



PROJECT

300 MW Henvey Inlet Wind project

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ACEC-Canada and Canadian Consulting Engineer

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Innovation

A landmark project

Henvey Inlet First Nation (HIFN) sought to build a wind farm that would turn strong gusts into clean energy and support the Band's future development by providing emission-free electricity and sustainable revenues from the sale of power to the province.

Today, the 300 MW Henvey Inlet Wind Energy Centre is the largest single-phase wind project in Ontario. The undertaking was led jointly by Pattern Canada and Nigig Power Corporation, a wholly-owned subsidiary of HIFN, where BBA was selected by CER, the general contractor for the project.

An iterative design process to weigh all options

Since the project required approximately 65 kilometres of trenching, any small increases in trench blasting or backfill expenses could result in millions of dollars in additional expenditures.

From a human-scale perspective, the reduction in displaced soil may not seem like a dramatic improvement, but multiplied over more than 65 kilometres, it results in substantially less blasting. This means fewer emissions, less noise to affect wildlife, less damage to natural ecosystems and lower expenditures on backfill.

Balancing the different variables—cable separations, backfill material characteristics, trench width—required numerous rounds of calculations, as the team weighed the relative benefits of modifying each variable. This iterative process was repeated for each unique segment that made up the 110-kilometre collector system and for the cable crossings within it.



Innovation

Iterations were also needed to design the grounding grids for the two substations and 87 wind turbines. While granite bedrock is an excellent material for anchoring wind turbines, it is a poor electrical conductor and therefore complicates the grounding of structures. BBA had to search for suitable grounding grid locations and ensure that they did not fall within environmentally protected zones.

The process involved:

1. Surveying all accessible areas within the 20,000-hectare site
2. Identifying locations that were sufficiently large and had visual indications of low electrical resistivity soils
3. Verifying with the environmental team that selected areas were not sensitive
4. Measuring the soil resistivity
5. Developing computer models to determine whether adding a remote grid at that location was technically and economically feasible

A single team to reduce project risk

BBA mitigated risk by assigning the same team to both the design and commissioning phases, eliminating the need for inter-team knowledge transfer. This reduced the risk of error in the commissioning phase and helped save on time, further benefitting BBA, the client and the community.



Complexity

Working against the elements to ensure on-time project delivery

A key project objective was on-time delivery, as any delay would cause a significant loss of revenue for Pattern and the Henvey Inlet First Nation community. However, in the summer of 2018, a wildfire tore through the Parry Sound area, forcing the project site to shut down. The ensuing delay—coupled with the need to complete construction before the onset of winter—resulted in a condensed schedule for various work packages. BBA responded with a rigorous approach to the electrical design, project management and commissioning, factors that all contributed to the project's timely delivery.

Tackling a rock-hard challenge

During the trench-blasting and cable-laying phase, many geographical issues—such as the presence of large boulders and a high water table—became evident, often forcing

BBA's engineers to produce new construction designs overnight. Their quick turnaround times prevented further delays and expenditures associated with idling construction teams and equipment.

Countering the winter cold

Since the commissioning phase was scheduled for the winter months, climate also posed a risk. With temperatures plunging to an average low of -20°C in January, weather conditions threatened to damage the electronics-based testing equipment. BBA prepared tents and frost-fighters to protect equipment—and personnel—from freezing.

To complicate matters, the area was carpeted with a record 13 feet of snow. Stringent HSE reviews helped keep the team aware of potential hazards and ultimately the project was completed with no lost time due to injury.



■ Social and/or Economic Benefits

The Henvey Inlet Wind Farm project is an example of sustainable development in its truest sense. Already, it is providing significant social, environmental and economic benefits that are sure to last well into the future. This includes significant and reliable revenue for the Band—estimated at \$10 million annually—and clean energy for 100,000 homes across the province of Ontario.

The social and economic benefits of this project are fundamentally intertwined. By providing a diverse range of well-paid employment and contractual opportunities, the project increases the community's overall wealth and financial stability.

Creating lasting wealth and opportunities

Having a source of reliable revenue and emissions-free energy within their territory

also gives the Band the chance to move forward with other development initiatives, such as expanding health and education services. They can now confidently envision building additional infrastructure for their community, knowing they will have the power and capital needed to make these objectives a reality. The Henvey Inlet Wind Energy Centre helps make the First Nation richer and more self-sufficient. When local youth and young adults can foresee a bright future for themselves on their land, the benefits become immeasurable.

“Now that construction is complete, we can begin to look forward to economic independence as a community. Our youth will see an even brighter future from expanding health and education services along with increased infrastructure.”

➤ Greg Newton, CEO of Nigig Power Corporation



Environmental Benefits

Renewable energy projects like the wind farm at Henvey Inlet First Nation Reserve No. 2 are helping Ontario meet its power demands while simultaneously reducing the impact on our environment caused by climate change. Wind energy generates electricity without emitting air pollutants, particulate matter or waste of any kind.

When compared to coal, the Henvey Inlet Wind Facility's annual emissions offsets are:

- **851,000 metric tonnes of carbon dioxide**
- **4,100 tonnes of sulphur dioxide**
- **1,200 tonnes of nitrogen oxides**
- **13.4 kilograms of mercury**

Powering the future of a First Nation

The project's sustainability contributions go far beyond the clean power generated by at the wind farm. In order to gain social acceptance, the HIFN Band developed a rigorous environmental program—one that Band Councillor Pat Brennan would later qualify as “the Cadillac of environmental [stewardship]”—for all contractors to adhere to.

By using innovative work methods to meet the program's environmental requirements while keeping total costs down, BBA proved that development projects can be completed in a manner that is respectful to ecosystems and to First Nations communities. This is the true meaning of sustainable development.



Meeting Client's Needs

Nigig Power Corporation and Pattern Canada launched this project in the hopes of securing a reliable source of clean power and revenues for the Band. However, these objectives could not come at the expense of the biodiversity and traditional sites located within the Reserve. Without assurance that all criteria would be met, the Band would not issue a permit and the project would not get the go-ahead.

BBA therefore had to think outside the box and find solutions to ensure:

- Project acceptance by the local community
- Designs allowing safe and reliable construction on very hard granite bedrock
- Minimally disruptive trench development
- No disturbance of protected wildlife areas during surveying and construction
- Timely delivery despite a forest fire and record snowfall
- Safe and effective commissioning in harsh winter weather conditions

Mitigating project risk

When a forest fire and geological issues put the project schedule at risk, BBA did everything possible to accelerate the facility's completion. This included adjusting technical designs in less than 24 hours and performing the commissioning during winter.

BBA also took careful measures to reduce OHS risks, which were increased due to very cold temperatures and deep snow. The strategies employed included using the same team for the design and commissioning, establishing clear communication protocols, and performing rigorous HSE reviews.



About BBA

BBA has been providing a wide range of consulting engineering services for over 40 years. Today, its engineering, environmental and commissioning experts team up to quickly and accurately pinpoint the needs of industrial and institutional clients. The firm's expertise is recognized in the Energy and Natural Resources industry. With 16 offices in Canada and internationally (Chile), offering clients local support and field presence, BBA is recognized for providing some of the industry's most innovative, sustainable and reliable engineering solutions.



Energy



Mining and
metals



Biofuels, oils
and gas



Industrial and
manufacturing
pharmaceuticals,
agri-foods, wood
and forestry, pulp
and paper



Fostering ingenuity
to better value nature.

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