THE SECRET IS OUT

WIND IS IN

Building a stronger, cleaner and affordable energy system.

canwea

WIND POWER. BUIL
CLEANER AND AFFORD

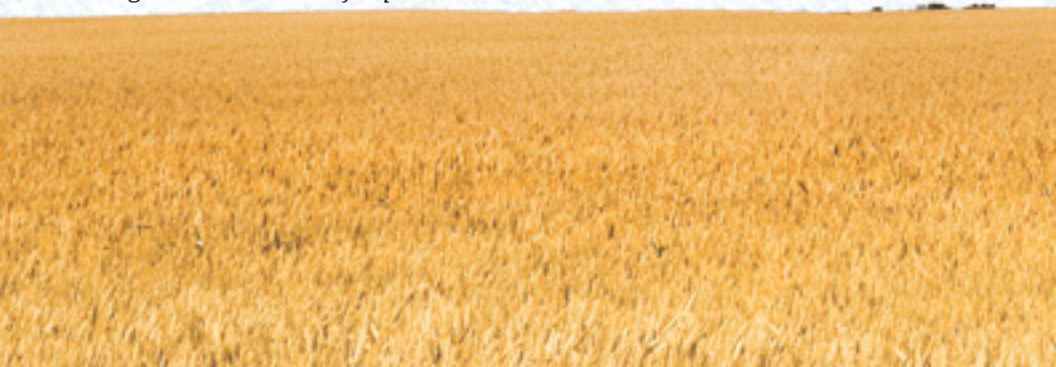
Wind energy is one of the fastest growing major sources of new electricity around the world. In 2011, global wind energy capacity grew by 21 per cent, with the wind industry installing a record level of just over 41,000 MW of new clean, reliable wind power. Today, there are close to 150,000 wind turbines operating around the world in 89 countries.

While wind energy has enjoyed growing success in many countries for several decades, it is a relatively new contributor to the power system here in Canada. As such, it is natural for people to have questions. As a responsible industry, we are committed to ensuring Canadians have the most up-to-date factual information on wind energy.

Wind by the numbers in Canada:*

- Current installed capacity: **5,511 MW**
- Wind Farms: **147**
- Wind Turbines: **3,204**
- Current per cent of Canada's electricity demand met by wind: **2.3**
- Wind energy is producing enough electricity to power over **1.2 million** Canadian homes
- Global ranking for total installed capacity: **9**

**Figures accurate as of September 2012*



DING A STRONGER, ABLE ENERGY SYSTEM

Canada is on track to surpass 12,000 MW of total installed capacity by 2016

- Representing more than $16 billion in new investments
- Creating an additional 68,000 person years of employment

Did you know?

- In 2011, wind turbines worldwide produced more than enough electricity to meet Canada's total electricity demand.
- The world installed 50 per cent more new wind energy capacity in 2010 than it installed in new nuclear capacity in the entire last decade.
- The world's total installed wind energy capacity at the end of 2011 was just shy of 238,000 MW.

Visit www.canwea.ca/farms/wind-farms_e.php for current wind energy initiatives in Canada.

What is a Megawatt (MW)?:

Electricity is measured in units of power called "Watts", defined as 1 joule per second, which represents the rate of energy conversion or transfer of useable (available) power. Watts are very small units, so the term Megawatt (MW) – or one million Watts – is commonly used to describe the maximum "rated capacity" of a wind turbine. A wind turbine with a rated capacity of 2 MW will typically produce the equivalent amount of electricity needed to power about 600 average Canadian homes for one year.

HOW A WIND TURBINE WORKS

1. Rotating generator converts kinetic energy of the wind into electrical energy
2. Transformer increases voltage for transmission to substation

Turbines work on the same principle that allows airplanes to fly. The wind doesn't push the blades, but passes over them. The resulting pressure difference between the upper and lower surfaces creates lift, which causes the rotor to turn.

As the blades spin, the kinetic energy of the wind is converted into mechanical energy, which is transmitted through a drive shaft to an electrical generator in the nacelle. The resulting current travels via underground cables to a substation, where it is converted to a higher voltage for the larger electricity grid. From there, it's delivered to the electric utility.

