

# Wha Ti Community Energy Plan

## Options for Energy Supply and Management for Wha Ti, Northwest Territories

Prepared for the Wha Ti Charter Community  
by Ecology North and the Pembina Institute

Report prepared by

Bob Bromley, Ecology North  
Jesse Row, Pembina Institute  
Matthew Salkeld, EnergyWise Technologies  
Pentti Sjöman, P O Sjöman Hydrotech Consulting  
Tim Weis, Pembina Institute  
Paul Cobb, Pembina Institute

June 2004



A run-of-river hydroelectric system relies on the natural daily water flow rates of the river to be diverted into the penstock. These systems are appropriate when there is sufficient flow year-round to meet the generation demands, while enabling sufficient water to bypass the diversion channel and remain in the natural stream bed, thereby not disturbing the natural aquatic habitat. If there are not sufficient water flows throughout the year, then another electricity source is required. This could take the form of a diesel generator. Alternatively, a storage reservoir, which will flood land and affect stream flows, could be used.

## 6.2 Proposed Hydro Plant

The proposed hydro project on La Martre River (see Fig 6.2) is approximately 20 km from Wha Ti. An intake above the river's waterfall will divert a portion of the river's flow into a penstock (pipeline) for approximately 1500m while descending 50m of elevation to the powerhouse. The turbine within the powerhouse generates electricity from the force of the water running through it, and the water is then returned to the river. There will be no dams or storage of water required for the project. A powerline would be constructed to transmit the electricity to Wha Ti.

The pre-feasibility study performed by P.O. Sjöman Hydrotech Consulting<sup>27</sup> looked at several plant sizes including 1200 kW and 800 kW. Final determination of the plant size will need to be completed in future studies and will be highly dependent on the expected amount of electric heating to be introduced to the community, as well as the expected population growth and electricity use patterns.

The hydrology study performed by P.O. Sjöman Hydrotech Consulting showed that there is enough water flowing through the river to operate the hydro plant at 1200 kW 95% of the time over the 11 years of data that was assessed. This assumes that a minimum of 25% of the average annual flow is left in the river at all times. This is a typical feature of hydroelectricity projects where fish habitat is located. If the area of the river where the hydro project is located is not considered a fish habitat, then as little as 10% of the average annual flow is typically required to remain in the river. This would allow the hydro plant to operate at 1200 kW year round.

The estimated capital cost of the 1200 kW plant is \$8,035,000, whereas the 800 kW plant is \$7,525,000. These costs include the required power line to the community. There is expected to be some savings in cost of major components, but labour costs are expected to be similar for the two plant sizes, hence the similarity in prices.

---

<sup>27</sup> P.O. Sjöman Hydrotech Consulting (2003) "Pre-Feasibility Study for a Renewable Energy Mini-Hydroelectric Power Project on La Martre River"

The economic feasibility study performed by the Pembina Institute and Stand Alone Energy<sup>28</sup>, assessed three economic scenarios.

The 30 year analysis of a Wha Ti mini hydro project has shown the project to be economically and environmentally attractive from a number of perspectives. Using current electricity prices of \$0.77 / kWh, the project showed a positive net present value (NPV) of \$1.7 million in the base case and cash flow becomes positive in year 6. With a breakeven NPV, the average electricity rate is \$0.58 / kWh, a 24% reduction from current rates. By introducing electric heating and funding from FCM, the economics improve even further to demonstrate a potential average electricity rate of \$0.53 / kWh.

**Figure 6.2: The falls on the La Martre River**



Additional benefits include those to the environment, the community and the current diesel plant owners. From an environmental perspective, displacing diesel generated electricity is estimated to produce an average annual GHG reduction of 2000 tonnes CO<sub>2</sub>eq., whereas the emission reduction from displacing fuel oil is estimated to be 530 tonnes CO<sub>2</sub>eq. per year, given the available capacity of the 1200 kW hydro plant modeled for electric heating. For the community, a hydro plant presents an opportunity for economic development and the potential to redirect money that is currently leaving the community. For the Northwest Territories Power Corporation, the current diesel plant owners, the proposed project uses the current diesel generators as a back-up power source, thus avoiding stranding the existing assets of the plant.

Based on the results of this analysis, it is recommended that a more detailed analysis of the mini hydro project proceed, including a feasibility study and business plan.

---

<sup>28</sup> Pembina Institute & Stand Alone Energy (2004) “[Wha Ti Mini Hydro Economic Feasibility Study](#)”, Prepared for Ecology North, Wha Ti Sustainable Community Project