

Appendix 1-A

Key Personnel Responsible for Preparing the EIS



PROJECT NUJIO'QONIK
Environmental Impact Statement



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Appendix 1-A Key Personnel Responsible for Preparing the EIS
August 2023

| Project Nujio'qonik Environmental Impact Statement EIS Study Team | |
|--|--|
| Management Team | Personnel |
| World Energy GH2 – EIS Lead | David Pinsent, M.Sc. |
| Stantec - EIS Management, Senior Direction, and Review | Trion Clake, Ph.D. Katherine Fleet, B.A., M.E.S. Lee Ann Malley, HBScF Elizabeth Way, M.Sc. Ellen Tracy, B.Sc. Wayne Tucker, B.A.(hons), M.E. Des (ES) George Hegmann, B.Eng., M.E.Des, P.Eng. Heather Giddens, MES Hilary Janes, B.Sc. Jocelyn Fries, MPL, MCIP, B.Sc. |
| EIS Component | |
| Stantec Personnel | |
| Executive Summary | Heather Giddens, MES |
| E1: Concordance Table / Guidelines | Elizabeth Way, M.Sc. Robyn Knight, B.Sc. (Hons). M.Sc. Jocelyn Fries, MPL, MCIP, B.Sc. |
| Chapter 1: Introduction | Amber Fox, MREM Mark Dawson, M.Sc., EP |
| Chapter 2: Project Description | Ellen Tracy, B.Sc. Amber Fox, MREM Robyn Knight, B.Sc. (Hons). M.Sc. |
| Chapter 3: Alternatives | Mark Dawson, M.Sc., EP |
| Chapter 4: Consultation and Engagement | Josh Barrett, BA, MA Nevena Gazibara, B.Sc., MREM, ENV SP |
| Chapter 5: Environmental Assessment Approach, Scope and Methods | Christine Walsh, MCIP Amber Fox, MREM |
| Chapter 6: Atmospheric Environment VEC Assessment | Melanie Fillingham, M.A.Sc., P.Eng. Catherine MacFarlane, BSc., M.A.Sc. Chris Lyons |
| Chapter 7: Acoustic Environment VEC Assessment | Brian Bylhouwer, MRM Catherine MacFarlane, BSc., M.A.Sc. |
| Chapter 8: Groundwater Resources VEC Assessment | Amy Domaratzki, P.Eng. Aaron Power, P.Eng |
| Chapter 9: Surface Water Resources VEC Assessment | Nicole Bell, M.A.Sc., E.I.T. Jacob Bauer, P.Geo |
| Chapter 10: Fish and Fish Habitat VEC Assessment | Jenny Reid, M.Sc. Matt Steeves, B.Sc. |



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| EIS Component | Stantec Personnel |
| Chapter 11: Marine Environment and Use VEC Assessment | Robyn Knight, B.Sc. (Hons). M.Sc. Ellen Tracy, B.Sc. Matt Steeves, B.Sc. |
| Chapter 12: Vegetation and Wetlands VEC Assessment | Krystal Mathieson, M.Sc. |
| Chapter 13: Avifauna VEC Assessment | Debbie Giesbrecht, M.Sc. |
| Chapter 14: Bats VEC Assessment | Jen Randall, B.Sc., MES |
| Chapter 15: Other Wildlife VEC Assessment | Karen Rashleigh, B.Sc., M.Sc. |
| Chapter 16: Areas of Conservation Concern VEC Assessment | Ivy Stone, BA (Hon), B.Ed., M.Sc. |
| Chapter 17: Employment and Economy VEC Assessment | Josh Barrett, BA, MA |
| Chapter 18: Communities VEC Assessment | Hilary Janes, B.Sc. |
| Chapter 19: Human Heath and Quality of Life VEC Assessment | Melissa Whitfield Aslund, Ph.D. Tania Noble, M.Eng., P.Eng., QPRA |
| Chapter 20: Land and Resource Use VEC Assessment | Amber Fox, MREM |
| Chapter 21: Indigenous Fisheries VEC Assessment | Alisha Gauvreau, BA (Hons), MRM, Ph.D. Candidate |
| Chapter 22: Archaeological and Heritage Resources VEC Assessment | Mike Rooney, BA |
| Chapter 23: Cumulative Environmental Effects | George Hegmann, B.Eng., M.E.Des., P.Eng. |
| Chapter 24: Accidental Events | Resha Ali, B.Sc., M.Sc. |
| Chapter 25: Effects of the Environment on the Project | Melanie Fillingham, M.A.Sc., P.Eng. Bryan Bylhouwer, MRM Catherine MacFarlane, BSc., M.A.Sc. Sylvia Bryson, M.Sc.E., P.Eng. Resha Ali, B.Sc., M.Sc. Navid Kimiaghalam, Ph.D., P.Eng. |
| Chapter 26: Summary and Conclusions | Ellen Tracy, B.Sc. |
| Appendices | Author Company / Stantec Personnel |
| Appendix 1-A: Key Personnel Responsible for Preparing the EIS | Ellen Tracy, B.Sc. |
| Appendix 1-B: Changes to the Project Since Originally Proposed in 2022 | WEGH2 |
| Appendix 1-C: Economic Impact Assessment Report (Jupia) | Jupia |
| Appendix 1-D: Labour Capacity / Demand Report (Jupia) | Jupia |
| Appendix 2-A: Hydrogen Production Process | WEGH2 |
| Appendix 2-B: Ammonia Production Process | WEGH2 |



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| Appendix 2-C: Transportation Impact Study and Traffic Management Plan | Arash Mirhoseini, M.Sc. P.Eng. PMP Rodney Blanchard, C.Tech, CPT |
| Appendix 2-D: Power Storage Facilities | WEGH2 |
| Appendix 2-E: Annotated TOC of EPP | WEGH2 |
| Appendix 2-F: Preliminary Emergency Response / Contingency Plan | WEGH2 ARUP |
| Appendix 2-G: Waste Management Plan | WEGH2 |
| Appendix 2-H: Hazardous Material Training Plan | ARUP |
| Appendix 2-I: Workforce and Employment Plan | Hilary Janes, B.Sc. WEGH2 |
| Appendix 4-A: Public Participation Plan | Josh Barrett, BA, MA Nevena Gazibara, B.Sc., MREM, ENV SP |
| Appendix 4-B: Domestic Wood Cutting Consultation Plan | Josh Barrett, BA, MA Nevena Gazibara, B.Sc., MREM, ENV SP WEGH2 |
| Appendix 4-C: Land and Resource Use Survey Results | Alicia Gauvreau, BA (Hons), MRM, Ph.D. Candidate WEGH2 |
| Appendix 4-D: Key Issues and Concerns and WEGH2 Responses | WEGH2 |
| Appendix 6-A: Air Quality Sample Calculations and Supporting Data | Vicki Corning, P.Eng. Melanie Fillingham, M.A.Sc., P.Eng. |
| Appendix 6-B: Dispersion Modelling Strategy | Vicki Corning, P.Eng. Melanie Fillingham, M.A.Sc., P.Eng. |
| Appendix 6-C: GHG Sampling Calculations and Supporting Data | Vicki Corning, P.Eng. Melanie Fillingham, M.A.Sc., P.Eng. Catherine MacFarlane, BSc., M.A.Sc. |
| Appendix 7-A: Acoustic Receptor Modelling Results | Brian Bylhouwer, MRM |
| Appendix 8-A: Groundwater Technical Memo | FracFlow |
| Appendix 11-A: Assimilative Capacity Study | Matt Steeves, B.Sc. Igor Iskra, P.Eng. PhD. (Eng.) |
| Appendix 19-A: Visual Impact Study | John Guariglia, RLA Audrey Cropp, MLA |
| Appendix 19-B: Ice Throw | DNV |
| Appendix 19-C: Shadow Flicker Codroy | Diane Munroe, B. Mgt., B.Sc., C.Tech, GISP, PMP |
| Appendix 19-D: Shadow Flicker Port au Port | Diane Munroe, B. Mgt., B.Sc., C.Tech, GISP, PMP |
| Appendix 19-E: Letters from Meteorological Service of Canada | WEGH2 |



