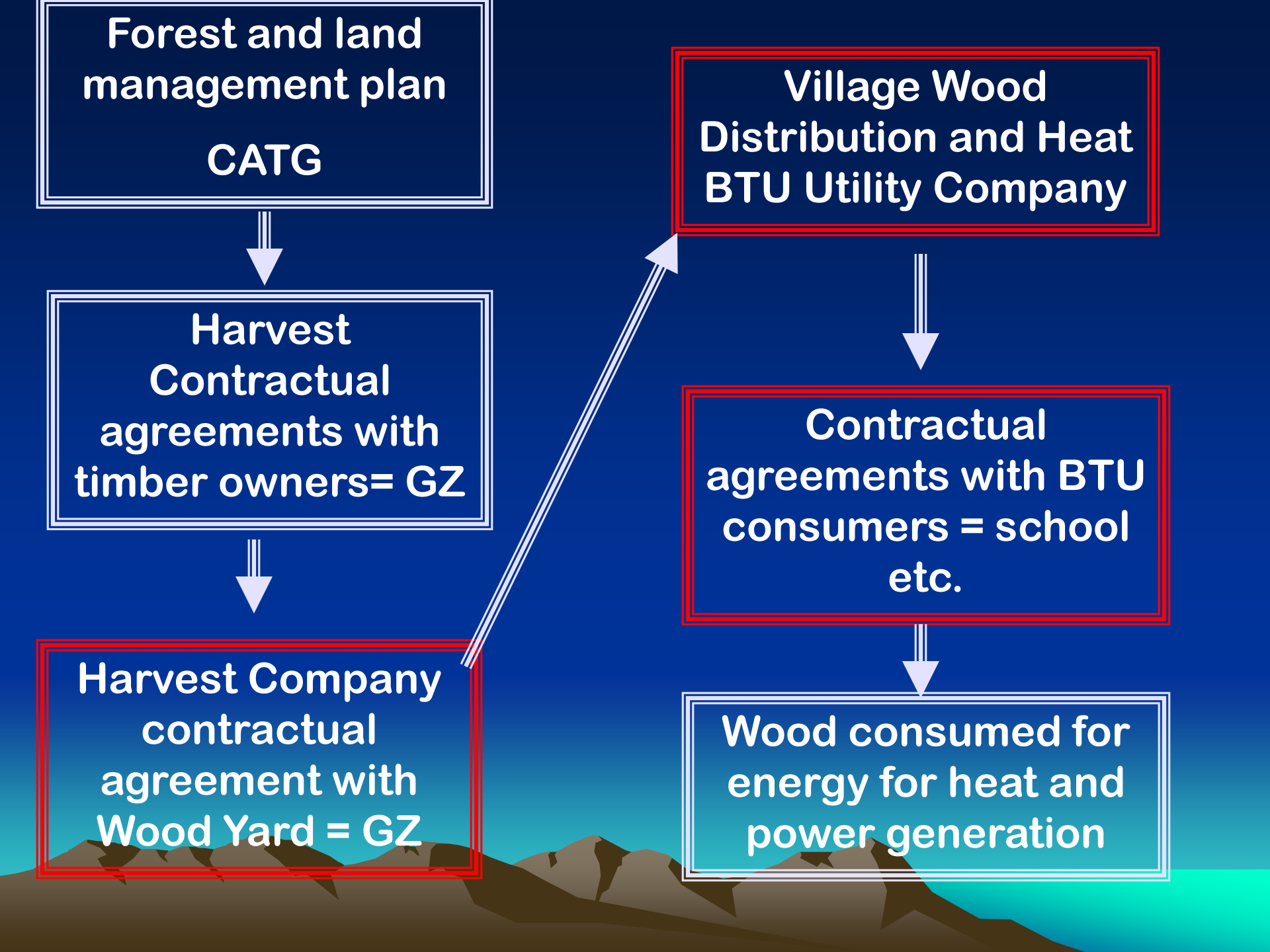
- Forest Management Service – CATG
- For-Profit Wood Utility Company – Vertically Integrated
- Gwitchyaa Zhee Native Corporation
  - Wood Harvest Company
  - Village Wood Yard/Distribution Company
  - Wood Energy Utility – Diesel Biomass
  - Wood diesel hybrid power plant CHP – still dreaming for 200-700 Kwh technology

