Change is in the air.


photo courtesy of Vision Quest


photo courtesy of GE

Wind power keeps improving in big and small ways. Advances in technology and soaring global energy costs are making wind power a clean and viable option for big and small energy producers everywhere.

There's a growing interest in wind right across this country. From major power producers looking for cleaner ways to produce energy for the grid to inventive companies searching for alternative ways to power their plants – even down to the individual who wants to live off-grid – it's the people who believe in wind who power it.

"In early 2006, world wind capacity reached 59,322 MW. According to the World Energy Council, if the current growth rate continues, global capacity will reach 150,000 MW by 2010."[1]

Belief in wind is driving the advances.

Wind turbine technology.

The windmill has been used for millennia to grind grain. In the decades leading up to the 1930s, the wind turbine was used to generate electricity. Since the 1970s wind power, and the technology behind the modern turbine, has undergone a revolution.

The first modern turbines were larger than those of the 1930s and were grouped together to form wind farms for the purpose of generating electricity. First used in Denmark and California in the 1970s, the average output of a wind turbine back then was 100 kW. Today, that output is typically 20 times greater.

Today's turbines are far more efficient machines. They sit higher up in the air affording them access to better wind resources and fewer obstacles. The materials used to build the blades are stronger and lighter, so turbines can be built bigger and cover a greater area as they spin, generating far more electricity with every sweep.

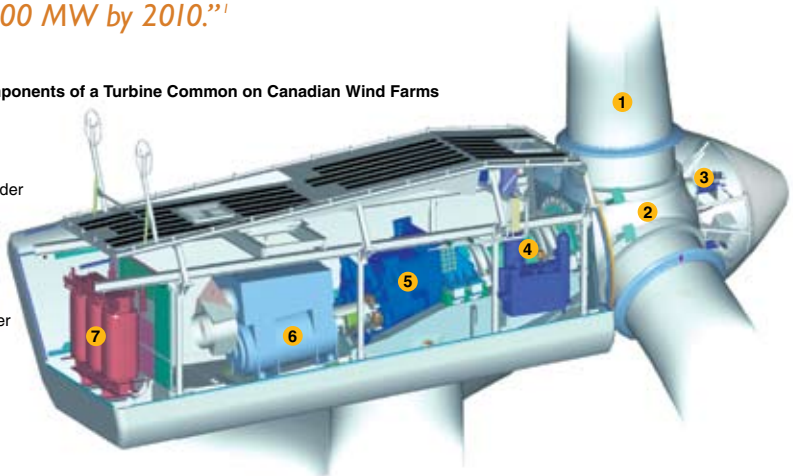
Offshore.

In other parts of Europe, a smaller inventory of onshore sites has led to the development of offshore wind. Putting turbines offshore offers producers the opportunity of a stronger and steadier wind resource. As offshore sites are more expensive to build, turbines must be larger and more efficient. Bigger wind turbines are being developed in Europe to make the most efficient use of their offshore wind resource.

In Canada, we are mainly focused on our onshore resource at this time, but some offshore projects are being pursued.

Primary Components of a Turbine Common on Canadian Wind Farms

1. Blade
2. Rotor Hub
3. Pitch Cylinder
4. Main Shaft
5. Gear Box*
6. Generator
7. Transformer



* Some turbine designs are "direct drive" and require no gear box.

illustration courtesy of Vestas Wind Systems A/S


photo courtesy of Vision Quest

PROFILE

How big are these turbines?

Big – and getting bigger all the time. Specs are for a 1.8 MW turbine.


photo courtesy of Vision Quest

The nacelle which the workers are standing on in the photo above, is the size of a small motor home and weighs 63,000 kg.

Each blade is 39 m long – the same length as a Boeing 737, and the 3-blade rotor weighs 35,000 kg.[3]

The 65 m tower is made up of rolled steel and comes in three pieces. The entire tower weighs 132,000 kg and contains enough steel to manufacture 206 average cars.[4]

The foundation is 9 – 10 m deep and 4 m across. 102 tension type bolts run the full depth of the foundation.

Swept area of the blades is 5,024 sq. m – the size of 3 NHL hockey rinks combined – or about 1.25 acres.

