Identification of Yukon Green Energy Infrastructure Gaps and Priorities

Focus Group Synthesis Report

Submitted to:
Laura Prentice
Community Services
Government of Yukon
Box 2703 Whitehorse, Yukon
Y1A 2C6

Submitted by:
Paul Kishchuk, MA
Vector Research
Box 31126 Whitehorse, Yukon Y1A 5P7
paul@vectorresearch.ca
t: 867.668.3164
f: 867.668.3124
c: 867.333.2910

February 8, 2009

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INTRODUCTION

Under terms of the Building Canada Framework Agreement signed in September 2008, the Yukon Government will receive $183 million over seven years ($26 million per year) from the Government of Canada. The Building Canada funding will be allocated to infrastructure projects that drive economic growth and productivity, achieve environmental goals and build strong, competitive communities. Priority Yukon infrastructure portfolios include drinking water, wastewater, solid waste, road and green energy.

To best achieve the objectives of the Building Canada funding, Yukon Community Services has begun work to prepare an Infrastructure Plan. The Plan will identify infrastructure gaps and priorities in the Yukon, including the priorities of Yukon communities (incorporated, First Nation and unincorporated), over a 10 to 15 year period.

With regard to the green energy infrastructure portfolio, eligible categories of investment include:

1. reinforcement, expansion of existing and construction of new transmission grids to transmit clean electricity;
2. hydrogen infrastructure (generation, distribution and storage);
3. electric vehicle infrastructure (centralized refueling stations);
4. biofuels distribution/storage infrastructure;
5. thermal heat/cooling delivery system (i.e., district energy systems) using renewable or combined heat/power (CHP) plants;
6. clean coal facilities; and,
7. renewable electricity generation facilities for municipal consumption (e.g., wind energy, solar energy).

To enable Yukon Community Services to undertake informed consultations with Yukon communities and First Nations on how to allocate the Building Canada funding, a preliminary identification of Yukon green energy infrastructure gaps and priorities was undertaken. The preliminary identification of gaps and priorities was achieved through a focus group exercise which took place on January 27, 2009 in Whitehorse, Yukon. The focus group was comprised of seven Yukon Government officials with expertise in the energy field, representing six Yukon Government branches and organizations. Input was also received from an individual unable to attend the session who responded in writing to the focus group questioning route document.

This report presents a synthesis of the focus group findings.

YUKON'S GREEN ENERGY INFRASTRUCTURE

A variety of types of green energy infrastructure were identified by focus group participants, including the usual suspects of hydro, wind, solar and geothermal. Interestingly, participants were quite vocal that other aspects of green energy be included in the list of green energy infrastructure, including energy efficiency, technology, knowledge and policy/programs. The following green energy infrastructure items were identified:

Electricity

Hydro

- Whitehorse Dam (4 turbines)
- Mayo (Wareham) Dam (1 turbine + Mayo B in planning)
- Aishihik Dam (2 turbines + 1 turbine under construction)
- Fish Lake
- micro hydro
  - Rancheria
  - Carcross Tagish First Nation
  - Doug Gilday
  - Ron Berdahl
  - Fraser, B.C. [micro hydro with diesel supplement, waste heat recovery, excess hydro used to generate heat]

Wind

- Haekel Hill Vestas turbine
- Haekel Hill Bonus turbine
- several micro-scale monitoring/demonstration sites (e.g., Yukon College)

Solar

- Yukon College solar photovoltaic (PV) demonstration site
- YTG Main Administration Building photovoltaic demonstration
- Duncan Building (Lowe St.) solar wall
- Tourist Centres (Old Crow, Tombstone Park)
- Off-grid systems (farms, individuals)

Transmission and Distribution Lines

- Whitehorse-Aishihik-Faro grid
- Mayo-Dawson grid
- distribution lines in all Yukon communities

Biofuel

- small-scale production of biodiesel from used cooking oil for motive and heating fuel
- several public buildings in Whitehorse have wood boilers (Elijah Smith School, Yukon College, Justice Building)
- Kluane First Nation wood chip boiler
- Little Salmon Carmacks First Nation administration building wood chip boiler
- Eliza Van Bibber School (Pelly Crossing) wood chip boiler
- independent firewood suppliers (cordwood)
- wood pellet plant in Teslin
- wood is used as primary heat source in a significant number of Yukon homes (cordwood and pellet stoves)

Cogeneration

- Watson Lake diesel-electric co-generation system
- a portable co-generation system

Geothermal

- Mayo and Whitehorse groundwater heating
- Vanier School (Whitehorse)
- Haines Junction district system
- Whitehorse fish hatchery

Energy Efficiency

Any measure that reduces consumption of non-green energy, examples include:

- control systems that provide comfortable space heating
- increased use of Whitehorse Dam surplus hydro (especially in shoulder seasons)
- energy conservation with focus on diesel communities [every 1 kW of diesel-generated electricity saved is equivalent to 3 kW of energy due to inefficiencies in generating electricity with diesel]

Technology

- ground source heat pumps
- air source heat pumps
- net metering
- smart metering
- heat recovery systems
- space conditioning control systems
- SCADA (Supervisory Control And Data Acquisition) systems

Policy and Programs

- Yukon Energy Strategy
- green energy programs (e.g., Yukon Housing Home Repair Program)
- Yukon Energy Secondary Sales Program
- independent power production (IPPs)

Knowledge

- lessons learned from building super green homes
- "Yukon has lots of depth in green energy knowledge"

YUKON GREEN ENERGY INFRASTRUCTURE GAPS

A variety of green energy infrastructure gaps were identified by focus group participants. Because the offsetting of carbon emissions is in itself a form of green energy, not all of the gaps identified involve the construction of new green energy sources. Participants repeatedly noted that the focus of efforts to displace non-renewable energy sources should be in Yukon communities where diesel is burned to generate electricity (Beaver Creek, Burwash Landing, Destruction Bay, Watson Lake).

