

Policies to Promote Wind Energy Development in Northern Communities

John F. Maissan, P.Eng.



Leading Edge Projects Inc.

Northern Realities

- **Small widely spaced communities**
- **Few communities connected by all-weather roads**
- **High transportation costs due to isolation**
- **Extreme winter weather conditions**
- **Power rate subsidies – government rates**

Northern Realities

- **No economies of scale in appropriate size of wind turbines for projects**
- **No economies of scale in appropriate number of wind turbines for projects**
- **Power line costs limit distance one can go from community to find best wind resource**
- **Lack of technical support close at hand in order to deal with problems encountered**

Northern Realities

- **High cost of engineering foundations and overall wind-diesel system**
- **High cost of wind turbine foundations in permafrost**
- **High cost of installing wind turbines – large equipment needed**
- **Lack of year-round cost effective transportation**
- **Perceived risk as wind-diesel integration technology not mature and off the shelf**

Northern Realities

- In some locations icing is a concern
- Higher elevation sites generally have more favourable wind regimes but also severe rime icing
- Limited construction season
- Small electrical loads, for example:
 - Destruction Bay / Burwash Landing load 125 kW to 250 kW, 1.5 GWh/yr, wind 6 m/s
 - Old Crow load 115 kW to 350 kW, 1.75 GWh/yr, higher wind, severe rime icing

Northern Costs

- **Capital costs two to ten or more times that of larger scale wind farms in southern Canada**
- **Operating and maintenance costs two to ten or more times that of larger southern neighbours**
- **Overall power costs 2 to 10 or 15 times higher than wind farms in southern Canada**

What is Needed for Technical Successes?

- **A market place with several up to date wind turbine models in the 50 to 300 kW range, that can operate in low temperatures**
- **Wind generators that are designed for low wind speeds**
- **Taller, guyed, winch-up towers that are simpler to install with local equipment**

What is Needed for Technical Successes?

- **Simplified “cookie cutter” turbine foundation systems**
- **Cookie cutter, reliable, low maintenance, modular wind-diesel integration systems**
- **For high altitude and problem sites, turbines with blade heating systems to overcome rime icing**
- **Businesses with capital resources, technical resources, and experience**

How Would This Start?

- **Chicken and egg situation: economic projects vs. mature, reliable equipment**
- **Need demonstration high penetration wind-diesel projects in suitable locations to start**
- **Projects integrated with community energy systems to maximize economies of scale**
- **Project proponents with adequate technical and financial support to develop solutions to problems as they arise**

What Policy Initiatives Will it Take?

- **WPPI in proportion to cost of energy from wind relative to southern Canada**
- **2 to 3 cents per kWh in small grids, large communities, or industrial sites**
- **5 to 10 cents per kWh in small diesel communities served year-round by road or boat / barge**
- **10 to 15 cents per kWh for small diesel communities served only by air or seasonally by winter road or boat / barge**

What Policy Initiatives Will it Take?

- R&D funding for key needs such as suitable turbines and taller winch-up towers
- R&D funding for permafrost tower foundation systems
- R&D funding for wind-diesel integration systems
- R&D funding for ice detection equipment
- R&D funding for anti-icing and de-icing equipment for wind turbines (blade heaters etc.)

What Policy Initiatives Will it Take?

- **Funding for portion of capital cost of pilot / demonstration projects**
- **A low hassle Green Energy sales opportunity**
- **A low hassle GHG sales opportunity**
- **Net metering – will help expand the market for turbines in the 50kW to 300 kW range**
- **Government rate “subsidies” converted to per kWh support for renewable energy**

Business Requirements for Success

- **Wind is not generally being favoured by utilities because of early failures and risk concerns**
- **Utilities must have interest in wind development for the long term or be supportive of wind power purchase agreements**
- **Government support for small, emerging local businesses needed**
- **Regional multi-project businesses are stronger**
- **Local champions required!**

Other Potential Wind Development Leaders

- **Industrial projects in the north**
- **Lodges, highway maintenance stations, and other facilities along higher elevation roads that typically use diesel generation**
- **Microwave tower sites – typically cycle charge systems with fuel flown in by helicopter**

Action will Result in

- **Stabilization of electrical energy costs in the face of rising fossil fuel costs**
- **Circumpolar and world wide sales opportunities for smaller wind turbines and wind-diesel systems**
- **Decreased GHG emissions in support of Koyoto commitments**

Summary

- **The north has no economies of scale in wind development**
- **Development of appropriate wind and wind-diesel integration equipment still needed**
- **Pilot / demonstration projects needed to break “chicken and egg” cycle**
- **Policy support for wind in the north is lagging behind support in the rest of Canada**
- **Federal and provincial/territorial governments, and their utilities can significantly influence wind energy development in the north**