Ecological Considerations for Wind Energy

Above Photo: Church Point, Nova Scotia
SOURCE: COMMUNICATIONS NS

What ecological issues are raised by wind energy?

Domestic renewable energy production makes our way of life more sustainable and provides many ecological benefits. Using a local resource like wind to generate electricity doesn't require extraction, processing or water, and doesn't produce air or water pollutants or other wastes.

However, wind energy projects must be carefully planned to ensure that their construction and operation do not have negative ecological impacts. A poorly-sited development can damage valued wetlands, harm species at risk, or result in collisions with birds or bats. These and many other issues are reviewed in the environmental assessment (EA) required for any wind energy project with a generation capacity of 2 MW or more. Smaller wind energy projects are not subject to an EA because the risk of environmental and social effects is less.

Site selection is critical in developing a large wind energy project with minimal ecological impact. Reviewing potential project sites involves many considerations, such as wind resource, but ecological factors are paramount. Once a site is selected, up to two years of planning, studies and consultation will be done before an EA is filed with the Province. With good site selection and planning, ecological impacts can be minimized or eliminated.

Producing electricity with renewable local resources reduces dependence on fossil fuels and resulting air emissions and greenhouse gas production, which mitigates climate change and benefits the local and global environment.

Do different sources of electricity have different environmental impacts?

Different electricity technologies raise different environmental considerations. Brief overviews of each, based on a Canadian Electricity Association[1] power generation study, appear below. The study considered air emissions, greenhouse gas production, water use, resource extraction, wastes and other issues. Impacts associated with manufacturing any of these technologies are not addressed.

Coal

Burning coal creates air pollutants and greenhouse gas emissions. Coal-fired generators require water for cooling and create a thermal discharge to receiving waters as well as solid wastes like fly ash. In Nova Scotia, coal electricity generation produces significant air emissions including carbon dioxide, a greenhouse gas.

Natural Gas

Like coal and oil, natural gas is an extracted fossil fuel that uses thermal generation to create electricity, but it is cleaner, producing fewer air emissions and less greenhouse gases and thermal discharge.

Nuclear

Nuclear requires extraction of uranium and has high cooling water demands; the most significant concern is the production and management of radioactive wastes from nuclear processes.

Oil

Oil's impacts are similar to those of coal-fired generators, but are less intense in terms of air emissions and cooling water requirements.

Biomass

Combustion of biomass produces some air pollutants and greenhouse gases; the amount depends on the resource and specific technology. The source and harvesting of the biomass are key factors.

Hydro

There are no air emissions from combustion, but reservoir hydro creates greenhouse gas emissions in the form of methane. The main impacts are on the river/lake and watershed itself, including fish and fish habitat.

Solar

There are no direct adverse effects on air or water, and no wastes directly produced by photovoltaic solar.

Wave & Tidal

Environmental effects of both wave and tidal power are site-specific, so site-specific research is generally required. The primary concern is fish and their habitat.

Wind

There are no wastes or emissions from operational turbines, but there are potential bird and bat collisions.

1 *http://www.electricity.ca/media/pdfs/EnvironmentallyPreferrablePower/2-powergenerationincanada.pdf*

How is wind energy part of the climate change solution?

Each year, our society releases millions of tonnes of carbon dioxide by burning fossil fuels, which contributes to climate change. In Nova Scotia, this is mainly from coal. While wind energy is not the sole answer to climate change, it can be instrumental in reducing greenhouse gas emissions. Climate change is a significant threat to our local ecosystems.

According to the Intergovernmental Panel on Climate Change's recent report, "Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent climate changes have had widespread impacts on human and natural systems" (IPCC 2014[2]).

Of all energy production technologies, wind energy appears to have the lowest lifecycle emissions. Wind-generated electricity produces no greenhouse gas emissions. Manufacture and transport of the turbine and associated equipment do produce greenhouse gases, but the European Wind Energy Association[3] states that it takes a turbine only three to six months to compensate for the energy that goes into its manufacture, installation, operation, maintenance and decommissioning at the end of its life.

Electricity generation is responsible for about half of Nova Scotia's greenhouse gas production. There are no silver bullets to address climate change, but decreasing our use of fossil fuels to make electricity and increasing our use of renewable sources like wind could lower greenhouse gas emissions substantially.

How can wind energy's ecological impacts be minimized?

Site planning considers ecological factors like wetlands and watercourses, fish and fish habitat, migratory and breeding birds, flora and fauna, and species at risk and of conservation concern. Selecting a site distant from important bird areas and bat hibernacula will reduce collisions. Micro-siting of turbine pads, electricity lines and access roads can avoid or minimize interaction with wetlands and watercourses. For larger projects, studies will be completed as part of the EA; for example, determining where there is low potential for affecting plant or animal species at risk.

Monitoring of carcasses under turbines has shown minimal collision kills with birds and bats, but this remains an important consideration, particularly if species at risk or of conservation concern, like the Little Brown Bat, are in the area. This species was once the most common bat in Nova Scotia but is now threatened by White-nose Syndrome and listed as Endangered[4].

2 *http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf*

3 *http://www.ewea.org/*

4 *http://novascotia.ca/natr/wildlife/biodiversity/species-list.asp*

SOURCE: CRAIG NORRIS

Amherst, Nova Scotia

SOURCE: COMMUNICATIONS NS

Amherst, Nova Scotia

Case Study Basic Stats

Location:

Municipality of the County of Cumberland

Output:

31.5 MW

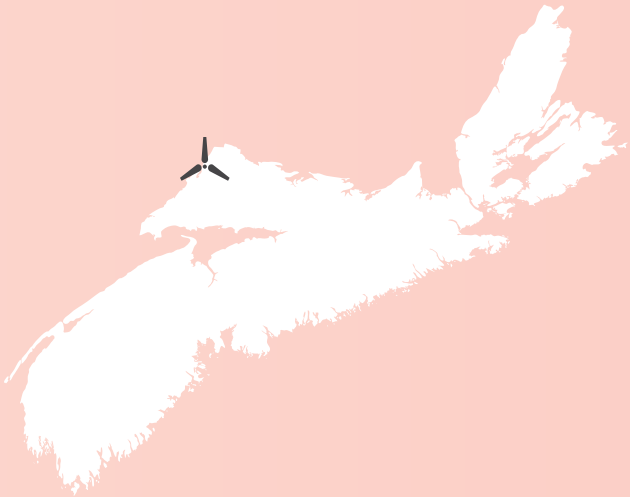
No. of Turbines:

15

Case Study: AMHERST WIND ENERGY PROJECT

Outside the Town of Amherst, near the New Brunswick border, there are fifteen 2.1 MW wind turbines owned by a private company. Because the project is sited on more than 400 hectares of agricultural lands near the John Lusby Marsh National Wildlife Area, the Chignecto National Wildlife Area, and the Amherst Point Bird Sanctuary, there were unique ecological sensitivities to consider. After several years of planning and studies, the environmental assessment (EA) was filed in 2008[5].

Nova Scotia Environment approved the project with many Conditions of Approval, typical for a large wind energy project. They included post-construction bird and bat monitoring and development of an Environmental Protection Plan to ensure compliance with the Species at Risk Act and the Migratory Birds Convention Act. Post-construction monitoring for birds and bats includes carcass searches to verify the EA's prediction that no significant adverse residual environmental effects are likely, including any to birds and other wildlife.



5 *http://www.novascotia.ca/nse/ea/amherst.wind.energy.project.asp*