

## CNA BACKGROUNDER

# HOW CAN NUCLEAR ENERGY POSSIBLY BE BETTER FOR THE ENVIRONMENT THAN WIND POWER?



Nuclear power is much cleaner than wind power backed by natural gas, according to an independent study prepared by Hatch Ltd., a leading engineering firm.

The wind doesn't always blow. When it's calm, an electrical system that uses wind power needs to find other power sources. To fill the gap, power companies often use gas-fuelled generators that they fire up as needed.

By itself, wind power creates almost no greenhouse gas – the pollutants that cause climate change. Neither does nuclear power. But natural gas does.

How much more? According to the Hatch review, the energy used to generate one kilowatt-hour (kWh) of electricity will send these amounts of greenhouse gas into the atmosphere:



(A kilowatt-hour is the electricity that would keep ten 100-watt light bulbs lit for one hour. A typical Canadian home uses about 800 kWh a month.)

### Wind: On and off

What matters is whether a wind turbine can work flat out, and produce all the electricity for which it is designed.

According to the Hatch analysts, a wind turbine usually produces only 20 percent of its potential power. If a turbine can physically produce up to one megawatt (MW) of electricity, then it typically turns in one-fifth of that, or 200 kilowatts (kW).

Because we don't have big-enough batteries yet to store electricity from wind turbines, the power company needs to get the other 800 kW from somewhere else, like a gas plant.

### 20/80 combo

Hatch assumed that a given amount of electricity would come either from a nuclear power plant or a combination of wind and gas plants. Hatch used a combination of 20 percent wind and 80 percent power, which its experts think is realistic, considering how power companies use wind and gas today.

In Ontario, power demand is highest during the day, and in the summer. But the wind blows mostly at night, and in the winter and spring. By its nature, wind power finds itself out of step with power demand.

The results? The average nuclear power plant emitted 18.5 grams of greenhouse gases per kilowatt-hour (kWh) through its entire lifecycle, compared to 385 grams per kWh for wind backed by natural gas.

In other words, in generating the same amount of electricity, the combination of wind and gas plants produced 20 times more greenhouse gas than a nuclear plant.

## Bottom line

Nuclear power is one of the best electricity sources to combat climate change. It is almost as clean as wind power, and far cleaner than natural gas.

The UN's Intergovernmental Panel on Climate Change recommended tripling the energy from renewable and nuclear sources in order to keep climate change within safe limits.

Many notable scientists and environmentalists agree, including James Hansen, the former head of NASA's Goddard Institute for Space Studies. In climate-change research, he is considered a global thought leader.

The Economist magazine recently listed nuclear power as the third-most effective way to slow climate change, after the first-place Montreal Protocol (which cut back on climate-warming chemicals called chlorofluorocarbons – a chlorine-based pollution.) Nuclear is estimated to reduce 2.2 billion tonnes of greenhouse gas annually, about four times as much as non-hydro renewables.

## Lifecycle analysis

Lifecycle analysis studies an industrial process from cradle to grave. It is the most widely accepted, comprehensive measure of environmental performance, because it allows an apples-to-apples comparison of technologies' full effects.

The Hatch analysts reviewed 246 lifecycle analyses performed since 2000. They took into account the lifetime emissions of a power plant from inception to decommissioning, including its fuel and other inputs, and the management and disposal of its waste.

## Canadian Nuclear Association

The Canadian Nuclear Association represents the nuclear industry in Canada and promotes the development and growth of nuclear technologies for peaceful purposes.

Along with medical therapy and imaging, food safety, and materials science, electric power generation is one of the principal applications of nuclear technology. Nuclear energy supplies

about 15% of Canada's electricity, and nearly 60% of electricity used in Ontario.

The CNA works to convey accurate information to Canadians about this reliable, affordable, clean and safe – but greatly misunderstood – source of energy, including accurate information about its health and environmental effects.

## For more information

“Curbing climate change: The deepest cuts.” The Economist. 20 September 2014.

[http://www.economist.com/news/briefing/21618680-our-guide-actions-have-done-most-slow-global-warming-deepest-cuts?fsrc=scn/tw\\_ec/the\\_deepest\\_cuts](http://www.economist.com/news/briefing/21618680-our-guide-actions-have-done-most-slow-global-warming-deepest-cuts?fsrc=scn/tw_ec/the_deepest_cuts)

“IPCC Working Group III Recommends Nearly Quadrupling Nuclear Energy.”

The Energy Collective. 20 April 2014.

<http://theenergycollective.com/rodadams/370626/ipcc-working-group-iii-recommends-nearly-quadrupling-nuclear-energy>

“If You're Concerned About Climate Change, You Should Support Nuclear Power.”

Carol Browner. Forbes. 5 May 2014.

<http://www.forbes.com/sites/realspin/2014/05/05/if-youre-concerned-about-climate-change-you-should-support-nuclear-power/>