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| Appendices | Author Company / Stantec Personnel |
| Appendix 19-F: Human Health Risk Assessment Technical Data Report | Melissa Whitfield Aslund, Ph.D. |
| Appendix 23-A: Project Inclusion List | Amber Fox, MREM Jocelyn Fries, MPL, MCIP, B.Sc. Robyn Knight, B.Sc. (Hons). M.Sc. |
| Appendix 24-A: Ammonia Fate and Effects Study | Navid Kimiaghalam, Ph.D., P.Eng. |
| Appendix 24-B: Quantitative Risk Assessment | Devin O'Malley, Ph.D., P.Eng. |
| Appendix 26-A: EA Commitments | WEGH2 |
| BSA-1: Atmospheric Environment - air quality, noise, vibration, light, GHG, Climate Change | Melanie Fillingham (Air), M.A.Sc., P.Eng. Brian Bylhouwer (Noise, Vibration), MRM Catherine MacFarlane (GHG/CC) , BSc., M.A.Sc. Chris Lyons (Air) |
| BSA-2: Aquatic Environment - water resources and use, wastewater discharge, fish-fish habitat-fisheries | Jenny Reid (Fish and Fish Habitat), M.Sc. Nicole Bell (Surface Water), M.A.Sc., E.I.T. Amy Domaratzki (Groundwater), P.Eng. Robyn Knight (Marine), B.Sc. (Hons). M.Sc. |
| BSA-3: Terrestrial Environment - avifauna, SAR, relevant habitat, areas of conservation concern, other wildlife | Jen Randall (Bats), B.Sc., MES Nathan deBruyn (Other Wildlife), M.Sc., P.Biol, R.P.Bio. Krystal Mathieson (Vegetation), M.Sc. Debbie Giesbrecht (Avifauna), M.Sc. Adam Borton (Conservation Areas), B.Env.St (Hons), P.Biol. |
| BSA-4: Socioeconomic - Land and Resource Use - traditional, cultural, recreational, industrial land use, land-based aquaculture facilities infrastructure and services | Hilary Janes (CSI), B.Sc. Amber Fox (LRU), MREM Josh Barrett (EE and CH), BA, MA Robyn Knight (LRU), B.Sc. (Hons), M.Sc. Alisha Gauvreau (TLRU), BA (Hons), MRM, Ph.D. Candidate Mike Rooney (Arch), BA Tania Noble (CH), M.Eng., P. Eng., QPRA |



Appendix 1-B

Changes to the Project Since Originally Proposed in 2022 EA Registration Document



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Changes to the Project Since Originally Proposed in 2022 EA Registration Document

As part of the Project planning phase, Project components and activities have been modified, refined, and adapted due to engineering optimization and in response to feedback during regulatory and public engagement activities completed to date in support of the EA (refer to Chapter 4). Project engineering has continued to progress and will continue to be refined throughout the design phase. Additionally, following the release of the EIS Guidelines and in consultation with regulators, the scope of this assessment has been expanded to include components and sites required to make the Project operational and viable. Table 1-B.1 describes the key Project refinements and provides a summary of the benefits to the environment, Indigenous Groups and stakeholders. Additional details on Project alternatives, including rationale for rejecting and selecting alternatives is provided in Chapter 3.

Table 1-B.1 Key Refinements to the Project Description

| Originally Proposed Project Design | Revised Project Design | Rationale |
|---|---|---|
| Wind Farms | | |
| The wind farm located on the Port au Port Peninsula (originally referred to as "Site A") was proposed to be located entirely on the Port au Port Peninsula, within an area occupying up to approximately 13,500 ha). Up to 164 turbines were proposed at this site. | Following the release of the Crown Land available for wind development and through Project design and refinements, the area on the Port au Port Peninsula has been reduced and an additional area has been added northeast of the Port au Port Peninsula. The Port au Port wind farm will occupy a total of approximately 11,820 ha of which approximately 10,480 ha will be located on the peninsula and approximately 1,340 ha will be located on the mainland. The Port au Port wind farm will deliver onshore wind capacity generated using up to 164 wind turbines. | The footprint on the Port au Port Peninsula has been reduced to avoid protected watersheds and mineral leases. The reduction of the footprint on the Port au Port Peninsula has compressed turbine infrastructure, and generally moved turbine locations away from residential areas. The adjacent site on the mainland was added to meet the required wind input to maintain an economically viable Project. |
| The Codroy wind farm (originally referred to as "Site C") was presented as a site for future expansion and was previously not included as part of the Project. | EIS Guidelines includes provision for inclusion of all components and sites that are needed to make the Project operational and viable. Therefore, the Codroy wind farm was added to the Project in place of "Site B" in the Lewis Hills area. The Codroy wind farm site will occupy a total area of up to approximately 12,900 ha. The Codroy wind farm will deliver onshore wind capacity generated using up to 164 wind turbines. With the addition of the Codroy wind farm, the Project will increase from 1,000 MW of renewable energy created to 2,000 MW of renewable energy created. | The Codroy wind farm was chosen to replace the Lewis Hills wind farm to make the Project operational and viable. |



PROJECT NUJIO'QONIK**Environmental Impact Statement****Appendix 1-B Changes to the Project Since Originally Proposed in 2022 EA Registration Document**

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Table 1-B.1 Key Refinements to the Project Description

| Originally Proposed Project Design | Revised Project Design | Rationale |
|---|---|--|
| <p>The wind turbine components, including nacelle, towers and blades will be received at the Port of Stephenville where they will be temporarily staged. It was then proposed that they would be transported by truck and trailer to the turbine location within the site development area on the Port au Port Peninsula.</p> | <p>The current concept for primary turbine transportation involves two temporary marine landing sites on the Port au Port Peninsula. The marine landing sites will be constructed to receive low draft barges for delivery of the wind turbine components and other bulk Project materials.</p> | <p>The landing sites at Aguathuna and West Bay have been chosen to reduce interference with local traffic usage. Starting from the marine landing sites, major component deliveries transition almost immediately to Project-specific roads in the peninsula interior.</p> |
| Ammonia / Hydrogen Plant | | |
| <p>The hydrogen / ammonia plant was proposed to have an electrical demand of approximately 500 MW. The facility was expected to run at a capacity factor of approximately 50%, resulting in a maximum annual production of approximately 30,000 tonnes of hydrogen, which will be converted to a maximum production of 100,000 tonnes of ammonia.</p> | <p>The capacity of the hydrogen / ammonia plant has been increased to allow for future expansion. The hydrogen / ammonia plant will have an electrical capacity of approximately 1,800 MW. The facility is expected to run at a capacity factor of approximately 50%, resulting in a maximum annual production of approximately 206,000 tonnes of hydrogen, which will be converted to a top production of 1,170,000 tonnes of ammonia.</p> | <p>The increase in capacity of the hydrogen / ammonia plant at this stage will allow for consideration of future expansion.</p> |
| Wastewater Discharge | | |
| <p>The wastewater discharge from the hydrogen / ammonia plant was anticipated to be directed to a municipal collection system owned and operated by the Municipality of Stephenville.</p> | <p>Through further Project design and engineering optimization, the treated effluent is planned to be discharged through the existing Abitibi effluent pipeline to the harbour. The outfall is assumed to extend 500 m from the shoreline. Outfall design will be confirmed in subsequent stages of environmental study and design.</p> | <p>The change to the marine outfall reduces the demand on the local municipal collection system. Potential effects associated with the marine discharge will be assessed in this EIS.</p> |
| Port Facilities | | |
| <p>It was anticipated that the existing berthing infrastructure at the Port of Stephenville would be able to accommodate vessels to transport hydrogen / ammonia without the construction of additional berthing.</p> | <p>The plan to use the existing berthing infrastructure at the Port of Stephenville remains; however, a jettyless floating offloading system is being considered which is floated to the vessel's side by tugs and secured to the vessel's hull with a specialized mooring system.</p> | <p>A jettyless loading system avoids the need for a new terminal or berth and extensive marine construction.</p> |



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Table 1-B.1 Key Refinements to the Project Description

| Originally Proposed Project Design | Revised Project Design | Rationale |
|--|---|--|
| Dredging was not considered originally in the Project plan. | <p>The Project will require dredging to reinstate depths to 12 m above chart datum of Mean Low Spring Tide.</p> <p>Specific environmental surveys, bottom profiling, and sub-bottom surveys are planned to determine if additional dredging is required due to increased vessel size.</p> | <p>Maintenance dredging has been conducted in the Port of Stephenville in the past. Project-related dredging will maintain conditions for safe vessel operation and reduce risk of grounding or other accidents.</p> |
| Subsea Cable | | |
| Due to the residential congestion at the isthmus and limited space for new overhead transmission rights-of-way, buried conductors were proposed for usage through the town of Port au Port. | Based on further Project design, it is now proposed that a subsea cable be used to cross Port au Port Bay. | The change to the subsea cable will reduce potential land use conflicts at the isthmus. Potential effects associated with the subsea cable will be assessed in this EIS. |
| Auxiliary Power | | |
| The Project will use power storage to manage seasonal and intra-day wind energy generation variations, acting as a buffer between power generation and the hydrogen / ammonia plant. The facility had planned to have three LM6000 aero-derivative 53 MW gas turbines as supplementary power sources. | Gas turbines are no longer being considered as an option for auxiliary power. Other various options of the electrical power storage design are being pursued to determine the optimal solution for the Project. | Alternative options from gas turbines for auxiliary power will reduce air quality and GHG emissions from the Project. |
| Connection to NL Hydro Facilities | | |
| The Project was proposed to be interconnected with the NL Hydro Island Interconnection System (IIS) for the exchange of excess wind energy to the IIS during the winter and supply of energy from the Island IIS during the summer. At least one new 230-kV transmission interconnection was expected to be required to connect the hydrogen / ammonia terminal station to NL Hydro facilities at Stephenville, with ties back to the station at Massey Drive. It was anticipated that, in the event that there is electricity production beyond what is needed for hydrogen production, the surplus would be sold to customers and delivered through the IIS under agreements with NL Hydro and electricity regulators. | <p>One new 230-kV transmission interconnection will be required to connect the hydrogen / ammonia plant terminal station to the NL Hydro facility at Stephenville, NL for the import of power from the grid.</p> <p>The potential export of wind energy from the Project to the grid is no longer proposed.</p> | <p>It was determined that only one transmission line is required to make the Project operational. Eliminating the need to construct additional transmission line(s) also reduces the economic costs and environmental effects associated with construction and operation of an additional transmission line(s).</p> <p>WEGH2 will continue to engage NL Hydro regarding the potential for a future agreement to supply excess wind energy to the grid.</p> |



