

CASE STUDY

REAL PROJECT

01

WIND ENERGY PROJECT

REMOTE COMMUNITY / YUKON TERRITORY, CANADA

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RESULTS

In 1992 and 1993, the Yukon Energy Corporation, a government-owned utility of the Yukon Territory, Canada, went out for tender, purchased and installed a 150 kW Bonus wind turbine. It was installed on Haeckel Hill, a shoulder of Mt. Sumanik, at 1,430 m, about 750 m above the valley floor where the Territory's capital of Whitehorse is located.

The total project costs, not including pre-feasibility phases, was about \$800,000. A track leading up the mountain to a fire lookout tower was upgraded to a road, and the existing single-phase power line was upgraded at a cost of \$170,000 (included in the total amount).

The wind turbine has experienced significant icing events, and has proven to be a very important testing platform for icing mitigation technologies. The project is considered a success, and as a result Yukon Energy Corporation installed a 660 kW Vestas wind turbine in 2000, in order to assess the possibility of a utility scale windfarm on Mt. Sumanik.

SYSTEM DESCRIPTION

A Bonus 150 kW Mark III turbine was used, and the manufacturer, Bonus A/S of Denmark, was highly involved in the implementation of the project. The turbine was modified to include aftermarket leading edge blade heaters, heated wind monitoring sensors on the turbine (used for control purposes), and a tilt-up tower system (to avoid crane requirements). The low-voltage, 3-phase electricity generated by the turbine is transformed to 25 kV and delivered to the grid.

LESSONS LEARNED

- Research & development projects must be implemented efficiently, but need not be financially viable. The value of such projects is in what is learned, what they can and do lead to, and in the successes and failures that are monitored, reported, and analysed.
- Single turbine costs for remote grids are high, especially when the best sites are not close to the load. This is, in fact, very likely, since communities are not typically built in good wind sites, but rather close to shelter, water and transportation routes.
- Northern wind sites have additional challenges, in terms of severe weather conditions (such as rime icing), extended cold temperatures, available equipment and "logistics." In some communities in the far North, there may be only one annual delivery of goods – meaning project management for a wind facility must be at least 100% on time!
- There are many remote communities in Canada and other parts of the world that have significantly higher diesel fuel costs and/or higher wind speeds, than those found in Whitehorse. For many of the sites, wind energy is financially viable (see: http://www.retscreen.net/retpii_e/).



THE BIG PICTURE

Yukon Territory is growing, and will likely need more power in the future. One of the largest loads in the Territory is a mine that operates intermittently, requiring large amounts of energy when it operates and causing large surpluses when it does not. With high levels of environmental awareness in the Yukon, wind energy has good potential. Yukon Energy Corporation has conducted a number of wind energy resource studies, and has demonstrated a long-term commitment to examining wind energy. The Yukon government has instituted a Green Plan, and has committed to exploration of green power. It is likely that in the future, larger scale wind energy facilities will be installed and operated in the Yukon.



HAECKEL HILL WIND TURBINES, WHITEHORSE, YUKON, CANADA
PHOTO CREDIT: YUKON ENERGY CORPORATION

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Yukon Energy Corporation, website: www.yec.yk.ca.

Yukon Government, website: www.gov.yk.ca.