For more information on how a wind turbine is put together and how it is used to produce electricity, visit www.friendsofwind.ca.

3 Substation increases voltage for transmission over long distances

4 Transmission to grid

A SAFE FORM OF ELECTRICITY GENERATION

Wind energy is broadly understood to be one of the safest and most environmentally friendly forms of new electricity generation.

- The balance of scientific evidence and human experience to date clearly indicates that sound from wind turbines does not adversely impact human health. This is backed by several reviews of the best available science in this area, including reports by Ontario's Chief Medical Officer of Health, the National Public Health Institute in Quebec, and an expert panel report to the Massachusetts Department of Public Health. In fact, there are at least 17 reviews of independent scientific research and evidence that all conclude wind is not harmful to human health.*
- As a responsible industry that has been delivering clean electricity for more than 30 years, the global industry collectively continues to engage with experts in science, medicine and occupational and environmental health to monitor ongoing credible research in the area of wind turbines and human health.

**Summary of main conclusions reached in 17 reviews of the research literature on wind farms and health. Compiled by Professor Simon Chapman, School of Public Health and Teresa Simonetti, Sydney University Medical School.*

"In all forms, renewable energy is a safe and healthy alternative to fossil fuels."

– Dr. Robert Oliphant, President and CEO of the Asthma Society of Canada

"According to the scientific evidence, there isn't any direct causal link between wind turbine noise and adverse health effects."

– Dr. Arlene King, Ontario's Chief Medical Officer of Health

For more information and resources visit CanWEA's Talking About Wind page at http://www.canwea.ca/wind-energy/talkingaboutwind_e.php.

WIND IS COST-COMPETITIVE

Wind energy is an affordable source of new power and is continuing to improve its cost-competitiveness, as provinces seek to clean and diversify their electricity systems.

- The fuel that turns the turbine blades is free, providing long-term cost-certainty and a stabilizing effect on electricity rates that protects consumers from unpredictable price spikes due to volatility in price of fossil fuels.
- The cost of electricity from wind energy continues to decline while the cost of all forms of conventional electricity generation are expected to increase as a result of increasing fuel costs and increasingly stricter environmental regulations.
- New and cleaner electricity generation will reduce costs that we currently bear as a result of the impact of conventional electricity generation on human health and wildlife.
- Wind energy can be planned, built and commissioned quickly compared to more traditional energy sources.

*"The cost of electricity from onshore wind turbines **will drop 12 per cent** in the next five years thanks to a mix of lower-cost equipment and gains in output efficiency."*

– Bloomberg New Energy Finance

Improved turbine performance *alone has made wind's levelized cost of energy 5 to 26 per cent lower today than it was a decade ago, depending on the wind resource at the project site.*

– US Department of Energy's Lawrence Berkeley National Laboratory

Turbine costs have dropped roughly 20 per cent over the past three years while productivity has increased almost 30 per cent thanks to technological advances.

– Analysis by GL-Garrad Hassan of 121 potential onshore wind development sites in British Columbia, Canada

Wind. A smart choice.

Electricity prices are poised to increase across Canada as a result of necessary investments in new electricity generation and infrastructure – the Conference Board of Canada predicts that $347 billion in investment is required between now and 2030. All new generation is more expensive than existing generation and wind energy is extremely cost-competitive. This is even more obviously the case when all costs are considered when choosing an energy source – including impacts on the air we breathe, the water we drink, and cost over-runs that are often passed on to ratepayers.

PROPERTY VALUES AND LOCAL BENEFITS

Proximity to wind energy facilities does not have a pervasive or widespread adverse effect on the value of nearby homes. Researchers examined 7,500 single-family property sales between 1996 and 2007, covering a time span from before the wind farms were announced to well after construction and operation.

– US Department of Energy's Lawrence Berkeley National Laboratory

Studies have consistently shown there is no causal relationship between wind farms and negative impacts on property values. In fact, communities with wind energy projects benefit from local economic development through new sources of stable revenue in the form of taxes and lease payments.

- There are a number of factors that impact property values and it is difficult to isolate the potential impact of any single variable.
- What we do know is that multiple studies around the world have consistently found no statistical evidence that links wind projects to reduced property values.