PROJECT NUJIO'QONIK**Environmental Impact Statement****Appendix 1-B Changes to the Project Since Originally Proposed in 2022 EA Registration Document**

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Table 1-B.1 Key Refinements to the Project Description

| Originally Proposed Project Design | Revised Project Design | Rationale |
|---|--|---|
| Temporary Laydown Areas | | |
| The Port of Stephenville has several acres of prepared laydown space, and additional cleared land is available for necessary expansion of the laydown yard. | A potential alternate site for laydown and staging areas for wind turbines and other components is located at the Stephenville International Airport (previous US military offload dock location). | WEGH2 is committed to supporting the communities in which Project activities are proposed, including the Town of Stephenville. WEGH2 has signed an agreement with the Town of Stephenville to co-fund the Stephenville International Airport's operational cash needs and has also agreed on terms for a lease to secure access to part of the airport as a potential laydown and staging area for the Project. The payments from this lease provide immediately required cash to the airport so that it can remain operational and will offer ongoing support to the airport by providing additional revenue from underutilized areas on the property. |



Appendix 1-C

Economic Model from Jupia Consultants Inc.

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PROJECT NUJIO'QONIK GH2:

An economic impact assessment

Prepared by:
Jupia Consultants Inc.



July 2023

EXECUTIVE SUMMARY

WorldEnergy GH2's Project Nujio'qonik GH2 will be a game changer in western Newfoundland, bringing substantial economic benefits during the construction phase of the project and sustaining hundreds of jobs and associated economic benefits on an annual basis over at least a three-decade period.

The report is based only on Phase 1 of Project Nujio'qonik GH2 which includes a 1 GW wind farm and a 600 MW hydrogen electrolyzer. There are potentially two additional phases that would triple the amount of wind energy production capacity from 1 GW to 3 GW as well as an additional 1.2 DW of electrolyzers. This would substantially expand both the capital expenditure economic impacts and the ongoing economic impacts from operations and taxation.

It is important to note the capital expenditures (CAPEX), operating expenditures (OPEX) and taxes generated from the project are based on the best available costing data as of June 2023. There will be more precision in the CAPEX, OPEX and taxes generated as the project numbers get finalized later this year.

Western NL could use an economic boost

Section 2 discusses the state of the regional economy and population in western Newfoundland. The region's economy has struggled in recent years, particularly the private sector economy. Over a 10-year period, the number of manufacturing jobs is down 35%, administrative services employment is down 32% and finance and insurance jobs declined by 29%. In contrast, health care is the fastest growing sector for employment.

This has contributed to the region now having one of the oldest populations in the country. The median age in the region targeted for Project Nujio'qonik GH2 is 54.3 and the share of the population 65 and older is 30%. In just 20 years, the region has gone from a positive natural population growth rate (more births each year than deaths) to only 35 births per 100 deaths.

The impact on the workforce has been profound as only 43% of the adult population is employed at some point during the year and 38% of the workforce is over 55 and heading towards retirement. Furthermore, the median employment income is 25% below the provincial level.

Western Newfoundland needs a boost in private sector investment. Project Nujio'qonik GH2 will be a game changer.

EXECUTIVE SUMMARY (CONT.)

Project Nujio'qonik GH2 economic impact summary

Section 3 provides the detailed economic impact model. The model considers direct and indirect, as well as induced economic impacts within the province and across the country.

Outside of the oil and gas sector, Project Nujio'qonik GH2 represents one of the largest private sector investments in recent history. The project will involve deploying nearly \$6 billion into the wind farm, hydrogen and ammonia development facilities and other related infrastructure. The company will amortize this large scale investment over the 30-year life of the project. As mentioned above, it could lead to a Phase 2 and 3 which would amplify the size of the project. The project will require an estimated \$2.5 billion worth of international imports including wind turbines and other components and equipment that are manufactured elsewhere in the world.

The CAPEX phase of the project is expected to substantially boost the provincial and national economies. Newfoundland and Labrador will see a contribution to provincial GDP of an estimated \$2.5 billion over the three-year period 2024-2026. It will require over 5,400 workers per year, on average, in Newfoundland and Labrador for the three-year period and will result in a total employment income of more than \$1.8 billion (from direct, indirect and induced economic impacts).

The CAPEX investment will result in \$1.3 billion in household spending in local communities across the province during the construction phase. Governments will benefit from nearly \$800 million in new tax revenue. The Newfoundland and Labrador government alone can expect \$428 million in tax revenue before considering the ongoing taxes and fees from operations. The table below shows the national impacts (including in-province impacts). The country overall will see a \$3.6 billion increase in GDP from the CAPEX along with \$2.5 billion in employment income and over 27,700 full time equivalent person years of employment.

Estimated CAPEX economic impacts –Project Nujio'qonik GH2

Total impact during the construction phase

| | Newfoundland and Labrador | | Canada-wide |
|-------------------------------|---------------------------|------------------------|---------------|
| | Total impacts | Average annual impacts | Total impacts |
| GDP contribution (\$M) | \$2,509.8 | \$654.9 | \$3,639.2 |
| Employment income (\$M) | \$1,807.4 | \$536.5 | \$2,480.2 |
| Person years (FTE) employment | 19,332 | 5,433 | 27,768 |
| Household spending (\$M) | \$1,304.5 | \$387.0 | \$1,798.6 |
| Taxes – municipal (\$M) | \$69.6 | \$15.5 | \$117.4 |
| Taxes – provincial (\$M) | \$428.4 | \$95.2 | \$547.2 |
| Taxes – federal (\$M) | \$298.3 | \$77.2 | \$410.2 |
| Total taxes (\$M) | \$798.1 | \$188.2 | \$1,074.1 |

EXECUTIVE SUMMARY (CONT.)

The project proponent envisions the wind energy and hydrogen production activity to last at least 30 years and provide a stable source of high paying jobs and tax revenue for governments. The table below shows the annual economic impacts from operations per year starting in 2027.

On an annual basis, the operations of the wind farm, hydrogen/ammonia facilities and other activities will boost provincial GDP by more than \$78 million, employment income by \$33 million and current household spending by nearly \$24 million. In the province, there will be 272 full time equivalent (FTE) jobs supported – most of those in western Newfoundland. The average salary of these jobs will be in excess of \$100,000 per year.

Adding together personal income taxes, HST, household property taxes as well as the fees and taxes associated with the operations of the project, the provincial government in Newfoundland and Labrador can expect to receive \$15.6 million in tax revenue excluding corporate income tax payments. The federal government can expect to receive \$8.8 billion in taxes from operations each year – excluding corporate income tax payments.

Annual OPEX economic impacts – from operations (\$2023) – excluding corporate income taxes

| Impact (starting in 2027): | NL | CAN |
|------------------------------|----------|----------|
| GDP contribution (\$000s) | \$78,649 | \$98,444 |
| Employment income (\$000s) | \$33,203 | \$43,280 |
| FTE employment | 272 | 391 |
| Household spending (\$000s) | \$23,959 | \$31,377 |
| Taxes – municipal (\$000s) | \$1,239 | \$2,198 |
| Taxes – provincial (\$000s)* | \$15,641 | \$17,719 |
| Taxes – federal (\$000s)* | \$6,766 | \$8,758 |
| Total taxes (\$000s) | \$23,645 | \$28,676 |
| Relative to GDP contribution | 30% | 29% |

Because of the project's investment tax credits, corporate income tax payments are projected only to start in 2041 and be paid annually through 2057. The amount of corporate income taxes will be substantial, averaging \$50.4 million per year between 2027 and 2057 (in \$2023). Total estimated taxes, fees and other revenue per year between 2027-2057 shown in \$2023 dollars are:

- Provincial government: \$41 million per year
- Municipal governments in NL: \$1.24 million per year
- Federal government: \$34 million per year

EXECUTIVE SUMMARY (CONT.)

↗ Combined CAPEX & OPEX economic impacts – NL only

Combining both CAPEX and OPEX economic activity, the entire project is expected to:

- Boost provincial GDP by \$4.9 billion over the 33-year life of the project (in \$2023);
- Contribute \$2.8 in employment income (in-province only);
- Support an average of 6,444 jobs per year during construction and 272 per year over a 30-year period;
- Boost annual household spending in NL by over \$2 billion; and
- Contribute \$107 million in tax revenue to municipal governments in the province, \$1.65 billion to the provincial government and \$1.26 billion to the federal government (excluding national impacts).