Total weight of the entire turbine is 230,000 kg – about the same as two fully fueled 3,200 HP diesel electric locomotives.

Even larger turbines are being tested for offshore applications. A 5 MW prototype with lightweight carbon fibre blades, 63 m long, covers a swept area two and a half times larger than the turbine described above. The 110 m tower is nearly twice as tall.[5]

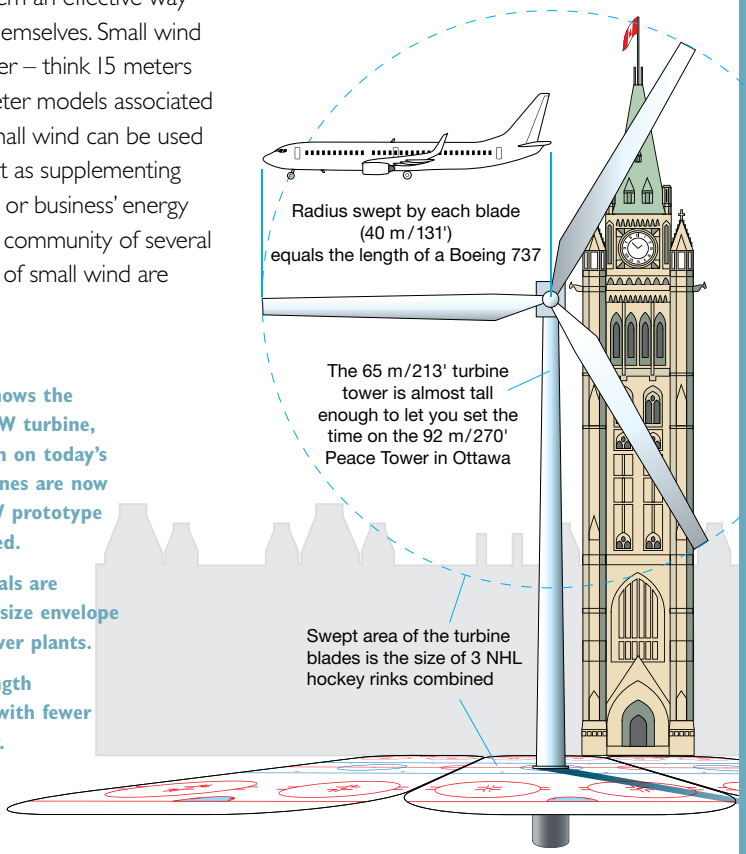

photo courtesy of Bergey Windpower Co.

Small wind. Small turbines.

Small wind turbines (300 kW or less and generally referred to as "small wind") give farmers or businesses a chance to generate electricity for their own purposes with one or two turbines located on their property. Small wind allows users to reduce their dependence on the grid and gives them an effective way to produce electricity themselves. Small wind turbines are much smaller – think 15 meters tall instead of the 90 meter models associated with wind farms. And small wind can be used for something as modest as supplementing a percentage of a home or business' energy use to powering a small community of several houses. The applications of small wind are limitless.[2]

Big advances. Bigger turbines.

Wind turbines and the farms that house them get bigger every year. The increased size of turbines has meant they can produce more energy more efficiently, and this drives down cost. In fact, the cost of wind-generated electricity has dropped more than 80% in the last 20 years and further declines are expected. Five years ago, wind turbines in Canada generated 600 kW, today the average turbine generates 1.5 MW. That's nearly a three-fold increase in output in just 5 years. Today 3 MW turbines are coming on line and in Europe, 5 MW prototypes are being designed – the technical evolution carries on.



This turbine diagram shows the relative scale of a 1.8 MW turbine, which is pretty common on today's wind farms. 3 MW turbines are now in production and 5 MW prototype turbines are being tested.

New lightweight materials are constantly pushing the size envelope for these sleek new power plants.

Increasing the blade length generates more power with fewer revolutions of the rotor.

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1: www.worldenergy.org/wec-geis/publications/reports/ser/wind/wind.asp
2: For some interesting applications of small wind, visit www.smallwindenergy.ca
3: Source: www.airliners.net/info/stats.main?id=96
4: Source: www.canadiansteel.ca/industry/factsheets/autoind.htm
5: Source: www.repower.de/index.php?id=237&L=1