"The Board finds there is no evidence to allow the Board to conclude that since the construction of the wind farm properties on what [the landowner] defines as the west side of the Island have sold for less than properties on the east side."

– Ontario Assessment Review Board. File No: WR 113994.
Municipality: Township of Frontenac Islands

WIND CREATES LOCAL BENEFITS

Wind energy developments are making positive and lasting economic contributions while helping to diversify communities across Canada.

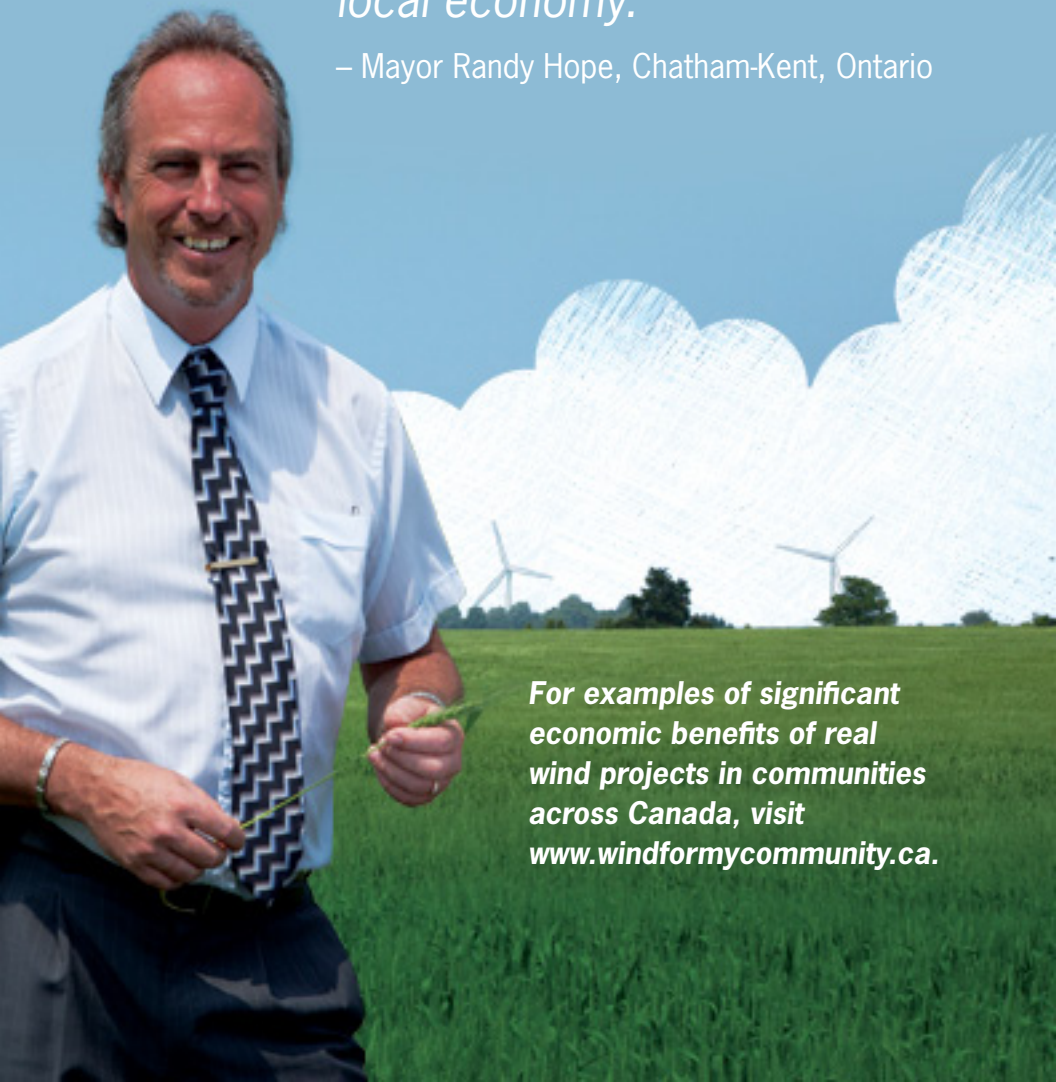
- Wind energy is creating new high-value jobs, providing employment opportunities for local trades-people and contractors as well as full-time permanent jobs once the wind farm is operational.
- Host communities are realizing significant economic benefits through new tax revenues, stable income for farmers and landowners from land lease agreements, and the financial benefits and potential spin-off from increased tourism.
- Wind energy projects bring direct investment in the form of contracts for raw materials and infusion of dollars to local services and retail businesses.
- In addition to the significant economic benefits wind energy projects bring to communities, developers are moving towards establishing voluntary Community Vibrancy Funds to support community initiatives and partnerships.