Combined and cumulative economic impacts, Project Nujio'qonik GH2 (\$2023)

In-province impacts only

| | CAPEX | OPEX | 33-year cumulative impacts (\$2023) |
|----------------------------------|--------------|--------------|-------------------------------------|
| GDP contribution (\$M) | \$2,510 | \$2,359 | \$4,869 |
| Employment income (\$M) | \$1,807 | \$996 | \$2,803 |
| Person years (FTE) employment | 19,332 | 8,149 | 27,481 |
| <i>Average annual employment</i> | <i>6,444</i> | <i>272</i> | |
| Household spending (\$M) | \$1,305 | \$719 | \$2,024 |
| Taxes – municipal (\$M) | \$70 | \$37 | \$107 |
| Taxes – provincial (\$M) | \$428 | \$1,225 | \$1,653 |
| Taxes – federal (\$M) | <u>\$298</u> | <u>\$959</u> | <u>\$1,257</u> |
| Total taxes (\$M) | \$798 | \$2,221 | \$3,019 |

Source: Derived by Jupia Consultants Inc. See Appendix A.

↗ The strategic role of Project Nujio'qonik GH2

It is important to highlight just how important this project will be to the regional and provincial economies during construction and operations. Section 4 provides more details.

| Economic benefit: | In context: |
|--|---|
| Will substantially boost provincial infrastructure investment | WorldEnergy GH2 is expecting to deploy \$5.99 billion (CDN\$) worth of capital on this project over a 3+ year timeframe (most will be spent between 2024-2027) – an amount equivalent to 50 percent of all private sector capital expenditures in the province between 2021-2023. |

EXECUTIVE SUMMARY (CONT.)

| Economic benefit: | In context: |
|---|---|
| Adds a top private sector employer in western Newfoundland | There will be nearly 300 full time equivalent annual jobs in the province, most in western Newfoundland, at an average salary twice the level of the average full-time job in Western NL. |
| Supports hundreds of small companies in the region | Adding between \$15-\$20 million per year to household spending in the western NL region will provide a considerable ongoing boost to the local economy ¹ . |
| Helps attract highly skilled talent and meet local workforce needs | These high wage, highly skilled jobs will be attractive to trades workers and professionals looking to advance their careers. Many of these 200+ highly skilled workers will bring with them families that will help support workforce needs in other sectors of the economy. |
| Drives substantial new tax revenue in the province | Project Nujio'qonik GH2 is expected to generate an average of more than \$41 million in new provincial government tax dollars each year. Municipal government, mostly in western NL, can expect an average of over \$3 million in tax revenue each year during the life of the project. |
| Creates another major export industry for NL | Project Nujio'qonik GH2 will create another major export sector for Newfoundland and Labrador. Green hydrogen will become a top five export sector by value for the provincial economy. |
| Positions western NL as a Canadian green energy leader | Project Nujio'qonik GH2 will position western NL as a Canadian leader in green energy production. |
| Could lead to a substantially larger project in Phase 2&3 | Potential phases 2 & 3 could lead to a tripling of wind energy production and a proportionate increase in green hydrogen/ammonia production. |

Maximizing economic benefits in the province

The proponent will work hard to use local labour and develop a local supply chain for the project but there are a number of ways government, educational institutions and other related stakeholders can help to ensure the maximum economic benefits stay in the province. These include:

- Ensuring NL workers are deployed on this project both in CAPEX and OPEX phases.
- Ensuring there is a sufficient talent pipeline to meet CAPEX and OPEX demand.
- Working to match local and Canadian companies to supply chain opportunities including such areas as temporary housing.
- Looking to fill longer term gaps in the local business community in western NL.

¹ The impact model forecasts \$24 million in household spending per year, but that is a provincial-wide figure. It is likely the western NL spending will be at least \$15 million, assuming most employees live in the region.

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1. INTRODUCTION TO PROJECT NUJIO'QONIK GH2

Western Newfoundland's economy has struggled in recent years and is facing a number of headwinds including an aging workforce. WorldEnergy GH2's Project Nujio'qonik GH2 could be a game changer bringing substantial economic benefits during the construction phase of the project and sustaining hundreds of jobs and associated economic benefits on an annual basis over at least a three-decade period.

1.1 Purpose of this report

The purpose of this report is to estimate the economic contribution of Project Nujio'qonik GH2 to the Newfoundland and Labrador and national economies. The report looks at the direct, indirect and induced gross domestic product (GDP), income, jobs, taxes, household spending and other impacts for both the capital expenditure phase of the project and the ongoing operations. Capital expenditures herein are referred to as CAPEX and operational expenditures as OPEX.

The multipliers developed by Statistics Canada are only published at the provincial and national levels and, therefore, the economic impacts are shown for Newfoundland and Labrador and the country overall. The level of CAPEX economic impact that accrues in western Newfoundland will depend on how many workers live in the area and how many suppliers are local. Section 4 looks at how the various government and community partners can work with WorldEnergy GH2 to maximize the economic benefits in western Newfoundland and in the province.

It is important to note this report is based on Phase 1 of Project Nujio'qonik GH2. There are potentially two additional phases that would triple the amount of wind energy production capacity from 1 GW to 3 GW as well as an additional 1.2 DW of electrolyzers. This would substantially impact both the capital expenditure economic impacts and the ongoing economic impacts from operations and taxation.

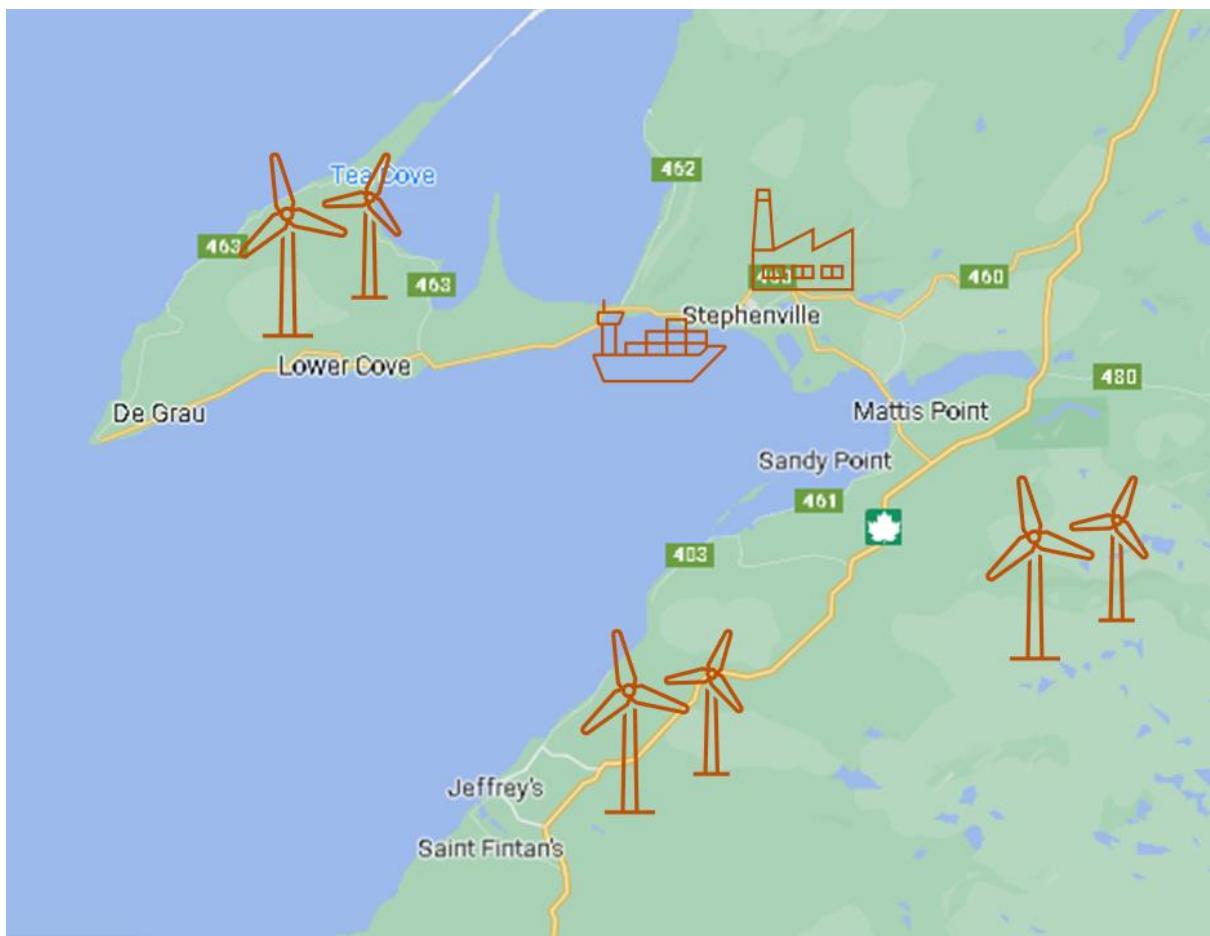
1.2 Project Nujio'qonik GH2: Summary

WorldEnergy GH2 is proposing to build one of the largest wind farms projects in Canada in western Newfoundland. The project uses the Mi'kmaw name for Bay St. George, Nujio'qonik, which means 'where the sand blows.'

