

## Wind power is gas power, and comes with pollution

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by Steve Aplin

According to Ontario's long term energy plan, in 2030 the province will get 26.3 billion kilowatt-hours from wind, solar, and bio-energy. Most of that will be from wind, which according to historical statistics produces electricity 33 percent of the time. To get 26.3 billion kWh, then, Ontario will need around 10,000 megawatts of installed wind capacity.

If you think this seems an odd way to plan a power system, you are right. Wind is not dispatchable; the electricity system operator cannot call the operator of a wind turbine and say "I'll need 50 MW of power in five minutes, so start ramping up." Well, he actually *can* call and request exactly that, but there is a 67 percent chance the wind operator will say "sorry, the wind conditions are such that I cannot fulfill your request." i.e., the wind isn't blowing.

This points up a central reality of power systems whose planners want to add a lot of wind capacity. In the words of Dr. Ulrich Decher, a nuclear engineer with Westinghouse, wind turbines "do not replace the need for any other generators. All the generators that are needed *without* windmills are needed *with* windmills."

Comparisons are often made of how many windmills it would take to eliminate the need for a conventional power plant. These comparisons are totally meaningless because windmills do not add any megawatts to the grid when the wind is not blowing. Windmills must be paired with some other power plant or energy storage device (such as pumped hydro storage) to add capacity to the grid.—Dr. Ulrich Decher (source: ANS Nuclear Café, <http://ansnuclearcafe.wordpress.com/2010/12/09/fitting-wind-onto-the-grid/>)

This means that when the Ontario system operator is forced to turn to another power generator to meet the provincial demand—not *if*, but *when*—it is almost certain that that other generator will run on natural gas.

This is because the province plans to phase out coal-fired generation by 2014. Which raises a critical issue that is directly related to the reason for the coal phase-out. The coal plants are being phased out because of their heavy carbon and pollution emissions. That is why coal is being replaced by wind and gas: wind turbines ostensibly put no emissions into the air, and gas puts less emissions than coal.

But because of the reality that Dr. Decher describes, those 10,000 MW of wind must be matched with 10,000 MW of gas. Let's also be clear that gas will actually be the main energy source in that pairing, producing those 10,000 MW of energy 67 percent of the time. Depending on the type of gas generator, each kWh of gas power can dump 330 to 550 grams of carbon dioxide into the atmosphere. In view of this, it is reasonable to consider what the emissions implications of the wind/gas pairing will be.

The spreadsheet below compares that the wind/gas pairing in Ontario with nuclear/coal. You may be surprised to see that nuclear/coal is actually cleaner. Ten thousand MW with wind/gas would dump over **19 million metric tons** of carbon dioxide and other bona fide air pollutants into the air every year.

<b>Wind and gas versus nuclear and coal</b>			
<b>Wind/Gas</b>		<b>Nuclear/Coal</b>	
power needed (MW)	10,000	power needed (MW)	10,000
hours in year	8,760	hours in year	8,760
kWh per year	87,600,000,000	kWh per year	87,600,000,000
Wind capacity factor	33%	Nuclear capacity factor	85%
Wind GHGs, in g CO2/kWh	0	Nuclear GHGs, in g CO2/kWh	0
Gas capacity factor	67%	Coal capacity factor	15%
Gas GHGs, in g CO2/kWh	330	Coal GHGs, in g CO2/kWh	900
Wind kWh per year	28,908,000,000	Nuclear kWh per year	74,460,000,000
Gas kWh per year	58,692,000,000	Coal kWh per year	13,140,000,000
<b>Mt CO2, wind/gas, per year</b>	<b>19,368,360</b>	<b>Mt CO2, nuclear/coal, per year</b>	<b>11,826,000</b>
<b>GHGs</b>			
ratio of wind/gas to nuclear/coal	1.64		
ratio of nuclear/coal to wind/gas	0.61		

For a pollution-reduction plan, the wind/gas pairing is terrible. Ontario could reduce more pollution simply by shifting more of coal's historic production to nuclear.

The wind/gas pairing is terrible also in terms of pure economics. As I showed in my post "*Ontario nuclear power subsidizes gas and renewables,*" at

<http://canadianenergyissues.com/2010/11/17/ontario-nuclear-power-moderates-subsidizes-the-cost-of-gas-and-renewables-an-investigation-into-the-price-of-political-correctness/>

wind and gas are responsible for 66 percent of the Global Adjustment dollars that Ontario ratepayers will have to cover just so the wind and gas generators will do business with the province.

Nuclear and coal are far cheaper, and the generators already exist and are connected to the grid.

Ontario could achieve bigger emission reductions with equipment it already has, and for cheaper, than it could by embarking on the wind/gas science project. More people need to know this.