



Environmental Impact



Will wind energy projects in Newfoundland and Labrador produce hydrogen?

Yes, wind energy projects in this province are expected to include hydrogen production. Newfoundland and Labrador, with its abundant renewable resources, plans to leverage methods such as electrolysis, where renewable electricity—sourced from wind, hydroelectric power, or solar—splits water into hydrogen and oxygen.

This process produces “green hydrogen,” a clean energy solution with zero emissions, positioning the province as a key contributor to the global hydrogen economy. With strong renewable infrastructure and a commitment to sustainable energy, Newfoundland and Labrador aims to produce green hydrogen that supports both local and global decarbonization initiatives.

Some projects may also convert hydrogen into hydrogen derivatives, such as ammonia, or Liquid Organic Hydrogen Carriers (LOHC), which can be for direct use or as mediums for hydrogen transport and storage.



2

How safe is hydrogen and ammonia production?

The industry has developed rigorous standards and safety protocols to mitigate risks, including specialized storage containers, leak detection systems, and strict operational procedures. Facilities will follow the prescribed regulations for hydrogen and ammonia production.

3

Are water supplies at risk?

Provincial regulations require all project proponents to have environmental management systems in place, including water analysis, environmental protection plans, risk mitigation strategies and contingency plans.

Water contamination risks from hydrogen production are low, especially with proper management. Electrolysis, the main method of green hydrogen production, only requires water and electricity, with oxygen as a byproduct.

4

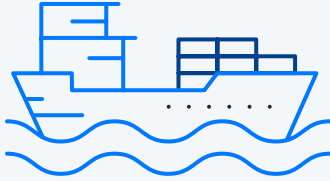
Will ammonia be used during the energy conversion process?

Ammonia is one of the derivative options being considered by proponents. Many of the wind-hydrogen facilities proposed for Newfoundland and Labrador will produce hydrogen from electricity generated by wind power. Hydrogen can be stored and shipped when it is converted into ammonia.

Ammonia is a carbon-free product that is used around the world as it is stable and easy to transport. Ammonia is typically used in refrigeration and ice rinks, though about 90% of the ammonia produced today is used for fertilizer. It can also be used as a fuel or as a power and heating source.

5

Is ammonia safe to handle and ship?



Ammonia has been produced, handled, and shipped safely for over a century. It plays a critical role in agriculture as a key component of fertilizers, as well as in refrigeration and industrial processes.

Ammonia is a commonly shipped good with 20,000 metric tonnes per year typically shipped globally and in 2020 there were 120 ports with ammonia trading facilities.

Thanks to its long history of use internationally, robust safety standards have been developed to mitigate risks, making ammonia transport and handling routine in global industries. Its established safety record underscores that, with proper protocols, ammonia can be managed efficiently and securely. Standard safety measures include proper ventilation, protective equipment for workers, and adherence to transportation regulations.

Newfoundland and Labrador has extensive experience in the safe handling, storage, and shipping of energy products, such as crude oil, and this experience, combined with regulations and protocols will ensure the safe handling, storage, and transportation of ammonia.

6

What are Liquid Organic Hydrogen Carriers?

Liquid Organic Hydrogen Carriers (LOHC) are an alternative to ammonia for the storage and transportation for hydrogen and are also being considered. LOHCs are chemical compounds that can both absorb and release hydrogen through hydrogenation and dehydrogenation processes. LOHCs are stable and handle like conventional gasoline, making them safer and practical for large-scale applications.

7

Are LOHCs safe to handle and ship?

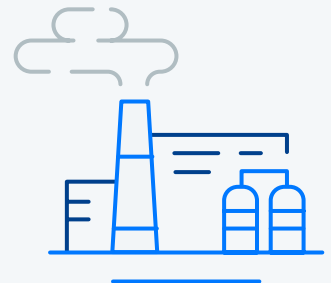
LOHCs are liquids at ambient temperatures and pressures, allowing for safe storage and handling. Depending upon the project, these storage and handling conditions can also permit the utilization of existing infrastructure with minimal reconfiguration, encouraging repurposing of idle equipment and familiar operations.

LOHCs have a similar risk profile as gasoline and crude oil, and with Newfoundland and Labrador's extensive experience in the safe handling, storage, and shipping of these energy products, combined with regulations and protocols, safe handling, storage, and transportation of LOHC can be ensured.

8

Will there be pollution from hydrogen and hydrogen derivative production facilities?

Hydrogen and hydrogen derivative production facilities, especially those powered by renewable energy like wind and solar, offer significant environmental advantages. These facilities often incorporate water recycling and other technologies to minimize their environmental impact. By using clean energy sources, they generate minimal greenhouse gas emissions, helping to reduce air pollution and combat climate change.



9

How much land will a project require?

The land required for hydrogen and hydrogen derivative production facilities depends on its size and the technology used. These facilities can vary from a few hectares to several square kilometers, depending on whether the site includes renewable energy sources like wind or solar farms.

