Fort Yukon Wood Energy Program: Wood Boiler Deployment

Department of Energy Tribal Program Review

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Department of Natural Resources

Please contact me for a full list of citations. kelda@catg.org
CATG is a consortium of 10 Gwich'in and Koyukon Athabascan tribes located throughout the Yukon Flats. Arctic Village, Beaver, Birch Creek, Canyon Village, Chalkyitsik, Circle, Fort Yukon, Rampart, Stevens Village and Venetie are the remote villages comprising CATG. The Yukon River and its tributaries, including the Porcupine, Chandalar, Birch Creek and Black Rivers, tie the people of the Yukon Flats villages together.
The Village of Fort Yukon is located 8 miles North of the Arctic Circle.

Only accessible by boat during the summer, snow machine during winter, and plane. The FYU Biomass Project will be the first off grid, off road system biomass CHP in the world.
Power Costs In Alaska Are Among The Highest The Nation

Gasoline = Ranges from $7.50- $8.50 per gallon. No 1 Diesel = $7.00 per gallon.
Average house hold cost for oil = $3,500 per year. Oil cost per year for school = $210,000
Fuel cost for electrical generation = $1.4 M Cord Wood = $275 – $300 per cord
Kwh = $0.51 (rate increase coming)
Propane = $193 per 100 lbs tank
First off grid, off road system biomass CHP in the world

New Power House (CHP) Facility construction

Wood Chip Boiler

District Heating loop providing heat to commercial buildings
  I.e. School, AC, Radio Station, Water Plant, etc.

Sustainable Forest Management program

Create a for profit in-village wood energy utility to displace diesel energy

Support training needs for field forestry technicians and supports workshops for education on key biomass issues for Fort Yukon and the Yukon Flats Villages.
Council of Athabascan Tribal Governments (CATG)
Gwitchyaa Zhee Corporation (GZ Corp)
Alaska Village Initiatives (AVI)
Department of Energy (DOE)
Denali Commission
Alaska Energy Authority (AEA)
State of Alaska Division of Forestry (DOF)
Money Talks

This Project has multiple funding source (9.8 million secured)
Planning/Trainings/Permitting (3 Million)
Final Design and Construction (6.8 million)
Construction Funding
Rural Utility Services (RUS $3.5 million)
AEA Rural Energy Fund $2.3 Million
DOE Tribal Energy Fund 990,000
The Loop
### CHP District Heating System End Users

<table>
<thead>
<tr>
<th>Building</th>
<th>Fuel Usage (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Building (Court House)</td>
<td>6,158</td>
</tr>
<tr>
<td>KZPA Radio Building</td>
<td>4,000</td>
</tr>
<tr>
<td>School</td>
<td>17,000</td>
</tr>
<tr>
<td>School Gym</td>
<td>8,000</td>
</tr>
<tr>
<td>School Shop</td>
<td>3,000</td>
</tr>
<tr>
<td>School Administration Building</td>
<td>4,000</td>
</tr>
<tr>
<td>AC Store</td>
<td>4,000</td>
</tr>
<tr>
<td>Post Office</td>
<td>2,532</td>
</tr>
<tr>
<td>City Water Treatment Plant</td>
<td>18,000</td>
</tr>
<tr>
<td>Tribal Administration Building</td>
<td>2,000</td>
</tr>
<tr>
<td>Arctic Circle Baptist Church</td>
<td>760</td>
</tr>
<tr>
<td>Armory</td>
<td>1,000</td>
</tr>
<tr>
<td>UAF Building</td>
<td>8,073</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>78,523</strong></td>
</tr>
</tbody>
</table>

The five buildings, below, were evaluated to be served by extending the district heating system to the CATG Clinic. The total estimated fuel use of these five buildings is 19,800 gallons/year. However, based on modeling of the district heating system, it was realized that the piping heat losses and additional pumping energy to the heat these buildings is equivalent to 16,500-gallons/year of heating fuel - which is nearly equal to the total fuel use of the five buildings. To serve this heating load from the district heating system would require an additional 700-tpy of chips, of which over 300-tpy would be wasted in losses. So, rather than cut down an additional 25-acres of trees to heat the ground, a distributed chip-fed boiler will be installed at the Clinic to meet the current and future Clinic complex heating loads.

