

**Opportunity No:** 6  
**Category:** Wind Farms for Grid  
**Proponent:** Dr. M. Smith  
**Organization:**  
**Opportunity Title:** Wind Farms for Grid Supply

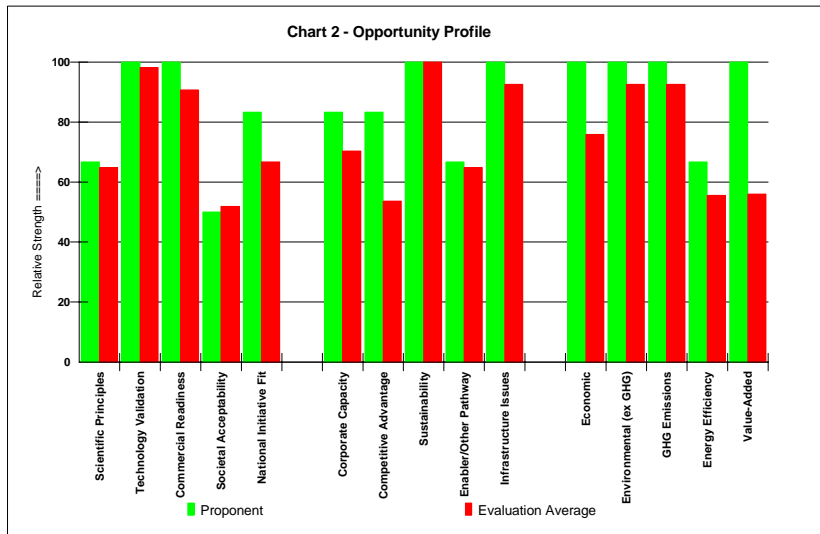
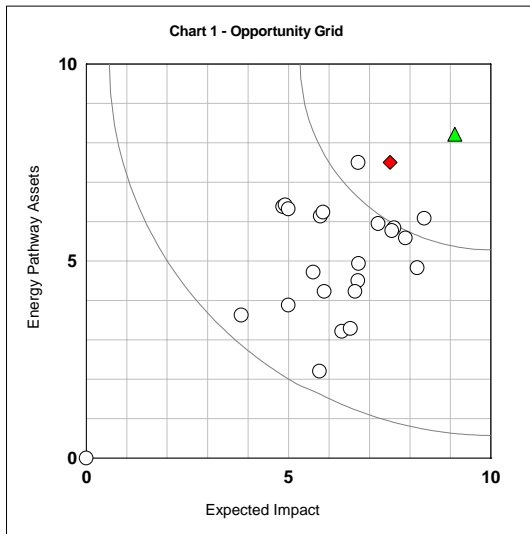
**Date Received:**  
**Type 1 \$:**  
**Type 2 \$:**  
**Date Start:**  
**Duration:** Years

**Summary:** Wind farms consist of an array of factory built wind turbines and the balance of plant infrastructure to collect the electricity and feed it into the electrical grid. Wind turbines are driven by zero-cost, non-polluting fuel, the wind. Technology development in the last 20 years for the rotor, drive train and electrical power conditioning equipment, have made wind power economically competitive and desirable as a replacement for other forms of generation that are environmentally less benign. Wide spread public support has created a regulatory environment where wind farm development is favoured through a relatively rapid permitting and environmental assessment process.

The Opportunity was evaluated according to the following Performance Criteria by: 9 Evaluators.

Energy Pathway Assets	Connectors	Expected Impact
Scientific Principles	Corporate Capacity	Economic
Technology Validation	Competitive Advantage	Environmental (ex GHG)
Commercial Readiness	Sustainability	GHG Emissions
Societal Acceptability	Enabler/Other Pathway	Energy Efficiency
National Initiative Fit	Infrastructure Issues	Value-Added

**Chart 1 - Opportunity Grid** shows the grid position for the Proponent's evaluation of the Opportunity (triangle) compared to the Evaluator's average (diamond) and the other Opportunities in strengths and weaknesses. the database (open circles).



**Comments on the Opportunity:**

**Action:**

**Total \$:**

11/14/2007

# **National Energy Engineering Association**

Opportunity No: 6

## **Reviewer 1**

### **Energy Pathway Assets**

The assets that this Pathway brings are getting stronger with time, as commercial use expands.