Project Nujio'qonik will be Canada's first commercial green hydrogen/ammonia production from renewable electricity through wind projects in one of the world's best wind resource regions.

The region was chosen because it has one of the best wind profiles for onshore wind in all of North America. There are other reasons to undertake this project in the Stephenville region including the deep-water port, interconnection to the existing grid for mutually beneficial, seasonable exchange of green energy, access industrial water for hydrogen production, favourable response from preliminary community engagement and First Nations' involvement in the project.

Figure 1: Map of Project Nujo'qonik GH2 investment areas*

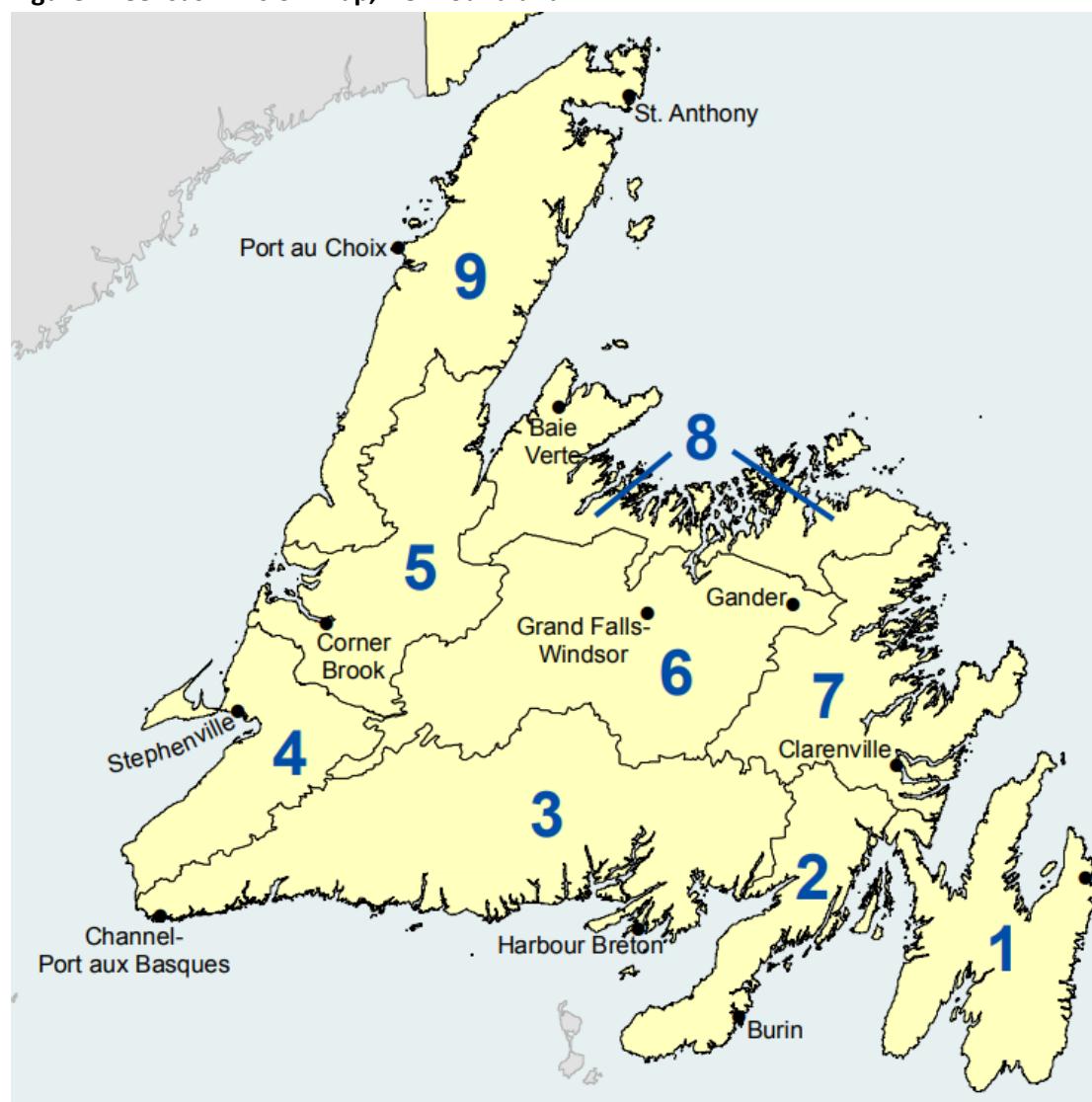


2. WESTERN NEWFOUNDLAND NEEDS AN ECONOMIC BOOST

2.1 Western Newfoundland: Geographic definition

The Port au Port-Stephenville Wind Power and Hydrogen Generation Project (Project Nujio'qonik GH2) will bring substantial benefits to Newfoundland and Labrador, specifically western Newfoundland. For the purposes of this report, western Newfoundland includes primarily Census Division #4 but also involves Census Division #5 which extends to Corner Brook and northward as shown in the map in Figure 2. In this area are communities such as Stephenville, Corner Brook, Pasadena, Deer Lake, St. George's, Stephenville Crossing, Kippens and Cape St. George.

Figure 2: Census Division Map, Newfoundland

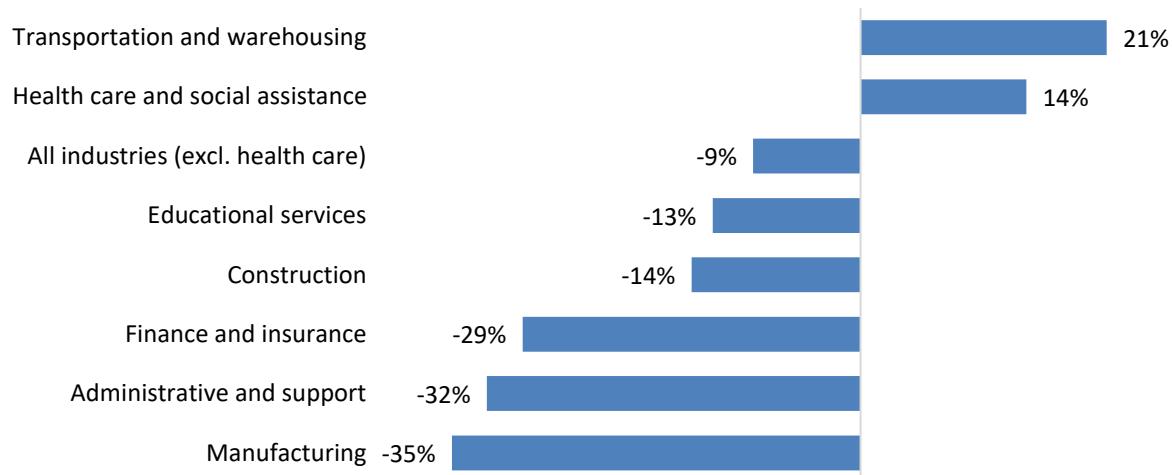


Source: Newfoundland and Labrador Statistics Agency (NLSA).

2.2 The western NL private sector economy has struggled

The western Newfoundland economy has struggled in recent years with the decline in the forest products sector and other industries. As shown in Figure 3, in just the 10-year period 2011 to 2021, total employment (excluding health care jobs) in the region declined by 10 percent and a number of core industries have seen even greater declines. Manufacturing employment is down 35 percent, administrative services down 32 percent, finance and insurance down 29 percent and education down 13 percent. Not shown in the chart, public administration employment dropped by 22 percent (or 500 jobs) over the same period. Health care added 650 jobs between 2011 and 2021 and was the fastest growing sector by far in terms of absolute job growth. Transportation and warehousing employment increased faster on a percentage basis but only added 210 jobs on an absolute basis.

Figure 3: Change in employment 2011-2021, selected industries, western Newfoundland*



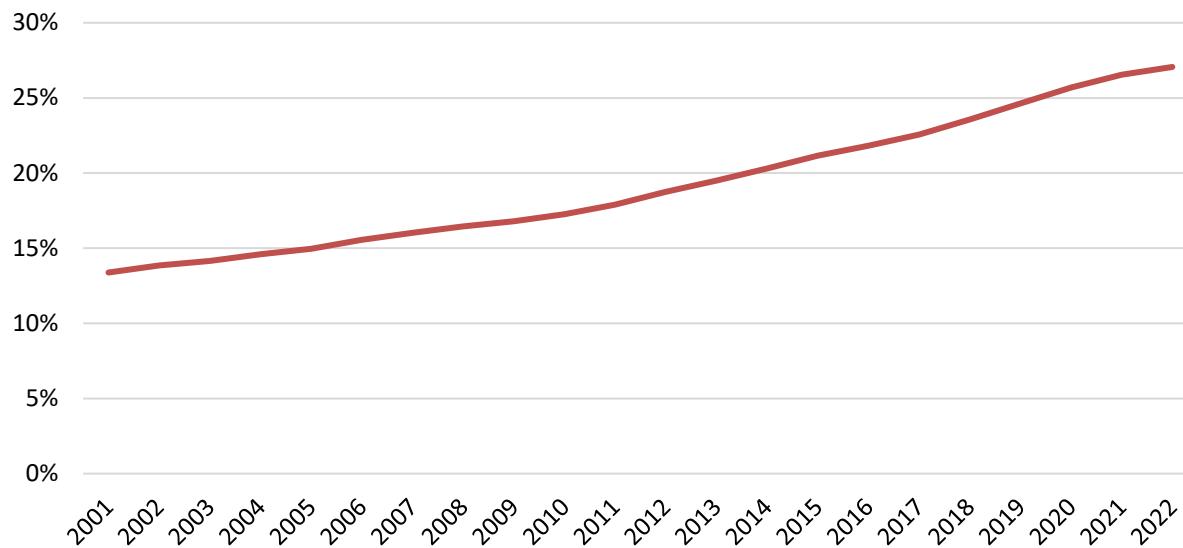
*Census Division #4 and #5 combined. Source: Statistics Canada.