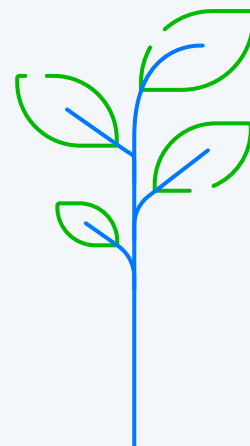
Similarly, the land required for wind development depends on the size of the turbines and the wind farm's layout. Approximately 100 square meters of land may be required for each turbine and associated infrastructure. The majority of the wind farmland can still be used for other purposes like agriculture. We encourage you to visit developers' websites for project-specific information regarding the spacing distance of wind turbines.

10

How do wind-hydrogen developments help combat climate change?

Wind energy is a clean, renewable energy source. When used to power hydrogen production facilities, it provides a pathway to produce hydrogen without any carbon emissions. This 'green' hydrogen can then be used as a zero-emissions fuel in various sectors such as transportation, industry, and energy storage, thus reducing greenhouse gas emissions.

An at-scale, low-carbon hydrogen economy is a strategic priority for Canada as it looks to diversify our future energy mix and reach our net zero greenhouse gas emission targets.



11

Will wind turbines cause light pollution?

Wind turbines often have subtle blinking lights at the top of the tower as a safety precaution for nearby aircraft (i.e. similar to the lights on local cell towers). Operating wind farms create much less light pollution than most industries or communities (e.g. car headlights, streetlights, business signage, light emitted from local residences). Some proponents are also exploring technology that automatically turns turbine lights on and off.

12

Are wind turbines hazardous to birds?

The environmental assessment processes used to approve wind turbines is rigorous and dedicates significant effort to protect wildlife and plant life, including at risk or endangered species, and specifically studies a project's impact on birds. Projects will be designed, constructed, and operated following applicable environmental regulations and guidance.

Ongoing research and monitoring efforts focus on developing best practices to enhance turbine operation while protecting birds, demonstrating a commitment to balancing renewable energy needs with wildlife conservation.

More birds die from colliding with buildings than with wind turbines, and the margin is substantial. Studies in the US indicate that wind turbines are responsible for ~0.04% of bird deaths (1). Passenger vehicles and cats are responsible for ~900 times and ~10,000 times more bird fatalities respectively than wind turbines in the US (1).

Additionally, modern wind turbines are designed to be taller, which significantly reduces the risk to many bird species, particularly those that fly at lower altitudes. Technological advancements in turbine design, such as larger blades and improved siting strategies, further minimize interactions with wildlife.

U.S. Fish & Wildlife Service, Threats to Birds: Migratory Bird Mortality – Questions and Answers.



13

How will wind turbines affect other wildlife, endangered species, or plant life?



The environmental assessment processes used to approve wind turbines are rigorous and dedicate significant effort to protect wildlife and plant life, including at risk or endangered species. Projects will be designed, constructed, and operated following applicable environmental regulations and guidance. Environmental management plans, including mitigation for potential effects on wildlife will need to incorporate guidance and requirements gained through the environmental assessment process, and through ongoing conversations with government regulators.

There are thousands of wind turbines operating around the world. This global experience has helped the wind energy industry learn and evolve, developing approaches to reduce effects on wildlife that have become standard practice and are required by regulators. These include turbine siting and design.

14

Are there risks to people, wildlife or the environment from ice throw?

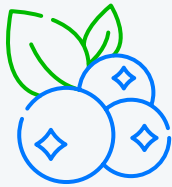


The environmental assessment process considers concerns such as ice throw, and appropriate mitigation measures are required to be provided. Additionally, turbines are typically sited far from residential areas to minimize risks.

We encourage you to visit developers' websites for project-specific information regarding risk mitigation from ice throw.

15

What will happen to areas frequented for berry picking, hunting, hiking, and other recreational activities?



Wind turbines have been present throughout the world for some time and have coexisted with human activities since their beginning.

Project proponents will work with communities to develop common use agreements so areas used for these purposes remain accessible.

During construction, access to active construction areas may need to be restricted to protect public safety, though, when construction is over, restrictions may be removed around turbines.

Hunting regulations regarding proximity to industrial installations will be in effect.

There will be fences where required for public safety, such as at electrical substations, but generally, fences will not be in place around turbines or access roads.

Each project is likely to have a specific approach, one that follows best practices of the global industry and provincial regulations.

16

How much noise do wind turbines create?

Modern wind turbines typically produce sound levels between 45-55 decibels at a distance of 300-500 meters, comparable to the noise level of a refrigerator.



West Wind Energy: How much noise does a wind turbine make? – Questions and Answers.

17

How could shadow flicker affect surrounding areas?

Shadow flicker is a visual effect caused when the sun casts a shadow of rotating wind turbine blades across a structure. If this is an issue in a particular location, adjustments can be made as per the guidelines provided by the environmental assessment process.



In summary, wind-hydrogen developments are a promising approach to reducing greenhouse gas emissions, with potential risks that can be managed through careful planning, technology, and regulation.