

Hartley Bay's Green Ambition

How the residents of Hartley Bay are embracing change through innovative technology.

Julie Domville

Deep within the Great Bear Rainforest, the isolated village of Hartley Bay, home community of the Gitga'at First Nation, has a big green ambition. This small community has embraced the goal to become the greenest First Nation village in Canada. To do so, they have undertaken an ambitious plan to fundamentally change the way they impact the environment, starting with how they make and consume power.

Seeing a Need for Change

Electricity for the 180 residents, businesses and public buildings comes from a 1930s era diesel plant, recently updated and currently powered by three large generators with an output of 1 megawatt. No roads lead to Hartley Bay—access is by air or sea, and as air is not an option, the generator fuel is barged in about every 10 weeks. The problems with this system are vast, as is the expense.

The community's fuel bill is over \$500,000 per year and constitutes upwards of 15% of the community's total expenses. When the cost of diesel shot up in 2008, their bill almost doubled. Electricity costs in Hartley Bay are between six and twelve times higher than the rate paid by BC Hydro customers who are connected to the grid. But, apart from the monetary cost, it is the environmental cost, both immediate and future, that concerns the people of Hartley Bay.

The Gitga'at have enjoyed a respectful, sustainable relationship with nature. The health of the land and waters that surround them is tied directly to the well-being of the community and the Gitga'at depend greatly on the bounty of the sea. Concerns about diesel spills contaminating the soil and groundwater and fouling the clam and seaweed beds propelled them to contact the Pembina Institute for an assessment of the community's options for a reliable, cost-efficient source of electrical power with the minimum of environmental risk.

The Band was interested in exploring the viability of developing a small scale, 900 kW run-of-river hydro site, which would provide 100% of the power needs for part of the year, thereby significantly reducing the need for diesel fuel. The climate and terrain surrounding Hartley Bay offers an ideal setting for run-of-river power generation; behind the village, nestled in a mountainous valley, are two large lakes, one of which feeds the Gabion River. The village receives up to 4.5 metres of rain per year and a whopping 2 or 3 metres of heavy snow. For the Gitga'at, a run-of-river power project made sense.

Concerns for their environment also prompted them to support an initiative called Back to Green. Developed in 2008 by David Benton, Project Manager (Band Manager at the time), with the support of Chiefs and Councils, Back to Green speaks to a desired state in which the community could collectively reduce their environmental impacts, with a view to preserving the territory, intact, for future generations through recycling, solid waste management, energy retrofits, food security and reduced fossil fuel consumption.

The success of Back to Green is “reliant on youth leadership, elder wisdom and the guidance of the Chiefs.” In accordance with that philosophy, the Pembina Institute engaged the teachers and worked with the children to build small, working models of hydroelectricity generators, and assigned the children the task of completing energy use surveys of their homes. The children counted light bulbs and appliances and recorded when and how often these items were turned on; the Institute then used the information to calculate the energy consumption of individual households.

A real benefit of the exercise was a new-found awareness of energy consumption on the part of the children, who in turn, educated and inspired their parents to take a personal interest in conserving energy. Approaching the education of the community by engaging the children delivered energy use awareness on a community wide basis—every home became familiar with the “Wait ‘til 8:00” mantra to reduce power consumption between 4 pm and 8 pm.

Using Technology to Good Advantage

The sheer isolation (145 km southeast of Prince Rupert and 80 km southwest of Kitimat) of Hartley Bay demands a certain degree of self reliance, and in that vein, the Gitga'at have traditionally been quick to adopt technological advancement, be it fish weirs to improve harvesting capabilities, sonar for the fishing fleet, or the introduction of the internet to the community in 2007, which has now been upgraded to T5 Wi-Fi (wireless) internet. Again, the isolation factor means outside service providers are expensive and challenging to mobilize in this village of raised wooden pathways, so the community is self reliant in technological troubleshooting and repair, as well.

“The community has always been able to use technology to their advantage, so we factored this in when we began looking for solutions that would allow us to be sustainable and environmentally responsible,” says Benton. This aptitude for embracing technology allowed the Councils and Chiefs, to seek out a truly innovative solution to their energy consumption desires, which led them straight to



Top: The community of Hartley Bay.

Middle: (L-r) Tom Owen EIT and Dr Michael Wrinch PEng with generator supervisor Marshall Reece and resident Myron Dundas, inspecting sewage pumping plant electrical system for efficiency improvements and capacity for energy monitoring.

Bottom: (L-r) Adrienne Nisyok, Tom Owen EIT, Dr Michael Wrinch PEng, Marshall Reece, during installation of generator smart meter monitoring equipment and reviewing system efficiency.



Removing the old hydro mechanical meter and inspecting meter socket.

“Progress is impossible without change”

-George Bernard Shaw

The Hartley Bay project provides a number of benefits, including:

- Greater energy awareness at a household and community level
- Energy savings for the community as a whole
- Training people and creating skilled workers who can work with other communities (the Federal government recently contributed \$1.2 million towards the rollout of similar systems in three other coastal First Nations communities)
- Technological growth and development through the design and installation of an innovative grid

the door of Pulse Energy. They pitched to Pulse Energy the need for a solution to their energy costs, the environmental impacts associated with the current system, and their goal to become energy self reliant.