Wood Harvest Company

- Harvests wood from GZ lands summer and winter – start with recent fires
- Delivers to Village Wood Yard
- Paid upon delivery of wood by weight and dryness formula
- Requires harvest equipment with capacity for 5-7,000 tons production per year sticks and chips

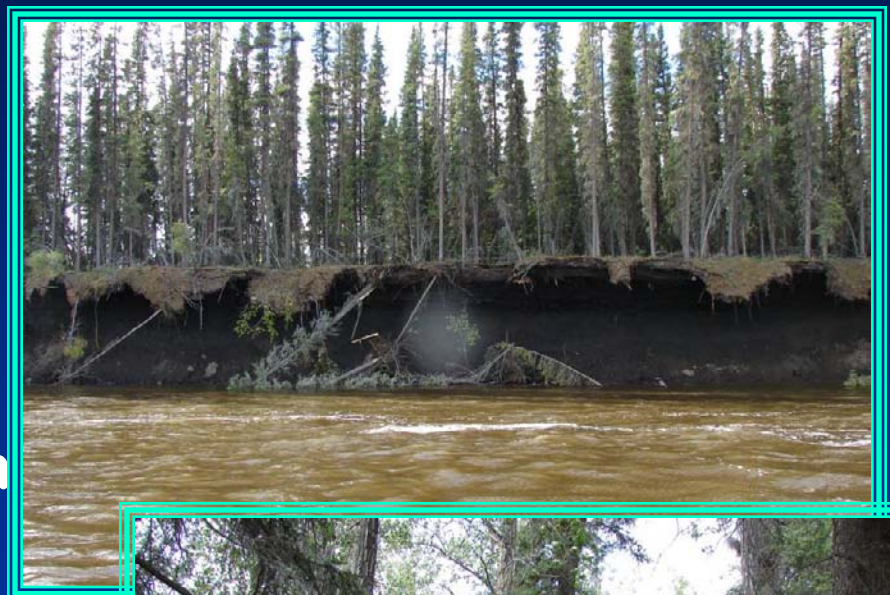
Village Wood Yard/Distribution Company

- 2-3 acre wood yard - capacity to deliver split fire wood, boiler round wood, wood chips for chip boilers;
- Small sawmill for production of dimension lumber for village use;
- Commercial buildings do not want to own or operate boilers;
- GZ owns heat boilers and sells BTUs of heat and is responsible for feeding boiler


Forest and land management plan
CATG
Harvest Contractual agreements with timber owners= GZ
Harvest Company contractual agreement with Wood Yard = GZ
Village Wood Distribution and Heat BTU Utility Company
Contractual agreements with BTU consumers = school etc.
Wood consumed for energy for heat and power generation

Acreage Harvested for Heating

- 3,000 tons / year heat
- 18 tons/acre
- 60 year rotation
- 167 acres / year
- 10,020 acres / rotation
- Moose habitat for 20 years
- Historical wildfire events have burned 80,000 acres in one month



