

Harvesting the Wind: Can Alternative Energy Sources Reduce Costs?

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■ Introduction

Energy is the backbone of Canadian economic growth and prosperity. It is also the Achilles heel of Canadian economic growth and prosperity.

Canada has lagged far behind most of the industrial world in the recognition and utilisation of alternate energy sources. We have a rich resource base of cheap fossil fuels and large-scale hydro combined with a small population and tight provincial jurisdiction in the energy utility generation field. Up till now this has provided Canadians with cheap power and a belief that energy is always going to be there at reasonable cost just like the public health care system. Not a sound idea on either front.

Wind energy is still more expensive than conventional energy and faces short-term cost increases due to turbine shortage, commodity prices (steel), exchange rates (Euro) and “learning by doing” costs. The long-term cost trend is clearly downward and wind energy is expected to compete directly in price against any source sometime between 2010 and 2020.

Natural gas prices will not fall over time and supply will be unable to keep pace with demand. More expensive, unconventional supply will be required. Also climate change and environmental measures will impose costs on energy produced from natural gas. Large hydro projects are ageing, limited to existing sites and our water commitments to our Southern neighbours and downstream customers are dictating when and how the water is utilized. Both coal and nuclear power are facing increasing pressure to eliminate them as energy sources.

■ Development of a Vision for Renewable Energy

During the energy crisis of the 70's, Europe, particularly the Scandinavian bloc and Germany, recognised energy as the primary economic driver to their social and financial future. There was a direct and clear vision in both political and business circles that the dependency on non-renewable resources could not continue. Money and technical resources were focused on reducing the dependency on fossil fuels. The development of wind and tide technology, biomass and solar power came out of that clear direction. Political will and the proactive development of policies to encourage and support renewable sources of energy have resulted in a strong, balanced energy grid that provides most of Europe with a reliable, resilient energy system.

The necessary components for that were:

- Recognition that there was a problem
- Political will to address the problem
- Funding to make it happen
- Cooperation and negotiation that extended beyond political boundaries

North America, in the same time period, made some half-hearted attempts at putting renewable energy sources on the landscape. California provided capital incentives to the wind industry in the 1980's. Anyone who has ever been to Palm Springs has seen the miles and miles of commercial wind farms that were erected to grab grant money.

Communities that had formed Rural Electrification Associations to deliver electricity to their citizens had their associations swallowed up by provincial utilities that created a monopoly in power distribution. There is a patchwork of regulatory and political realities stopping and starting at provincial boundaries. The federal government is out of touch with the energy "big picture" but has committed itself to meet reduced emissions under the Kyoto Accord. As a result, Canada is trying to make the renewable energy portfolios correct decades of bad planning.

What the Europeans' 30 year plans have avoided is happening here now. All the politicians and interest groups are finally interested in developing a sensible, sustainable, across Canada energy network. The Canadian Wind Energy Association, once a joke in utility boardrooms, is now invited to speak at provincial and federal legislatures. Wind is now mentioned in budget deliberations and put forward as the answer to the energy dilemma.

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competition out of
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The reality is somewhere in the middle. The economics are not there yet to make wind a cost effective, reliable source of Canadian energy, when approached from the traditional perspective, but we are very close. Other factors though make a very compelling case for renewables, particularly wind. We are finally recognising the only way to do business in a global economy is to be as conscious of environmental issues as economic ones and with this perspective wind can blow the competition out of the water.

We are establishing a strong wind industry across Canada (**Table 1**). Some very sound policies and procedures are being established. We have a long way to go but energy from an endless wind source could power 20% of Canada's energy needs. The real beneficiaries are the rural communities where the economic activity and development will occur.

Table 1. Current and Projected Canadian Wind Energy Capacity

	August 2005 Capacity, MW	Proposed Capacity by 2013, MW
Alberta	274	500
Saskatchewan	22	200
Manitoba	20	1,000
Ontario	15	2,025
Quebec	212	3,500
New Brunswick	14	400
Nova Scotia	32	100
Newfoundland	0	25
PEI	0	65
BC	0	50
Yukon Territory	1	1
Total Canada	590	7,866

Creative policy development by provincial governments can stimulate that growth and the agriculture producers who rely heavily on cost effective, reliable energy will benefit.

The environmental benefits of wind energy are:

- No air emissions (acid rain, urban air quality) or water emissions
- No solid, toxic or nuclear wastes

- Can co-exist with many other land uses (e.g., farming)
- No greenhouse gas emissions

The economic benefits of wind energy are:

- Investment - \$1.8 million / MW
- Jobs – 10.5 indirect and direct person years / MW (80,000 employed globally)
- Canada now only gets a portion of these benefits (construction / operations and maintenance, limited manufacturing) – we need full manufacturing
- Investment, municipal tax revenue, jobs and land lease income in rural communities across Canada
- Wind energy has no fuel cost – no risk of cost inflation once built
- Can substitute for and preserve natural gas resources
- Can allow for more efficient use of hydro resources

■ **Can Wind Energy Be Part of Your Bottom Line**

Wind turbines work on a simple principle taught in grade 6 that electricity is produced when a copper coil is passed thru a magnetic field. The wind lifts the blades of the turbine in exactly the same principle that allows airplanes to fly this lift is converted to a circular turn because they are attached to the shaft and the tower. The blades turning either directly thru a magnet of a gearless turbine or the shaft of a generator in a geared machine produces electrical power.

Wind turbines can be erected on individual farm operations and can be scaled to provide energy according to load. Dutch Valley Produce in the Municipal District of Pincher Creek has 3 375KW hrs as part of their energy supply. Costs for turbines typically sized for small farm operations are costed at about 16cents/pkw installed.

Large wind turbines can produce power at a breakeven cost of about 7 cents a kilowatt hour which is very comparable to gas generation but these machines have a capital cost of about 2 million dollars/megawatt. A large turbine erected on a farmsite would produce excess power for resale when in operation but backup power would be required as, of course, the wind does not blow all the time (even if we farmers think it does) and so there needs to be connection to the grid or energy storage capacity when it is not blowing.

Right now you can sell your power to the power pool or regulated utility at one price but of course you pay a much higher price when you need to buy some back.

The better solution by far would be for the provincial governments to legislate net metering. This would mean that an individual farmer, a Rural Electrification Association or a co-operative could erect a wind farm, use the power from the wind, selling the excess when the

To become a very effective solution to offset energy costs we require net metering

turbines are producing, and using power from the grid when their units are not producing power. In essence your meter would be running both ways. The turbine owner(s) would benefit from the arrangement: through lower input costs for energy, fixed contracts for pricing could be established for the sale of surplus energy as the fuel costs in zero, capital costs for the wind farms could be amortised over a period of years secured by real assets. The only detracting voices would be from the existing power generators and distributors who would loudly protest that their grid (which incidentally has been paid for many times over by the subsidised generators in regulated utilities) is used for storage. In the Alberta deregulated market we could easily determine a price for transmission line usage. In other provincial jurisdictions there has been some attempt to have net metering on a micro scale, it is not available on any scale in Alberta. Today I will tell you that wind energy is here to stay but if we want it to become a very effective solution to offset energy costs we require net metering.

The Canadian Wind Energy Association has an excellent listing of small and medium sized manufacturers of wind turbines and a very extensive website and contact list of industry and organisational players.

The website address is canwea@canwea.ca