



Hydrogen and Our Communities



① Why is Newfoundland and Labrador such an attractive place for wind energy and hydrogen development?

Our geography and natural resources, specifically wind, makes Newfoundland and Labrador a prime location for new large-scale wind developments.

As we know from experience, our wind is consistent and powerful. For context, the U.S. Energy Administration states that for utility-scale turbines, 5.8 meters per second (m/s) [20.8 km/h] is a good annual average and a 2016 report placed the annual average wind speeds for high potential areas in Newfoundland and Labrador at 9.18 m/s [33 km/h].

Further, **88%** of land in the province is unpopulated Crown land which has the potential for wind development.

Using renewable wind energy to produce hydrogen makes it a green energy source. Our province also has a significant availability of freshwater which is preferred for hydrogen development. In fact, Newfoundland and Labrador has the second highest freshwater runoff in Canada.

We are well positioned as the most easterly jurisdiction in North America which puts us closer to the markets of Europe and provides great access to other areas as well. Our 29,000 kilometres of marine coastline along international shipping lanes, many of which are adjacent to deep, ice-free ports, provides us with a distinct advantage.

When you combine the above factors with our skilled labour and decades of expertise in the energy sector, Newfoundland and Labrador is ready to take advantage of the opportunity before us.

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How many jobs/ careers will be available, and what types?



Energy NL commissioned an economic impact report for the potential of the industry. According to this report, the operations phase the proposed projects would support nearly 1,800 direct jobs and 3,800 total jobs across the province on an annual basis, not considering the spending of tax/royalty income. The number of jobs available will vary by project, and we encourage you to visit developers' websites for project-specific information.

Source: "Game Changer: Green hydrogen and the evolution of Newfoundland and Labrador's energy sector" Jupia Consultants, March 2024

The **construction of wind turbines** involves a wide range of job opportunities across various skill levels that may include:

- **Project Management:**
Project managers oversee the entire construction process, ensuring that the project stays on schedule and within budget.
- **Engineering:**
Civil, mechanical, and electrical engineers are crucial for designing the foundations, turbines, electrical systems, and overall layout of the wind farm.
- **Construction Workers:**
This includes heavy equipment operators, welders, and general labourers who build the turbine foundations, erect the towers, and assemble the turbines.
- **Electrical Technicians:**
These workers are responsible for wiring and connecting the turbines to the grid, as well as installing the necessary control systems.
- **Logistics and Transport:**
Specialists are needed to manage the transportation of large turbine components to the site, often involving complex logistics for oversized loads.
- **Environmental Consultants:**
They ensure that the construction process complies with environmental regulations and that any impact on local wildlife and ecosystems is minimized.



The **construction of wind turbines** involves a wide range of job opportunities across various skill levels that may include:

Wind Turbines

- **Operations Manager:**
Oversee the day-to-day operations of the wind farm, including maintenance scheduling and performance monitoring.
- **Data Analysts:**
Monitor turbine performance data to optimize energy production and predict maintenance needs.
- **Security Personnel:**
Protect the wind farm from unauthorized access and potential threats.
- **Wind Technicians:**
Perform routine maintenance and repairs on turbines, ensuring they operate efficiently and safely.
- **Environmental Compliance Officers:**
Ensure the wind farm adheres to environmental regulations and manages its impact on local ecosystems.

Hydrogen Production Facility

- **Plant Managers:**
Oversee all operations within the facility, ensuring that production targets are met safely and efficiently.
- **Maintenance Technicians:**
Responsible for maintaining and repairing equipment, including electrolyzers, compressors, and storage tanks.
- **Safety Officers:**
Continuously monitor and enforce safety protocols to protect workers and the facility.
- **Process Operators:**
Monitor and control the production processes, adjusting parameters as needed to maintain optimal performance.
- **Quality Control Analysts:**
Test the purity of hydrogen and ammonia produced, ensuring that it meets required standards.





Infrastructure improvements to support these projects generate additional employment:

- **Civil Engineers and Surveyors:**
Required to design and oversee the construction of roads, ports, and other infrastructure needed to transport turbine components and materials for hydrogen production facilities.
- **Port Operators:**
For projects involving maritime transport, port operators and dock workers play a crucial role in handling the large shipments of components and materials.
- **Utility Workers:**
Install and upgrade power lines, water supplies, and other utilities necessary for the operation of wind farms and hydrogen facilities.
- **Construction Workers:**
Engage in building or upgrading roads, railways, and ports to accommodate the heavy and large-scale materials required for these projects.
- **Transportation Planners:**
Plan and optimize the logistics of moving large components to the site, ensuring minimal disruption to local communities



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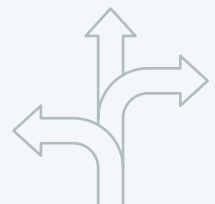
What types of spin-off employment benefits are created from the construction and operation of renewable energy projects?

The construction and operation of wind turbines and hydrogen facilities generate numerous spin-off employment opportunities:

- **Hospitality and Retail:**
Increased economic activity can boost local businesses, including restaurants, hotels, and retail stores, catering to the workforce and visitors.
- **Supply Chain Services:**
Local suppliers may benefit from increased demand for materials, tools, and services needed during construction and operation, supporting jobs in manufacturing, distribution, and sales.
- **Technology and Innovation:**
The presence of advanced energy projects can attract tech companies and startups, creating jobs in research, development, and software engineering.
- **Real Estate:**
An influx of workers can drive demand for housing, leading to jobs in construction, real estate sales, and property management.
- **Education and Training:**
Local educational institutions may offer specialized training programs to prepare workers for jobs in renewable energy, creating opportunities for teachers, trainers, and administrative staff.