"Wind energy has created thousands of jobs for our IBEW members and affiliate organizations in Ontario and is providing green electricity for the families of the many communities we live in. These highly skilled jobs help build our local economies and provide new work opportunities for our future generation."

– Phil Flemming, International Vice-President, IBEW

"Wind energy is about land stewardship. We're using a small portion of land to provide the clean energy our modern society demands. New jobs and investment from wind energy mean a brighter future for the local economy."

– Mayor Randy Hope, Chatham-Kent, Ontario



For examples of significant economic benefits of real wind projects in communities across Canada, visit www.windformycommunity.ca.

WORKING TO PR

The wind energy industry is committed to respecting and protecting wildlife habitat and the environment. The industry partners with academic leaders, researchers, regulators and wildlife organizations to ensure development of wind energy is respectful and responsible.

Avian considerations:

While the relative contribution to overall avian mortality from wind turbines is extremely low relative to other sources of avian mortality, the wind energy industry is committed to continuous research and improvement in our understanding of avian interaction with wind turbines.

- The overwhelming evidence from studies consistently shows that wind farms are a minor source of bird mortality relative to other human impacts and other sources of electricity production.
- The industry continues to monitor and research emerging issues and to take steps to further mitigate losses – we are also held to high standards by regulatory authorities.
- Currently there are mechanisms in place to reduce potential risks and understand actual mortality of avian species – both prior to and following commissioning of wind energy projects. Examples include the use of appropriate siting, pre-construction risk surveys, post-construction mortality studies and implementation of adaptive management protocols.

OTECT WILDLIFE

Wind energy is emission-free and does not contribute to climate change – the single biggest threat to avian wildlife. Wind farms are also sited with respect for habitats – addressing two significant threats to birds and all other forms of wildlife.

Bat considerations:

The wind industry is actively engaged in leading-edge research to mitigate bat mortality at wind farms.

- The wind industry is one of the only industries that voluntarily studies and mitigates for wildlife impacts.
- Many members of the wind industry are actively involved in funding and researching mitigation options to reduce bat fatalities and understand impacts to wildlife.
- To improve our understanding of bat/turbine interactions, the Bats and Wind Energy Cooperative (BWEC) was formed in 2003. BWEC is dedicated to improving fatality search methods and advancing our understanding of bat fatalities. BWEC is also actively investigating ways to mitigate impacts, such as acoustic deterrents and potential mitigation through changes in operations. For more information visit http://www.batsandwind.org.

WATER USE: PRESERVING A PRECIOUS RESOURCE

Over its lifetime, a wind farm requires significantly lower water use compared to all traditional forms of electricity generation. In fact, wind energy is actually helping to preserve our increasingly precious water resources and fighting climate change.

- Water scarcity is becoming a global challenge exacerbated by population growth and climate change.
- The power sector is one of the world's biggest consumers of water, but wind energy uses virtually no water to produce electricity.
- Shifting from conventional forms of electricity production towards renewable technologies such as wind energy, will reduce impacts to water resources, by slowing the effects of climate change, and reducing overall water consumption in the electricity sector.

