FORT YUKON WOOD ENERGY PROGRAM
WOOD BOILER DEPLOYMENT

• SOW: construct a wood boiler and district heating system in Fort Yukon, AK

• Our DOE grant was initiated in 2008, to harvest willows for stand-alone boilers

• The concept to combine local resources together, our village elected to work on replacing our existing diesel generator power plant with a combined heat & power project.

• This DOE grant: Wood Boiler Deployment evolved into our CHP, the Wood Chip Boiler will heat a District Heat Loop combined with Waste Heat.
PROJECT LOCATION: FORT YUKON, ALASKA
FORT YUKON WOOD ENERGY PROGRAM
EXISTING POWER PLANT
The Yukon Flats, the interior of Alaska, Fort Yukon, is located on the Yukon River. We are just below the upper mouth of the Porcupine River.
Our project first construction set back; Porcupine River Flood - the May flood filled our only gravel quarry.

This was a crucial set back for our project as we planned the CHP Pad construction as soon as the Yukon River was navigable. Due to the large volume of water and high water table, a new gravel pit was needed; with the support of Doyon and GZU & Tribal staff, potential gravel sites were explored in the remaining May & June.

BASED ON THIS INFORMATION A PREFERRED GRAVEL SITE WAS SELECTED ADJACENT AND WEST OF THE EXISTING FLOODED PIT. A GEOTECHNICAL INVESTIGATION WAS CONDUCTED BY GOLDER AND ASSOCIATES TO ASSESS THE QUANTITY AND QUALITY OF GRAVEL AT THE SITE. THE INVESTIGATION FOUND GOOD GRAVEL AND VERIFIED THE SITE WAS NOT AFFECTED BY THE FLOODWATERS AT THE ADJACENT GRAVEL PIT.

WE WERE FINALLY ABLE TO HAUL GRAVEL IN AUGUST 2015, COMPLETE THE PHASE I OF THE CHP PAD, MID OCTOBER 2015.
August 2015

Construction Phase 1: Gravel Pad

Clearing Gravel Site, Grubbing
Clearing-Developing New Gravel Source
More site clearing
Pushing up over burden
Gravel Hauling starts...
New CHP site
End of CHP Pad Phase 1 October 2015
June 2016, as pad sat over the winter to settle, now to begin work to complete the pad construction.
Construction Phase 2: Northern Management Services, contractors, begin foundation work June 2016 as our crew worked on the district heating system.
Notice, with climate change, we now understand the need to insulate foundation work, this keeps the permafrost intact.
FOUNDATION WORK COMPLETED, NOW THE BUILDING CONSTRUCTION BEGINS:
Building Construction finished September 2016
Current SOW: electrical welding & fabrication
CHP DESIGN DRAWINGS:
District Heat System Route on East 3rd
CHP PLANT FIRE EXTINGUISHER & WARNING SIGN/PLACARD PLAN

WARNING SIGN & INFORMATION PLACARD SCHEDULE:

[Diagram of fire extinguisher and warning sign]

ISSUED FOR CONSTRUCTION JULY 2015

CHP PLANT

FIRE EXTINGUISHER, WARNING SIGN & PLACARD PLAN

NOTE: See fire suppression plans and specifications for additional planned to be provided with the suppression system.

[Handwritten notes on the diagram]
Kob Pyrot Boiler: **Benefits at a Glance**

- High efficiency with advanced combustion technology, triple-pass heat exchanger and modulating output control (turndown ratio 4:1).
- Maximum heat transfer with triple-pass heat exchanger design.
- High efficiency and ultra-low emissions with precisely controlled primary and secondary air.
- Automatic ignition device limits idling and saves fuel.
- Low maintenance with fully-automatic deashing, optional pneumatic cleaning system and flue gas deduster.
- Advanced safety equipment ensures safe and reliable operation.
- Custom design of your system by our team of experts.
CHP - COMBINED HEAT POWERHOUSE

District Heat Loop captures:
- Waste Heat from diesel generators
- Biomass boiler
CHP / BIOMASS PROGRAM BENEFITS

• Energy Cost Reduction-Displace Fossil Fuel
• Improve Environmental & Health Issues
• Habitat Enhancement
• Wildfire Mitigation
• Improves Local Economy
TO MOVE FORWARD CHP/BIOMASS PROGRAM

• Update sustainable 5-year harvest plan & support structure
• Wood harvest, transportation and delivery planning
• District heat system design includes wood delivery and storage system functions
• Harvesting permitting processes- Global warming is a concern- winter harvest
• Boiler operations functioning
• Training & capacity building functioning
• Feed the boiler
BOILER SYSTEM

• Chip Fired 1600-2000 tons per year @ $175/ton
• Displace 67,000 Gallons per year @ 7 buildings
• 14 year payback @ $4/gallon
• 6.5 year payback @ $6/gallon
ACREAGE HARVESTED FOR HEATING

• 2,000 tons / year heat
• 25 tons/acre
• 40 year rotation
• 80 acres / year
• 3200 acres / rotation
• Historical wildfire events have burned 80,000 acres in one month
• Global warming-changes 2016
  no wild fires, as a rainy season
AS BUILDING CONSTRUCTION CONTINUES, THE DISTRICT HEAT LOOP INSTALLATIONS:
STARTED LAYING PIPE FOR THE HEAT LOOP AT CITY WATERHOUSE - NOTE THE HEAT EXCHANGE PIPE. W/ GLOBAL WARMING CONCERNS WE INSTALLED THE HEAT LOOP ABOVE THE EXISTING INFRASTRUCTURE.
THE TRENCH ROUTE ON E. 3RD AVE FOR DISTRICT HEAT LOOP
WORK AT THE STATE BUILDING
YUKON FLATS SCHOOL DISTRICT MAINTENANCE BUILDING
FINAL HEAT LOOP ROUTE TO THE NEW CHP BUILDING
OCTOBER 2016 CHP INTERIOR INSTALLATIONS
Control Panel Room & Generator Room
CHP WILL BE ONLINE FEBRUARY 2017

WASTE HEAT WILL BE CIRCULATING THROUGH THE DISTRICT HEAT SYSTEM AT 25% FUEL SAVINGS UNTIL SEPTEMBER 2017, WHEN THE BIOMASS BOILER IS ON LINE.
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• AEA
• USDA RUS
• Denali Commission
• Gwitchyaa Zhee Gwich’in Tribal Government (GZGTG)