According to Statistics Canada, in Census Division #4 (the area where Project Nujio'qonik GH2 will be located), there are only four employers with 200 or more workers and they include a community college campus, hospital, library and fish and seafood wholesaling company. In other words, only one large employer in the private sector.

2.3 The region is facing population and demographic challenges

Western Newfoundland's population has not declined significantly in the past 20 years. In 2022 there were an estimated 62,000 living in the region, only two percent less than the population back in 2021. However, the population has been aging much faster than the country overall. As shown in Figure 4, 27 percent of the population in 2022 was 65 or older, more than double the rate 20 years ago. In Census Division #4 this share is 30 percent. Western Newfoundland is now one of the oldest regions in Canada. The population living in Census Division #4 has a median age of 54.3. Census Division #5 is slightly younger with a median age of 49.6 in 2022.

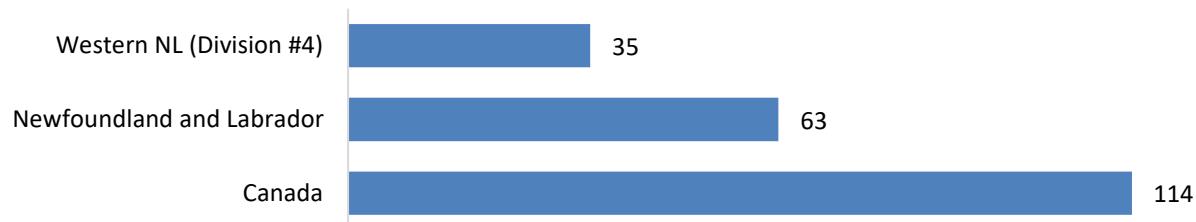
Figure 4: Share of the population aged 65 and older, western Newfoundland*



*Census Division #4. Source: Statistics Canada.

Among the more than 270 Census Divisions across Canada, western Newfoundland (Census Division #4) had the second lowest natural population growth rate in 2022 with only 35 births for every 100 deaths. Only Census Division #8 in Newfoundland, Queens County, Nova Scotia and La Haute-Gaspésie, Quebec had a lower natural population growth rate. Census Division #5 has a higher natural population growth rate but at only 53 births for every 100 deaths, the area is still well below the replacement rate.

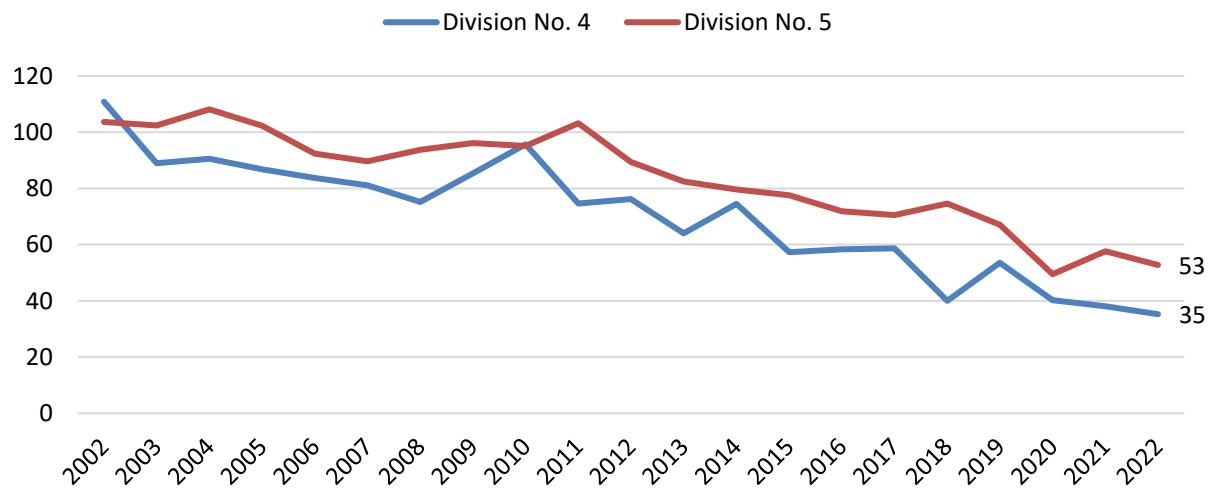
Figure 5: Natural population growth rate (births for every 100 deaths), 2022



Source: Statistics Canada.

Figure 6 shows the trend in the natural population growth rate in the region for the past 20 years. In just two decades, the region has gone from having more births than deaths each year to among the largest gaps between births and deaths in the country.

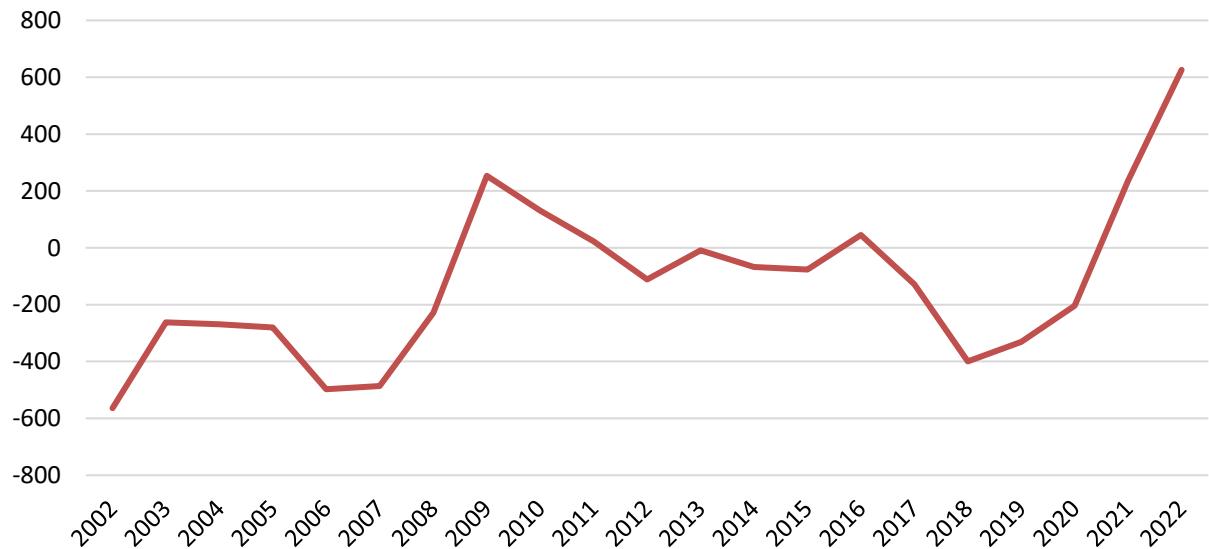
Figure 6: Natural population growth rate (births for every 100 deaths), western Newfoundland



Source: Statistics Canada Table: 17-10-0140-01.

A big challenge over the past 20 years has been the region's inability to curtail outward migration of young people or attract new people to live in the area. Census Division #4's net intraprovincial migration rate has been negative (more moving out to other parts of the province than in) for 19 of the past 20 years. The net interprovincial migration rate (with other provinces) has been negative for most of the past 20 years as well. Immigration has been non-existent. A similar pattern was seen in Census Division #5. The good news is that in the past two years, net interprovincial migration has been positive in both Census Division #4 and #5.

Figure 7: Net interprovincial migration by year, western Newfoundland



Source: Statistics Canada Table: 17-10-0140-01.

2.4 Impact on the workforce

The workforce in western Newfoundland is aging out. In Census Division #4, there were 9,665 adults aged 15 and older who did not work in 2020 and only 7,370 who were employed at some point during the year. That means that only 43 percent of the adult population worked for employment income in 2020, a share 31 percent less when compared to the country overall. To put this into context, if Census Division #4 (the area where Project Nujio'qonik GH2 will be located) had the same share of the adult population worked for wages in 2020, there would have been over 3,200 more people earning employment income that year.

