



Environment,
Climate Change
& Water

NSW Wind Farms and Greenhouse Gas Savings



The scientific consensus is that Australia, and other nations, must start to reduce their greenhouse gas emissions in the next decade if we are to avert the risk of what the Intergovernmental Panel on Climate Change refers to as 'dangerous' climate change.

Electricity generation is responsible for over a third of Australian and NSW greenhouse gas emissions, largely because of a heavy reliance on fossil fuels in power generation. At present, Australia has the second highest greenhouse gas emissions per unit of electricity produced.

Currently, wind energy is generally the cheapest renewable energy and the only renewable energy technology with immediate opportunities for large-scale deployment.



NSW wind farms and greenhouse gas savings

Some have argued that wind farms do not reduce greenhouse gas emissions, as they believe that coal fired and gas power will continue to be produced regardless of how much power wind farms generate.

Energy market experts, SKM MMA, found that due to the way the NSW electricity market operates, every additional unit of wind power injected into the NSW grid 'almost exclusively' displaces coal and gas fired power.

In other words, the power made by wind replaces the power made by coal or gas and therefore reduces the greenhouse gas emissions.

Figure 1 shows the yearly greenhouse savings on average for different sized wind farms in NSW.

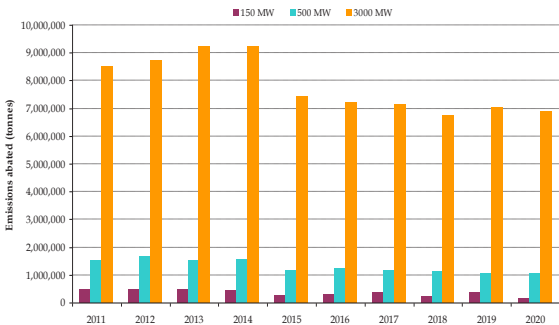


Figure 1 Greenhouse gas emissions abated in NSW for 150 MW, 500 MW and 3000 MW wind capacity

Note: in the future, if a carbon price is implemented, gas power stations will start to become more cost effective as they have lower greenhouse gas emissions. Wind energy, in turn, will save less greenhouse gas emissions as it displaces more gas fired power. This is why the graph tends to slope downwards after 2015, when it is assumed a carbon price will be implemented.

The table below demonstrates the greenhouse gas savings that wind power can achieve.

Table 1 Wind farm output and greenhouse gas savings

Wind farm size	How many houses will it power each year?	What are the greenhouse gas savings?
The average size of a NSW wind farm – 150 megawatts	60,000 – 65,000	200,000 – 600,000 tonnes per year
A large wind farm – 500 megawatts	Around 200,000	Over one million tonnes per year
The approximate total capacity of wind farms with planning approval in NSW in 2010 – 3000 megawatts	Around 1 .25 million	Over seven million tonnes per year



How wind power works

A wind turbine comprises a tower, topped by an enclosure called a nacelle, and the rotor, which is the propeller-like structure connected to the nacelle.

The wind strikes the blades connected to the nacelle and, due to their shape, they cause the rotor to spin. When the wind is strong enough, the rotational energy in the rotor converts to electrical energy within the generator.

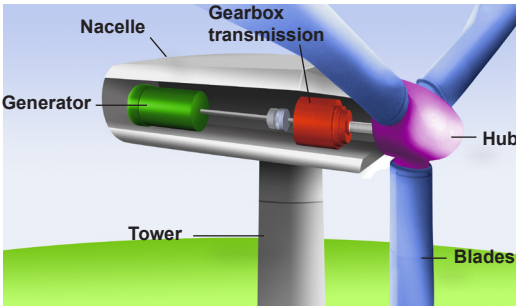


Figure 2 A wind turbine

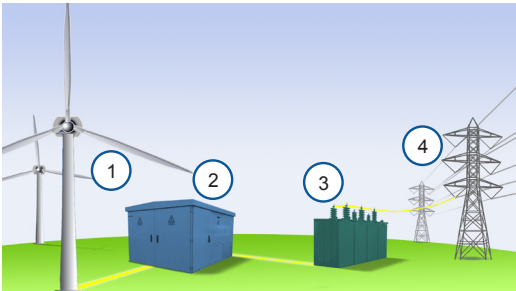


Figure 3 How wind turbines transfer power to the electricity grid

- 1 Rotating generator converts wind energy to electricity
- 2 Transformer increases voltage for transmission to substation
- 3 Substation increases voltage for transmission over long distances
- 4 Transmission to the grid

**Do you want to see the
greenhouse gas savings from a
wind farm in your area?**

**How much power will it
generate?**

Find out with the **NSW Wind Farm
Greenhouse Gas Savings Tool**,
[www.environment.nsw.gov.au/
climatechange/reprecinctresources.htm](http://www.environment.nsw.gov.au/climatechange/reprecinctresources.htm).

The tool will allow you to easily calculate the
projected greenhouse gas savings from new
wind farms in NSW.

The wind industry will also use the tool for
planning applications, ensuring a consistent
method is used in calculating greenhouse
gas savings.

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