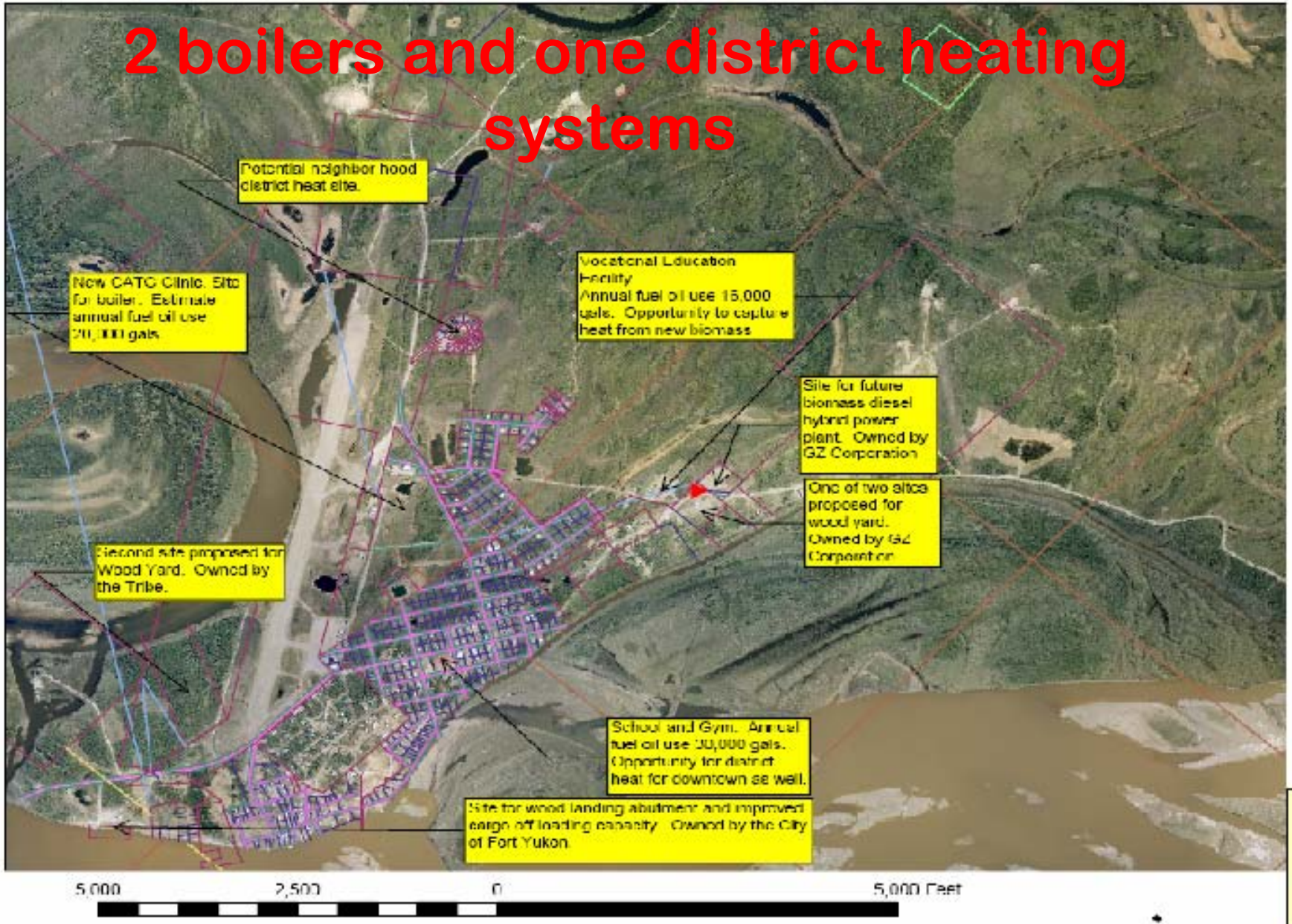
Yukon Flats Villages Annual Consumption

- We estimate that the Yukon Flats Region will require more than 6,000 tons of wood annually to fuel their heat and electrical power consumption

Three concurrent projects

- Boiler installation and operation
  - 2 boilers 2009 one at clinic and one at Voc ed
  - District heating system downtown 9 buildings 2010.
- Wood harvest system equipment purchase and operations/training 2009
- NRCS fire rehabilitation contract $450,000
- Capacity development:
  - 5 year harvest plan
  - Equipment and harvest system integration = harvesting wood to chips to feeing boilers
  - Boiler operations
  - Annual harvest operations plans and implementation
  - Community communications and coordination's across organizations