### CATG Loop District Heating System End Users

<table>
<thead>
<tr>
<th>Building</th>
<th>Fuel Usage (gal)</th>
<th>Future Use (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>City Office/Shop</td>
<td>6,000</td>
<td></td>
</tr>
<tr>
<td><strong>CATG Clinic</strong></td>
<td><strong>8,000</strong></td>
<td><strong>8,000</strong></td>
</tr>
<tr>
<td>CATG Education Building</td>
<td>1,400</td>
<td></td>
</tr>
<tr>
<td>CATG Nat. Resource Building</td>
<td>1,400</td>
<td></td>
</tr>
<tr>
<td>GZ Corporation Office</td>
<td>3,000</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19,800</strong></td>
<td></td>
</tr>
</tbody>
</table>
Proposed Timeline

- Site Development
  Summer 2014

- Clinic Distributor Chip-Fed Boiler
  Summer/Fall 2014

- CHP Plant Foundation/
  Building Construction
  Summer 2015
Forestry Technician Training

- Measure portion of Harvest Area 1 near Ylotta Slough

Involvement

- Fort Yukon tribal members and Salish Kootenai Tribal College
  - basic forest skills - DBH tree measurement, GPS, and data collection.
Why:
• Develop forest technician work force.
• Apply field data collection, and best practices
• Maintain sustainable harvest
Harvest Equipment Operator and Safety Training

November 4th – 7th: Classroom instruction, field time instruction, and FRPA training.

Selections based on:
- Previous experience
- Attentiveness
- Safety Awareness
- Work Ethic
- Comradery
- Common Sense

Overall Objectives:
- Operational Safety
- Operational efficiency
- Regulatory compliance

Gerald James pictured above (Fig 5) operating the Kubota. Pictured below (Fig 6), Cynthia James training on the New Holland.
Special thank you to all of the agency representatives who joined us in Fort Yukon!

AEA
AVI
DOF
GZ Corporation
Don Ryan
Stuart Marquardt
Shawn Champagne
Equipment Training
New Holland Tractor and Kubota

Kubota Training:
- Cutting and Loading Capabilities
- Maintenance
- Falling Debris
- Proper timber cutting layout

New Holland Training:
- Safety
- Maintenance
- Proper functions, in the woods and around other machinery and hazards.
- Proper log skidding techniques.

Fig 7: New Holland TV 6070 mounted with 3 point hitch Tractor Mounted Crane (Nokka 4472)

Fig 8: Kubota KX080-3 with Ryan’s Equipment 12” Feller Bunching Shear
Harvest Equipment Operator and Safety Training

- November 4\textsuperscript{th} – 7\textsuperscript{th}:
  - 3 days of classroom instruction, field time instruction, and FRPA training.
  - 23 people trained
- Overall objectives
  - Operational Safety
  - Operational efficiency
  - Regulatory compliance

Pictured left to right, Cynthia James and Gerald James during operator training.
Outcomes:
- Train people
- Start harvest
- Data collection
- Document the process

Activities Associated with Biomass
- Harvesting, piling, drying, transporting, and chipping
- Weather Conditions
- Harvest Sites
- Transportation
- Safety
Once a program has been established in Fort Yukon, it is the intent of CATG Natural Resource Department in collaboration with the Village Tribes, Native Corporations and Private Lands to support the installation of programs in each of the villages in the Yukon Flats Region. The model program being developed in Fort Yukon will serve as the basis for all projects in interior Alaska.
Conclusion

There is no right or wrong.

Establishing key individuals in your community.

Learn by doing—there will always be room for improvement.

“Indigenize It”
Acknowledgements

Department of Energy (DOE)
Alaska Energy Authority (AEA)
Denali Commission
Alaska Village Initiatives (AVI)
Jeff Graham Stewardship Coordinator State of Alaska Division of Forestry (DOF)
Gwitchya Zhee Corporation (GZ Corp)

We greatly appreciate contributions and partnerships from the above agencies!