



YUKON RESEARCH CENTRE
Yukon College

Bio Mass Workshop

December 1, 2011

How the Tour Evolved

- Fact finding mission to EU northern countries
- Goal - to bring cold climate technologies to the Yukon
- Worked with YG Executive Council Office staff involved in Science and Technology.
- Requested assistance from Foreign Affairs and International Trade Canada (DFAIT) – Great help!
- Focused on the geographic areas that we could cover in a 2 week period.



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Scandinavia –February, 2011

- Finland - 5 Days
 - Wood Energy Solutions Conference – Koli
 - Coordinated by Canadian Bioenergy (CanBio) – Doug Bradley, Pres
 - On site tours of District Heating and Combined Heat and Power Plants
 - Harvesting Techniques
- Sweden - 4 days
 - Canadian Embassy – FTF meetings with Alternative Energy Companies
 - Royal Institute of Technology – Solar to Hydrogen, Micro turbine, Stirling engine
 - Uppsala University – Bio-Char, Electrical Storage
 - Luleå – Biomass Gasification



Scandinavia – Jan 29 Feb 12, 2011

- Denmark – 3 Days
 - Barrit - Thomas Harttung CEO of Black Carbon
 - Bio Char -Pyrolysis plant based on a Stirling engine
 - Dantherm - Bella Coola HARP (Hydrogen Assisted Renewable Power)
 - Stirling Denmark - biomass-fuelled Stirling engines (35 KW)
 - Danish Technical University, ARTEK – Multiple research projects in Sisimiut, Greenland – Permafrost, House Construction (HRV)

Results:

- 58 Contacts from Industry Experts
- Joint Partnerships for applied research projects – ARTEK, and Stirling Denmark



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Joensuu, Finland
Population 70,000
Latitude 62° 36'

Total Energy produced from biomass and biogas from local city landfill piped into plant.

- 50MW Electrical, 140MW Thermal (one location)
- 10 smaller heating sites create an additional 218 MW
- 180 Kilometers of heating pipe throughout the city













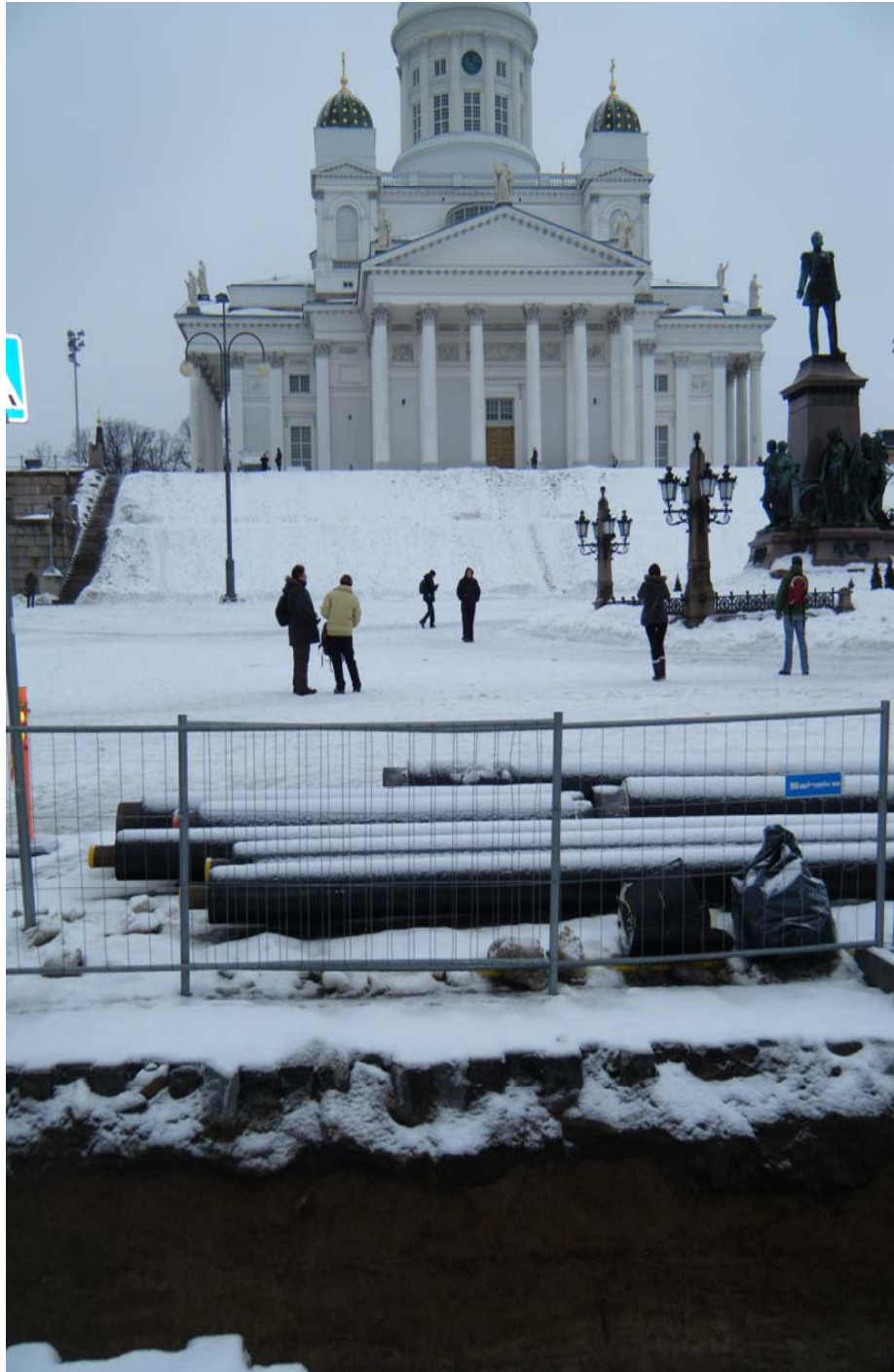


























Types of Biomass Units Visited

- Organic Rankine Cycle $> 80^{\circ}\text{C}$ 11L/min
- Fluid Bed Gasification 10 -100 MW
- Cyclone Bed or Circulating Fluidized Bed gasification 10 MW
- Stirling Engine 35KW

Lessons Learned

- There are many **PROVEN** technologies out there.
- Different technologies have a sweet spot for level of efficiency.
- Yukon's opportunity
 - To build the specifications that we want.
 - Ask for help
- The Yukon Research Centre can help!