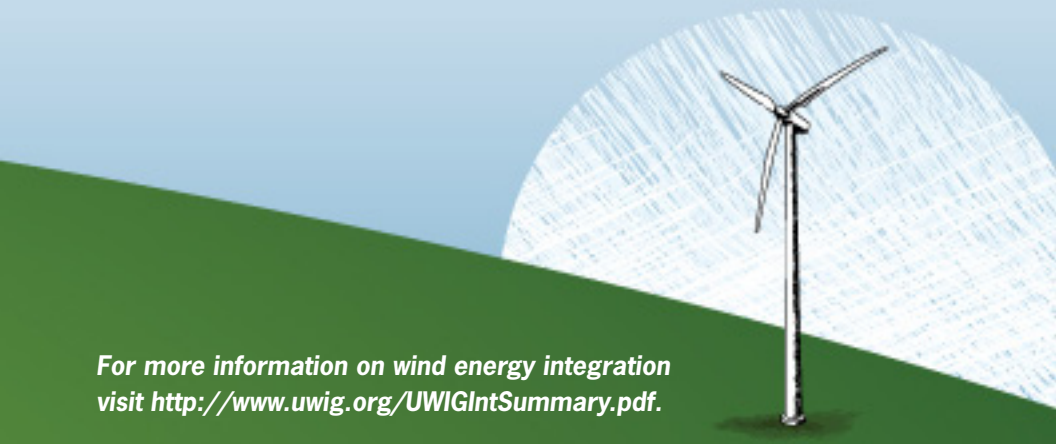
In the US alone, the Department of Energy estimates that with a 20 per cent share of wind energy in the power system by 2030, as much as 15 trillion litres of water could be saved. That's the equivalent to the annual consumption of more than 9 million US citizens.

(http://www.nrel.gov/docs/fy08osti/41869.pdf)

RELIABLE POWER PARTNER

Canada needs a variety of reliable, clean and safe sources of new energy to meet its future electricity demands and greenhouse gas emission commitments. Wind energy is part of a "balanced energy diet" and is making a substantial positive contribution to our energy supply mix.

- Utilities all around the world continue to recognize the value wind energy plays within a larger interconnected electrical system.
- The overall supply and demand of electricity on the grid is always in flux – grid operators have a century of experience in balancing the variability in supply and demand, and are becoming more familiar with the challenges and opportunities wind presents.
- Continual improvements in wind energy forecasting are helping grid operators enhance their day to day planning, by increasing their ability to accurately predict how much wind generation will be available at any given point.



For more information on wind energy integration visit http://www.uwig.org/UWIGIntSummary.pdf.

Based on real world operational experience, it is now well established that most electrical grids can obtain 20 per cent of their total electricity from wind without having to make substantial changes to the existing electricity grid.

CANADA'S INFINITE SOURCE OF CLEAN ENERGY

With the world's second largest landmass and longest coastline, Canada has one of the best wind resources on the planet. The benefits from developing Canada's wind energy resource are vast and varied.

- Wind energy is an environmentally preferred choice, generating electricity **without polluting** the air and emitting greenhouse gases, depleting precious water resources, or producing significant quantities of waste.
- Host communities realize **significant benefits** in the form of **new income** for rural landowners and farmers, new tax revenue for municipalities, **jobs** for local trades-people and contractors, and the financial benefits and potential spin-off from increased development.
- For some communities in Canada, the extra revenue from wind farms makes it possible for farmers to stay on family land and preserve a traditional way of life. **For others, it is an opportunity to be part of the solution for a cleaner future.**

Working with communities:

Effective and meaningful community engagement is fundamental to the success of a wind energy project, and our industry is dedicated to continually improving and strengthening the ways we work with local stakeholders. CanWEA has developed world-leading Best Practices for Community Engagement and Public Consultation to help guide our members work with local communities. The Best Practices document is available at www.canwea.ca/about/communityengagement_e.php.

TAKE ACTION!

Join the wind energy conversation at www.friendsofwind.ca

- Become a Friend of Wind – there are thousands across Canada!
- Submit a letter to your provincial representative
- Write a letter to your local newspaper
- Tell us your story – share your views on wind energy
- Join our social circle:

Like us on Facebook

Follow us on Twitter @CanWindEnergy

Follow us on YouTube

RESPONSIBLE.
SUSTAINABLE.

As the voice of Canada's wind energy industry, CanWEA actively promotes the responsible and sustainable growth of wind energy on behalf of its more than 420 members. We serve as Canada's leading source of credible information about wind energy and its social, economic and environmental benefits.

To join other global leaders in the wind energy industry, CanWEA believes Canada can and must reach its target of producing 20 per cent or more of the country's electricity from wind by 2025.

Learn more about the benefits of wind energy,
visit www.canwea.ca.