Figure 8: Share of the 15+ population earning employment income in 2020



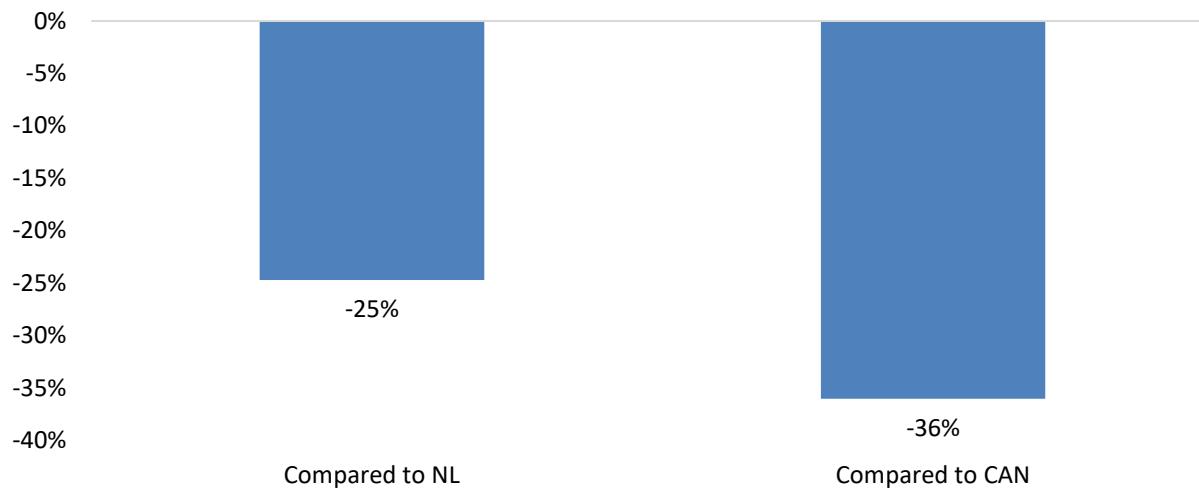
Source: Statistics Canada 2021 Census.

A further challenge for western Newfoundland is the large share of its workforce about to hit retirement. There are over 10,000 workers in the region (Census Divisions 4 & 5) that earned employment income in 2020 and were 55 or older. In Census Division #4, 38 percent of the entire workforce (or almost two out of five) is over the age of 55 and most are likely to retire in the next decade. In Census Division #5, the share is 33 percent.

It will be critically important to attract new workers and families to the region in the coming years just to replace those leaving the workforce.

Another challenge with the regional economy is its reliance on seasonal industries. In 2019, 43 percent of all workers in Division #4 collected Employment Insurance income at some point during the year. In Division #5, the share was one in three (33%). There are many implications from this reliance on seasonal industries. A big one is that it has led to significantly lower median employment income. As shown in Figure 9, in Division #4, the median employment income in 2020 was 25 percent below the provincial level and 36 percent below the national level. This 'gap' is largely due to the seasonal industries, as among those working full-time/full-year, the difference in median employment income narrows considerably (to 16% with the province and 18% with the country overall).

Figure 9: Median employment income gap, Census Division #4 versus provincial and national income levels



Source: Statistics Canada 2021 Census.

2.5 The region needs new industries offering stable, high wage jobs

It is clear western Newfoundland will need to attract thousands of people to the region in the coming years to meet the demand for local jobs. As is developed below, Project Nujio'qonik GH2 will create hundreds of high paying, year-round jobs. People will move to the region for these jobs, and many will bring spouses and children who can eventually fill other needed roles in the local workforce.

2.6 The region has a history of bouncing back

The good news is western Newfoundland has a track record of bouncing back. Multiple large employers left the community at various times throughout history. In 1966, the U.S. Air Force closed the air base that had transformed Stephenville from a town of 500 into a regional hub of over 7,000. The region responded by growing its forest products industry. In 1977, Labrador Linerboard Limited shuttered its Stephenville mill, putting hundreds more locals out of work. In 1981 the mill reopened, converted to newsprint by its new owners, Abitibi Consolidated. In turn, the Abitibi mill closed in the early 2000s.

The region is now at another inflection point. The green energy sector and related downstream investment in manufacturing hydrogen along with the boost to the regional port will provide an excellent economic foundation for the next generation of industries in the region.

3. PROJECT NUJIO'QONIK GH2 – A GAME CHANGER

This section looks at the economic impact of both the capital expenditures (CAPEX) and ongoing operating costs (OPEX) associated with Project Nujio'qonik GH2.

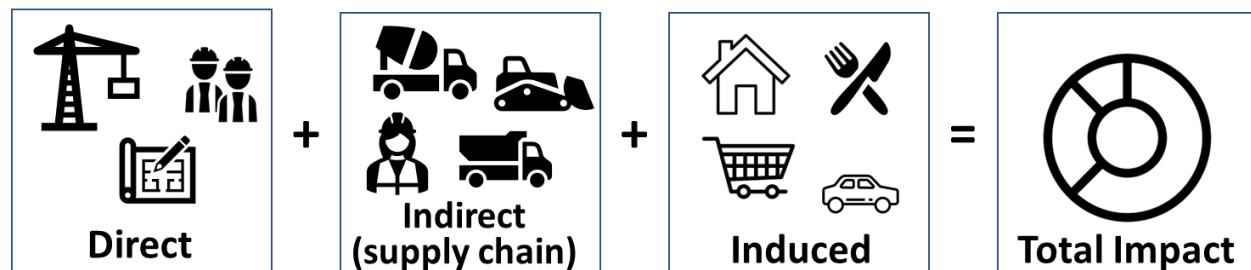
3.1 The economic impact model

The economic impact model used to estimate how Project Nujio'qonik GH2 will impact the Newfoundland and Labrador economy, as well as the national economy, is based on Statistics Canada's Input-Output (I-O) tables which provide a detailed profile of how expenditures in specific sectors flow through the provincial and national economy as well as through international trade. The economic impact model evaluates the direct, indirect and induced economic impact, using the following parameters:

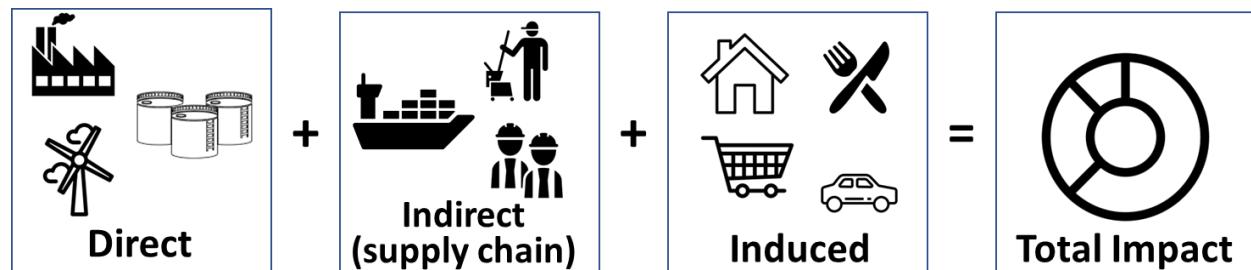
- *Direct impact* measures the value-added to the economy attributed directly from the wages earned, and the revenues generated from the workforce spending in Newfoundland and Labrador and Canada.
- *Indirect impact* measures the value-added generated within the regional economy through firm and organizational demand for intermediate inputs or other support services (e.g. the supply chain).
- *Induced impacts* are derived when workers in the aforementioned industries spend their earnings. These purchases lead to more employment, higher wages and increased income and tax revenues and can be felt across a wide range of industries.

Figure 10: Economic multipliers associated with Project Nujio'qonik GH2

CAPEX Phase:

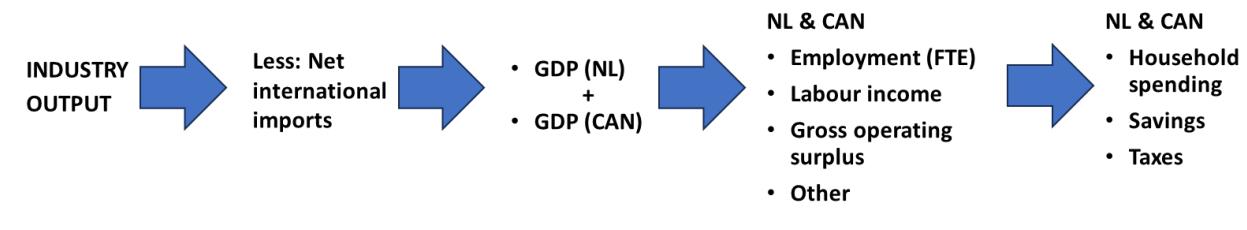


OPEX Phase:



The I-O tables trace the impact of economic activity (output shock) on the provincial and national economies (including imports and exports). In addition to the GDP and employment impacts, the economic impact model estimates the amount of tax revenue supported by the industry as well as consumer spending impacts.

Figure 11: Economic impacts by geography: Project Nujio'qonik GH2



The industries used in the model included (industry classification in brackets):

- Electric power engineering construction [BS23C300] – used for CAPEX*.
- Non-residential building construction [BS23B000] – used for CAPEX.
- Electric power generation, transmission and distribution [BS221100] – used for operational impacts associated with the energy generation and transmission.
- Basic chemical manufacturing [BS325100] – used for operational impacts associated with the hydrogen plant.