GAP 1. transmission grid integration to connect existing green energy sources and to allow expanded distribution of green electrical energy. Both the

integration of the WAF grid with the Mayo-Dawson grid and the integration of the completed Yukon grid with the British Columbia or Alaska grids.

GAP 2. improve energy conservation (buildings that are more energy efficient have lower operating costs)

GAP 3. transparent identification of costs of operating energy inefficient buildings

GAP 4. replacement of oil and propane-fired heating systems (residential and industrial) with wood/wood pellet/wood chip systems

GAP 5. micro hydro distributed generation as a means to extend existing Yukon grid short distances

GAP 6. install district heating, combined heat and power systems where appropriate (one efficient system could supply heat for a number of buildings)

GAP 7. better use of spilled hydro at Whitehorse Dam:
   a. secondary sales program that allows for incremental bringing on and taking off (would allow for more secondary sales customers),
   b. electrical energy storage (batteries, pump water uphill, flywheels, hydrogen, convert to heat and store in ground and combine with heat pumps)

GAP 8. new large-scale hydro development (80 MW+), pole-vault whole policy debate forward and discuss how to use green energy to displace non-renewable sources

GAP 9. geothermal from flowing warm water

GAP 10. electricity from hot water (geothermal)

GAP 11. put excess electricity into district heating system in shoulder seasons (why are public buildings burning diesel in September, October, April and May?)

GAP 12. smart appliances that twig on electricity price changes, with prices changing according to changes in demand (e.g., dryer that turns on only when electricity drops below a certain price)

GAP 13. smart appliances that switch between heat generation and electricity generation

GAP 14. centralized electric car charging stations on small/seasonal scale since charging demand tends to coincide with peak grid demand (e.g., on way home to turn on oven after work)

GAP 15. increased hydro storage upstream from Whitehorse Dam (Marsh Lake, Atlin Lake, other Southern Lakes), hydro diversion into Aishihik water system (though a decidedly lighter shade of green)

GAP 16. reduction in the volume of fuel that is trucked up the highway (saves energy used to transport fuel), local supply of fuel

GAP 17. science-based policy options paper that could guide a comprehensive shift to renewable energy in the Yukon i.e., a policy paper that has options for a complete redesign of the Yukon's overall energy system (more comprehensive than tinkering with a "broken" system)

GAP 18. a bundle of green energy programs with a larger combined potential impact

CRITERIA FOR IDENTIFYING GREEN ENERGY PRIORITIES

Focus group participants were supplied with a list of the seven eligible categories in the green energy portfolio and were then asked to identify what sorts of factors should be considered in choosing between the different green energy investment priorities. The group was of a consensus view that before priorities could be identified, some of the categories should be struck from the list at the outset as they were unpalatable to Yukoners or unworkable. The categories to be struck included:

- clean coal facilities
- hydrogen infrastructure (with the possible exception of preliminary research work to prove out the technology)
- liquid biofuel distribution and storage (biomass distribution and storage ok)

With regard to the other investment priorities, a variety of factors were identified. Investment choices should…

- involve technology that has been cold-climate proven
- reduce or minimize greenhouse gas emissions
- have the potential to generate significant new energy supply
- recognize where viable industries already exist without government involvement (e.g., fuelwood supply)
- recognize that some pieces in the green energy puzzle can enable different types of green energy advances at differing scales
- recognize that changes in other factors (market, biophysical, etc.) are constantly changing the viability of green energy choices (e.g., spruce beetle killed wood presents an opportunity for biofuel industry)
- be consistent with existing policies (including the Yukon Energy Strategy)
- consider the Yukon's population distribution; though projects in communities outside Whitehorse will be small, the relative impacts of those projects can be very large
- recognize that some projects will need multi-year funding and that some can be funded within a single year
- recognize that YESAA assessments are not typically needed for energy efficiency improvements
- recognize that not all electricity-related initiatives require Yukon Utility Board approval (e.g., conservation measures that take electricity prices as a given, measures such as net metering subsidized by government such that such YECL and YEC rate bases are not affected)
- try and piggy back on Building Canada funding in other infrastructure areas, for example, lay pipe for district heating systems alongside new sewer lines when roads are already torn up
- deliver immediate and direct benefit to Yukon homeowners
- ensure that target audience for energy efficiency programs have financial means to actually participate in the programs

TOP PICKS FOR YUKON GREEN ENERGY INFRASTRUCTURE INITIATIVES

Focus group participants were also asked, if it were up to them to make the decisions about where to direct Building Canada funding, what their top three projects would be. The list below presents the results of the query. Due to the differing scale/cost of the various projects, a ranking of the projects was not attempted; the top picks below are presented in no particular order.

- new hydro supply to feed the grid (several small projects, one or two large ones)
- renewable energy project in a diesel community (to displace diesel)
- connect WAF and Mayo-Dawson grids by completing the Pelly to Stewart Crossing transmission line
- make better use of the energy that is available to us right here, right now, specifically waste energy at the Whitehorse Dam (refine the secondary sales programs)
- district heating system (e.g., Whistle Bend)
- bundled suite of green energy programs designed to improve energy efficiency and reduce consumption of non-renewable energy
- Mayo B generation project
- infrastructure on both the supply and the demand sides of the energy equation for converting oil and propane systems to biomass
- application of heat pump technologies
- develop capacity for dual-source (electricity plus another source) heat in residential homes (to absorb surplus hydro)