AURORA RESEARCH INSTITUTE
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Whati Wind & Solar Energy Pre-feasibility Analysis Summary

Introduction

Since 2005, the Aurora Research Institute (ARI) has researched the wind energy potential for communities in the NWT that are served by diesel. In Whati the ARI has studied the feasibility of both wind and solar energy and compared them with diesel generation.

Assessment of Wind and Solar

The ten-year (2001-2010) average wind speed at Whati's airport was measured to be 2.8 m/s, which is too low for wind energy to be cost effective in the community. The average solar energy potential was estimated at 2.78 $kWh/m^2/day$ (daily insolation), which is considered to be good for solar electricity production.

Proposed Wind and Solar Projects

The most optimum wind project sizes for Whati's energy needs were found to be 100 kW to 110 kW. This would help reduce greenhouse gas emissions and save diesel fuel, but would not be cost effective compared to current diesel rates.

Solar systems are more flexible and so project sizes of 1 to 5 kW (home base grid connected) and 50 kW (utility scale) using generic solar modules on either a fixed frame (adjusting the angle of the modules seasonally is recommended) or on a solar tracker were considered for the solar assessment.

Production and Cost of Wind and Solar Energy

A wind project in Whati will produce 683 to 914 kWh per kW of installed wind energy capacity. The wind energy will cost about $2.08 to $2.47 per kWh. This is five to six times more than the diesel savings of $0.43 per kWh that the utility needs to achieve for the wind project to be economical.

A home-based solar system in Whati will produce from 1,079 (on a fixed frame, adjusted seasonally) to 1,443 (on a one axis solar tracker) kWh per kW installed. The cost of solar electricity is calculated at $0.77 (one axis tracker) to $0.83 (fixed frame) per kWh.

A home-based 2 kW solar system on a fixed frame (adjusted seasonally) will cost $20,000 and will displace 2158 kWh of electricity and 582 litres of diesel fuel a year. With a revised rate of $0.49 per kWh for the Whati home owner. the electricity savings represent $1057 per year (simple payback of 20 years). With the unsubsidized electricity rate of $0.846 per kWh, the net savings are $1,826 per year (the simple payback is 11 years).

A utility scale solar project of 50 kW will produce the same amount of energy per kW installed as the home-based system but will cost about $0.65 (one axis tracker) to $0.67 (fixed frame, adjusted seasonally) per kWh. This cost is 51 to 56% more than diesel savings of $0.43 per kWh that the utility needs to realize for the solar project to be economical. The simple pay back for a 50 kW system is about 18 years.

Conclusions

If Whati is considering alternative energy developments, the use of solar energy generation would be a better option than wind energy. Subsidies would be required to make the solar project cost-effective compared to continued diesel generation.

The full Whati Wind and Solar Energy Pre-feasibility Analysis Report is available for download at www.nwtresearch.com

For more information on this or other wind energy studies in the NWT, contact the Aurora Research Institute at:

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