### **Expected Impact**

There will two main issues affecting impact, public support and the competition for investment from other energy options.

## **Reviewer 2**

### **Energy Pathway Assets**

### **Expected Impact**

## **Reviewer 3**

### **Energy Pathway Assets**

### **Expected Impact**

In a rush to get away, but it all seemed to work. Chris

## **Reviewer 4**

### **Energy Pathway Assets**

This one makes sense all around. However, it has not yet gone beyond a very small scale and locally controlled level in Canada and thus is nothing more than a small supplementary source. I guess if these were set up where the wind always blew, where birds never flew and where people never went or lived then most of the objections would go away quickly.

### **Expected Impact**

## **Reviewer 5**

### **Energy Pathway Assets**

### **Expected Impact**

## **Reviewer 6**

### **Energy Pathway Assets**

The scientific principles of the technology are well understood, the technology is validated though many improvements can and will be made (especially in perfecting the asynchronous connection of the turbine to the power network, thereby considerably increasing the availability, economics and overall effectiveness of the technology), present technology is commercially proven (despite the need for improvements), and its societal acceptability can be engineered where necessary (despite the low power density per kilometer with respect to other sources such as large hydro projects and nuclear) and has an excellent fit to a Canadian national initiative. One might even consider equipping EHV transmission line towers over long distances in isolated regions with suitably sized wind generation capacity if the wind potential allows.

### **Expected Impact**

The economic impact of supplying and deploying the technology has been demonstrated (such as in Denmark). Though this technology does not create GHG emissions (which is quite positive), numerous other environmental impacts have yet to be studied in depth such as their impact on birds, bats, insect life and migration patterns, etc. Other environmental issues likely need to be explored, from the generation of noise (which becomes an issue in more populated areas) and the possible change in wind patterns, which may come to affect climate locally. An aggressive policy of developing wind-based generation will result in reduced dependency on fossil fuel electricity generation. However, the low power generating density per square kilometer leads to the need for large surfaces to exploit wind-based power generation: this is viable only where this resource is available, or where a shared resource with other users is possible. The impact of wind energy on the overall efficiency of electric power generation and transmission would be positive, as it would contribute to reduced dependency on fossil fuel based energy generally, and thereby reduce numerous negative related ancillary effects of GHG production and global warming. As a result, the value-add impact is potentially significant and would contribute quite significantly to fostering energy independence for Canada.

## **Reviewer 7**

### **Energy Pathway Assets**

## **Reviewer 7 (continued)**

A very well developed pathway. This is one pathway which has a highly optimistic future. The assessment of Canadian assets is generally realistic.

### **Expected Impact**

I agree in general with the potential but feel that expected the projected impact is overly optimistic. 10,000 MW by 2010 is highly improbable. The commercial infrastructure is not in place. Construction of wind generators and associated electrical transmission will take considerable time

## **Reviewer 8**

### **Energy Pathway Assets**

### **Expected Impact**

## **Reviewer 9**

### **Energy Pathway Assets**

The challenge here is more social and political than technical. The NIMBY syndrome has already affected at least one wind-power investment decision. The development of wind power on a commercial scale will require a very careful communications effort. If people compare turbines on the horizon with no turbines on the horizon, all other things being equal, they will oppose wind power. But that is not the choice they face. They have to compare turbines on the horizon with increasingly frequent brown-outs and accelerated climate change. And it is up to politicians to make sure that the options are made unmistakably clear. And that, in turn, requires the politicians to be very well informed by the people who understand the issues in depth.

### **Expected Impact**

One impact of wind power has not received the attention it deserves: the potential for local self-sufficiency in energy that would eliminate long transmission lines to many small users. Much is made of the need to connect wind turbines into the grid because it is non-dispatchable. However, one could also design local systems with storage capacity that would make inefficient long-distance transmission over expensive lines to farms, villages and little towns unnecessary. This subject needs good engineering design, but all the components are there, e.g.: pumped storage in local reservoirs (natural or built), hydrogen production, battery banks, etc. I believe that the change in the architecture of our power distribution to farms and small communities could prove to be very economical.