2 boilers and one district heating systems



Equipment Wish List

Biomass Harvest Start Up Equipment

WOOD HARVEST EQUIPMENT TO BE PURCHASED

Fecon FTX100L			$115,000
Kubota KX080 Excavator			$84,000
Kesla Processor head			$39,000
Vermeer BC 1400TX Chipper			$85,000
Kubota M125X Tractor w/loader			$57,000
Fecon/Kubota Attachments	Bucket		$2,500
	Tree Shear		$12,000
	Brush Rake		$3,800
	Rear Fecon Grapple		$5,800
	Excavator log grapple		$4,500
	Backhoe		$7,000
	Guarding for Excavator		$12,000
Aluminum Chip Bin			$12,000
Kelsa Forwarder Trailer with loader			$55,000
20 foot skiff			$30,000
Firewood Processor (Blockbuster model 1820)			$34,000
Firewood Elevator			$7,500
Sawmill			$75,000
Freight			$45,000
Total Equipment Cost			$686,100

Harvest System Development

- A complete harvest system capable of producing 6-8,000 tons of woody biomass annually will cost approximately $650,000

Ground Harvest Systems

- **Small scale harvest systems with proven reliability will be employed**

Fort Yukon Power Barge

Harvest Production Model

Cost and Revenue Data

In Tons and Cordwood Units

Cordwood Production Cost Summary

Species	Annual Tons Produced	# Cords (8' logs)	Logging Cost/Ton	Harvest Days Required	$/Cord Short Logs	Total Annual Harvest Cost	Annual Markup
Spruce	2,000	1,657	$ 128.39	89	$ 154.97	$ 256,782.72	$ 64,195.68

Cordwood Energy Value

Species	BTU/ Cord	BTU/Gal-Diesel	Gal Diesel/ Cord	Diesel $/Gallon	Diesel $ Value /Cord	Mark Up (25%)	Distributor Costs	Delivered Cost/Cord	De Co
Spruce	15,900,000	138,000	115.22	$ 3.50	$ 403.26	$ 154.97	$ -	$ 154.97	$

Annual Savings From Cordwood

Species	Annual Cords Consumed	Annual Cost Cordwood	Efficiency Loss Wood Boiler	Gals Diesel Displaced	Value-Diesel Displaced	Annual Savings
Spruce	1,657	$ 256,783	25%	143,186	$ 501,153	$ 244,370

Biomass Acreage Requirements

Tons/Acre	Tons Required Annually	Acres Required Annually	Rotation Age Assumption	Total Sustained Acres Required
15	2000	133	60	8,000

Biomass Harvest Assumptions

Annual Harvest-Acres	Pieces Per Acre	Acres/Day Harvested	Pieces/Day Harvested	Tons/Day Harvested	Total Harvesting Days/Year	Cords/Day Harvested
133	500	1.5	750	23	89	19