In Summary:

- Renewable energy projects not only create direct jobs during construction and operation, but they also stimulate broader economic growth by creating opportunities in infrastructure, supply chains, and various service industries. These projects strengthen local economies, offering long-term benefits to communities.



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What opportunities will be created for local businesses to service hydrogen production?

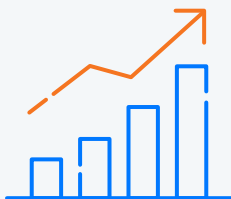


Energy NL advocates for local businesses to be involved in the energy industry and provide services to major projects. Local businesses can benefit from servicing hydrogen production facilities through:

- **Material:**
Local suppliers can provide materials, equipment, and services required for the construction and maintenance of hydrogen plants. This includes everything from raw materials to specialized machinery and technical services.
- **Logistics and Transportation:**
Companies involved in logistics and transportation may find opportunities in transporting hydrogen, associated derivative products, or the equipment needed for production and distribution.
- **Technical and Professional Services:**
Engineering firms, IT services, and environmental consultancies could see increased demand for their expertise in supporting hydrogen production projects.

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What is the estimated overall economic impact of a hydrogen production project?



The economic impact of a hydrogen production project can be substantial, varying by size and scope.

- Energy NL commissioned an economic impact report for the potential of the industry. According to this report, by combining direct, indirect and induced impacts, an average green hydrogen project will boost provincial GDP by **\$2.3 billion** during its construction and an additional **\$394 million** annually, over the life of the project.
- An average project would create **\$1.8 billion** worth of employment income and support over 17,000 full-time equivalent (FTE) person years of employment across the province during construction.

Source: "Game Changer: Green hydrogen and the evolution of Newfoundland and Labrador's energy sector" Jupia Consultants, March 2024

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How much will these projects cost the provincial government (or taxpayers)?

These projects will have no cost to taxpayers or to the provincial government, as there is no provincial investment required, though an average green hydrogen project is expected to generate \$336 million in tax revenue for the provincial government during the construction phase of the project.

Source: "Game Changer: Green hydrogen and the evolution of Newfoundland and Labrador's energy sector" Jupia Consultants, March 2024

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How will the hydrogen be used? Why are the proponents exporting hydrogen?

Our world is facing a challenging situation of global energy supply. Around the world, nations are evaluating their energy suppliers and energy sources. Green hydrogen is a highly sought-after commodity in international energy supply. Newfoundland and Labrador has the opportunity to be a leading global jurisdiction to supply renewable energy. We encourage you to visit developers' websites for project-specific information on how and where the energy they produce will be used.

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Where will the production facilities be located?



Production facilities are currently proposed to be near these primary locations:

- Argentia
- Come By Chance
- The Burin Peninsula
- Exploits Valley
- Isthmus of the Avalon Peninsula
- Stephenville.

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How will tourism be affected by these projects?



Developers are committed to designing and placing infrastructure, such as wind turbines, in a way that minimizes disruption to landscapes and areas frequently visited by residents and tourists. The renewable energy industry recognizes the importance of coexisting with those who have long relied on and enjoyed our natural environment.

To ensure this balance, a socio-economic impact analysis will assess the project's effects across various industries, with the findings made publicly available. This will help guide responsible development while supporting both sustainability and community interests.

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How much land will a project require?

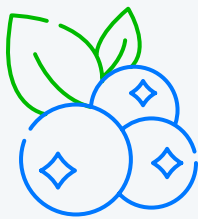


The land required for hydrogen and hydrogen derivative production facilities depends on its size and the technology used. These facilities can vary from a few hectares to several square kilometers, depending on whether the site includes renewable energy sources like wind or solar farms.

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.

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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.

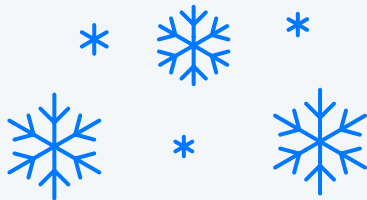
There will be fences where required for public safety, such as at electrical substations, but generally, fences will not be in place around turbines or access roads.

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

12 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.

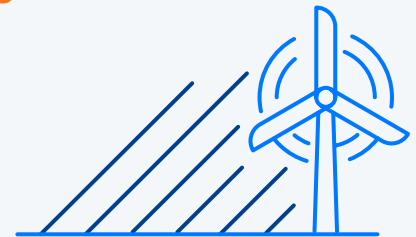
We encourage you to visit developers' websites for project-specific information regarding risk mitigation from ice throw.



In Canada, where cold weather is common, wind farms like the ones in Ontario implement strict safety protocols, including automatic shutdown systems and exclusion zones, to manage ice throw risks.

13 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.



14 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.



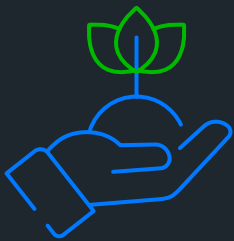
West Wind Energy: How much noise does a wind turbine make? – Questions and Answers.



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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.



In summary, while hydrogen production and wind energy projects bring significant economic and environmental benefits, they also require careful planning and management to mitigate potential impacts on local communities, wildlife, and recreational activities. The integration of modern technologies and adherence to regulatory standards plays a crucial role in balancing these benefits and risks.