

Inuvik Wind 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 Inuvik the ARI has studied the feasibility and economics of developing wind energy, and compared it with diesel generation.

Assessment of Wind Resource and Site Selection

The seven-year (2005-2011) average wind speed at Storm Hills was measured to be 6.7 m/s, which is considered among the best wind resource in the territory. At Inuvik's airport the wind speed was 2.7 m/s which is similar to other measurements made near Inuvik.

Wind flow modelling was done for three sites: (1) near Inuvik, (2) 35 km north of Inuvik at the high point on Caribou Hills, and (3) 60km north of Inuvik at Storm Hills. Wind speeds were modelled for each site at 75 meters above ground level (height of a proposed wind turbine). The estimated wind speed was 4.6 m/s for Site One, 6.6m/s for Site Two, and 8.0 m/s for Site Three.

Proposed Wind Projects

An optimum starting size wind project for Inuvik's energy needs were considered to be 1.5 MW to 1.8 MW. This is a low penetration wind project which would not require significant addition of power quality controls to the existing plant. This would help reduce greenhouse gas emissions and save diesel fuel, but would not be cost effective compared to current diesel rates.

However, if the project size was increased to 4 MW it will have economies of scale and be competitive with diesel. There would be a small amount of excess wind energy but it could be fully utilized through load shifting (to periods of high winds).

Cost of Wind Energy

A wind project of the size 1.5 MW to 1.8 MW (not including road and power line development) would cost from \$7.6M to \$8.5M to build.

A wind project at Site One would only require a short road and power line at an extra cost of about \$1.1 million, but the resulting energy cost (LCOE) will be \$0.70 to \$0.80 per kWh. This is double the \$0.39 per kWh diesel savings (LCOE) that would be realized.

At Site Two, at Caribou Hills, the road and power line cost would add \$12M to the project costs and the cost of energy would be \$0.60 to \$0.67 per kWh.

At Site Three, Storm Hills, the cost of road and power line access is estimated to be about \$22 million. The cost of wind energy from this site would range from \$0.64 to \$0.72 per kWh.

Increasing the wind project size to a 4 MW capacity and including the full costs of power lines and roads, would produce electricity at a cost of about \$0.38 per kWh at Caribou Hills and about \$0.36 per kWh at Storm Hills. At this scale wind would be cheaper than the diesel savings (\$0.39 per kWh).

Conclusions

With careful planning wind energy could be developed for Inuvik at a lower cost than diesel. If the proposed highway from Inuvik to Tuktoyaktuk was combined with this wind project, it would greatly reduce the road construction cost portion of the project.

The full Inuvik 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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