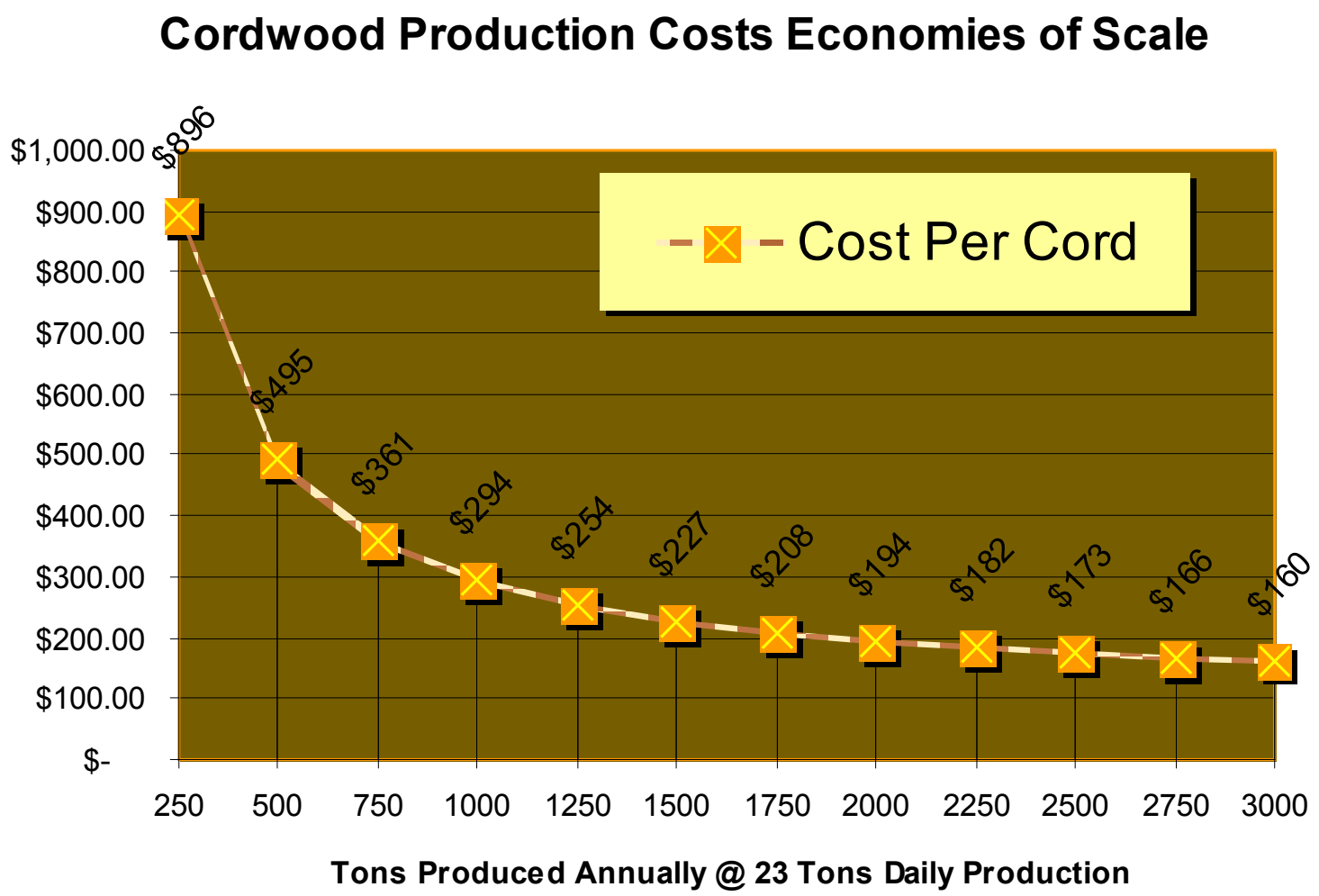
Biomass Harvest Costs Work-up

Annual Equipment Lease Payments	Annual Maintenance/ Repair Costs	Annual Fuel Consumption (Gallons)	Fuel $/Gallon	Annual Fuel Cost	Annual Insurance Cost	Total Annual Equipment Costs
$ 132,000	$ 3,000	4,750	$ 3.55	$ 16,863	$ 25,500.00	$ 182,116.05

Man-hrs Per Day	$/Man-hr (All Inclusive)	Labor Cost Per Day	Labor Cost Per Acre	Labor Cost Per Ton	Machine Cost Per Ton	Annual Payroll	Logging Cost Per Ton
24	35	840	$ 560.00	37	$ 91.06	$ 74,667	$ 128.39

Economies of Scale

Annual Production Influence on Cost



Woody Biomass Advantages

- Stabilizes village energy costs
- Energy import substitution
- Local employment
- Self-sufficiency
- Subsistence based culturally sound jobs 1@$30/hr 2@$20-25/hr 3@$15/hr

  All jobs are 6-8 months with time off for fishing hunting!!!!!
- Village sustainability

Funding Partners

- **USDA NRCS**
- **DOE Tribal Energy Program**
- **Division of Forestry – DNR**
- **Denali Commission**
- **Alaska Wood Energy Development Task Group**
- **Alaska Energy Authority**
- **USDA Rural Development**
- **State and Private Forestry – USFS**

Wolf Learns New Tricks