Upon learning about the community’s energy challenges and goals, David Helliwell, CEO of Pulse Energy, was interested in the project, but on two conditions. “We were only interested in working with the community if we had assurance that the financial savings derived from energy management stayed within the community (First Nations in Canada receive an energy allowance or grant), and if the request for assistance had the support of Chiefs, Councils and community, both of which have been met as we have had the support of two consecutive Councils and the money saved so far has been used to upgrade village buildings,” says Helliwell.

The opportunity was well-timed for Pulse Energy. The company primarily works on much larger scale projects, improving the energy efficiency of large commercial buildings, but has plans to develop a non-profit branch to address energy efficiency in First Nations communities

around Canada and the electrification of the developing world. The Hartley Bay project was just too appealing on too many levels to not be involved.

“There was a real technical competitive advantage for us to partner with Hartley Bay on their energy conservation plan. It is extremely rewarding to have all the components come together—the only thing missing, from a corporate perspective, is profit but we are confident that this project will pay off down the line,” says Helliwell.

“From a purely technical and engineering perspective, Hartley Bay presented an amazing opportunity to build an independent, fully integrated, smart grid on a small scale as these projects usually cost billions of dollars and are only undertaken by huge utilities over many years. We are able to do it for hundreds of thousands dollars over a few months.”

The Hartley Bay project is partially funded by the BC government’s Innovative Clean Energy (ICE) Fund, Western Economic Diversification’s Community Adjustment Fund, and the Department of Indian and Northern Affairs Canada; the remaining project costs are being carried by Pulse Energy.

A ‘Smart’ Solution

The engineers at Pulse Energy designed and installed a community wide smart metering system to measure energy consumption. The assessment identified spikes in energy consumption and an overview of wasted energy such as lights left on in buildings overnight, thermostats set too high and left at a constant setting for 24 hours, heaters left turned on when rooms were vacant—all typical findings where energy conservation is not actively pursued.

Senior Engineer and lead designer for the project, Dr Michael Wrinch PEng, explained the process: “We have installed the first stage of a “smart meter” infrastructure where the community power consumption can



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be monitored using a simple web browser in 15 minute intervals. Each community member is able to monitor their energy use in real time by simply logging into a web page that is personally designed for them. Base loads are also going to be monitored by the Band which will allow us to devise methods of controlling and improving the community efficiency.”

“Everyone thinks the smart grid is just the meters, which is not correct. The smart grid is the measurement, optimization, information and control system that allows your grid to become smart—once you have a measurement system in place that can be centrally monitored, you can start looking at optimizing the system as a whole and not just at individual consumption, and that is where the innovative engineering comes in.” Wrinch and a team went door to door throughout the community, explaining the meters and demonstrating how everyone can view their energy consumption.

The project is being rolled out in five two-year phases. The first phase was the design and installation of a community wide energy measurement system. The Pulse team has installed the system and has metered about two-thirds of the community.

The second phase is to meter the remaining tough to reach loads. Once complete, Pulse will be able to take a holistic view of how the community uses their energy. The third phase is to develop a user interface that meets the needs of the community members. Following this, Pulse will introduce and train the community on how they can manage and view their personal energy consumption.

The fourth phase is to develop and conduct system wide optimization using demand-response and to develop reporting schemes for simplified energy management.

The final phase is to work with the community on how

they can manage their energy and to reduce their carbon footprint. If the system is going to be sustainable it needs to be operable by the residents.

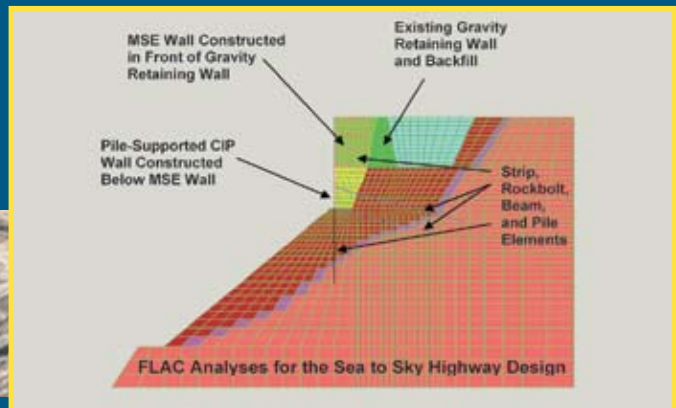
“Our software and engineering teams at Pulse Energy are thrilled to be implementing this innovative project here in BC. The people of Hartley Bay have been great hosts,” says Wrinch.

The residents of this small village are changing the way they live to protect the earth and they are using innovative technology as their tool. The success of this endeavor is due to the determination and commitment of the village, and the leadership of David Benton and Chiefs and Councils. It is equally due to the engineering team at Pulse Energy for their innovative design, application and implementation of the software and their desire to support the community in their goal to become the greenest First Nation village in Canada. ☒



Dr Michael Wrinch PEng (left) and electrician Adrienne Nisyok (right) inspect and install the first smart electrical meter.

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