**The expenditure profile for wind turbine construction is different than other forms of electric power engineering construction such as hydroelectricity or natural gas-fired production. Jupia Consultants worked with the Industry Accounts Division at Statistics Canada to reprofile the multipliers for the wind energy sector. Specifically, any economic impact associated with the manufacture of the wind turbines and related system was removed from the model.*

International imports

The model assumes \$2.5 billion (CDN\$) of international imports associated with this project, equivalent to 42 percent of total capital expenditures. This is based on input from the project proponent and on typical international import levels for the two main sectors used in the CAPEX modelling. These imports include the cost of wind turbines, electrical equipment and components, electric wire and cable and some fabricated metal products. It also includes the cost of specific imported equipment for the hydrogen electrolyzer and the ammonia plant. There is very little GDP and other economic impacts in Canada associated with the purchases of these imports. Any wholesale margins as well as the cost of transportation and installation is included in the model.

3.2 Project Nujio'qonik GH2: CAPEX impacts

Based on the methodology described in Section 3.1, the economic impacts from the capital investment spending associated with Project Nujio'qonik GH2 are developed in this section.

Provided by WorldEnergy GH2, the total capital expenditures in 2023 dollars were set at \$4.49 billion USD or \$5.98 billion CDN. These expenditures include development costs, the building of the wind energy infrastructure as well as the hydrogen and ammonia plants. It also includes costs associated with grid integration and power storage and other project-related capital expenditures. As discussed in Section 3.1, 42 percent of the value of CAPEX was removed from the model as it relates to international imports. The other 58 percent of the CAPEX spending was assumed to boost output in Newfoundland and Labrador and Canadian industries.

3.2.1 Wind energy infrastructure (CAPEX)

Table 1 shows the estimated CAPEX economic impacts associated with the deployment of the wind energy infrastructure. This is a capital-intensive activity as it requires site preparation and the construction of related wind energy infrastructure (bases, transmission infrastructure, etc.). The cost of internationally imported turbines and related components was removed from the model.

Still, with the multiplier effects, the economic impacts from this spending are expected to be significant in Newfoundland and Labrador and the rest of Canada. From direct and supply chain (indirect) spending, the deployment of the wind energy infrastructure is expected to boost provincial GDP by \$891 million. Adding the induced effects, the total provincial GDP created by this project increases to \$1.14 billion. The employment income in the province associated with this segment of the CAPEX from direct, indirect and induced effects is expected to be an estimated \$835 million over the three years plus development cycle. This employment income is associated with an estimated 6,780 person years of employment in the province. It will induce an expected \$602 million in household spending across Newfoundland and Labrador. Governments will benefit from substantial tax revenue induced by the CAPEX including an estimated \$25.5 million to municipal government, \$201.6 million to the Newfoundland and Labrador government and \$153.4 million to the federal government for a total tax contribution of \$380.5 million.

The deployment of the wind energy infrastructure will also boost the national economy (through supply chain and induced effects). As shown in the table below, combined with in-province effects, the total GDP boost across the country will exceed \$1.6 billion, and employment income will be \$1.23 billion, supporting more than 10,700 FTE person years of employment. Across the country, household spending is expected to be \$892 billion and the total tax take for all municipal, provincial and federal governments is expected to be \$498 million.

Table 1: Estimated CAPEX economic impacts - wind energy infrastructure deployment

Total impact over construction phase

| | Newfoundland and Labrador | | Canada-wide | |
|-------------------------------------|--------------------------------------|----------------------|--------------------------------------|----------------------|
| | <u>Direct & indirect impacts</u> | <u>Total impacts</u> | <u>Direct & indirect impacts</u> | <u>Total impacts</u> |
| GDP contribution (\$M) | \$891.0 | \$1,140.0 | \$1,146.2 | \$1,607.9 |
| Employment income (\$M) | \$834.5 | \$937.1 | \$1,018.9 | \$1,230.1 |
| Person years (FTE) employment | 6,780 | 7,976 | 8,420 | 10,741 |
| Household spending (\$M) | \$602.0 | \$676.3 | \$738.2 | \$892.3 |
| Taxes – municipal (\$M) | \$15.1 | \$25.5 | \$24.1 | \$45.4 |
| Taxes – provincial (\$M) | \$128.0 | \$201.6 | \$150.7 | \$251.1 |
| Taxes – federal (\$M) | \$115.6 | \$153.4 | \$142.4 | \$202.3 |
| Total taxes (\$M) | \$258.7 | \$380.5 | \$317.2 | \$498.1 |
| <i>Relative to GDP contribution</i> | 29% | 33% | 28% | 31% |

Source: Developed by Jupia Consultants Inc. See Appendix A.

3.2.2 Hydrogen/ammonia facilities (CAPEX)

In addition to the deployment of the wind energy infrastructure, there are considerable economic impacts associated with the building of the physical infrastructure to produce, store and transport hydrogen and ammonia. As above, the cost of international imports such as the electrolyzer were removed from the model.

From direct and supply chain (indirect) spending, the construction of this related infrastructure is expected to boost provincial GDP by \$1.07 billion (Table 2). Adding the induced effects, the total provincial GDP created by this project increases to \$1.37 billion. The employment income in the province associated with this segment of the CAPEX from direct, indirect and induced effects is expected to be \$870 million over the three years plus development cycle. This employment income is associated with an estimated 11,356 person years of employment in the province.

It will induce an expected \$628 million in household spending across Newfoundland and Labrador. Governments will benefit from the tax revenue induced by the CAPEX including an estimated \$44.1 million to municipal government, \$226.8 million to the Newfoundland and Labrador government and \$144.9 million to the federal government for a total tax contribution of \$417.8 million.

The construction of this related infrastructure will also boost the national economy (through supply chain and induced effects). As shown in the table, combined with in-province effects, the total GDP boost across the country will be an estimated \$2.03 billion and employment income will rise by \$1.25 billion, supporting 17,000+ FTE person years of employment. Across the country, household spending is expected to exceed \$900 million and the total tax take for all municipal, provincial and federal governments is expected to be \$576 million.

Table 2: Estimated CAPEX economic impacts - hydrogen production facility, ammonia plant and other Total impact over construction phase

| | Newfoundland and Labrador | | Canada-wide | |
|-------------------------------------|--------------------------------------|----------------------|--------------------------------------|----------------------|
| | <u>Direct & indirect impacts</u> | <u>Total impacts</u> | <u>Direct & indirect impacts</u> | <u>Total impacts</u> |
| GDP contribution (\$M) | \$1,073.7 | \$1,369.8 | \$1,477.8 | \$2,031.3 |
| Employment income (\$M) | \$774.9 | \$870.3 | \$1,036.8 | \$1,250.1 |
| Person years (FTE) employment | 9,520 | 11,356 | 13,188 | 17,027 |
| Household spending (\$M) | \$558.9 | \$628.2 | \$751.5 | \$906.3 |
| Taxes – municipal (\$M) | \$31.5 | \$44.1 | \$52.2 | \$72.0 |
| Taxes – provincial (\$M) | \$157.5 | \$226.8 | \$188.1 | \$296.1 |
| Taxes – federal (\$M) | \$116.1 | \$144.9 | \$153.0 | \$207.9 |
| Total taxes (\$M) | \$306.0 | \$417.6 | \$393.3 | \$576.0 |
| <i>Relative to GDP contribution</i> | 28% | 30% | 27% | 28% |

Source: Developed by Jupia Consultants Inc. See Appendix A.

3.2.3 Total CAPEX impacts

Combining the economic impacts associated with deployment of the wind energy infrastructure, the building of the physical infrastructure to produce, store and transport hydrogen and ammonia and other expenditures, the total economic impact from the capital investment phase is shown in Table 3.

The total CAPEX phase of Project Nujio'qonik GH2 is projected to boost Newfoundland and Labrador's GDP by \$2.5 billion over the three years plus. Across the country, GDP will rise by \$3.6 billion. The CAPEX phase is expected to support over 19,300 person years of employment in the province and over 27,700 across the country. Employment income is expected to be \$1.8 billion in-province and \$2.5 billion across Canada. Household spending will rise over the three years plus by nearly \$1.3 billion in Newfoundland and Labrador and \$1.8 billion across the country.

Municipal governments in the province are expected to see \$70 million in new tax revenue, the Newfoundland and Labrador government \$428 million and the federal government \$298 million for a total tax contribution from in-province activity of an estimated \$798 million. Based on national impact, the federal government is expected to see a rise of \$410 million in tax revenue.

Table 3: Estimated CAPEX economic impacts – total Project Nujio'qonik GH2

Total impact over construction phase

| | Newfoundland and Labrador | Canada-wide | | |
|-------------------------------------|--------------------------------------|----------------------|--------------------------------------|----------------------|
| | <u>Direct & indirect impacts</u> | <u>Total impacts</u> | <u>Direct & indirect impacts</u> | <u>Total impacts</u> |
| GDP contribution (\$M) | \$1,964.7 | \$2,509.8 | \$2,624.0 | \$3,639.2 |
| Employment income (\$M) | \$1,609.4 | \$1,807.4 | \$2,055.7 | \$2,480.2 |
| Person years (FTE) employment | 16,300 | 19,332 | 21,609 | 27,768 |
| Household spending (\$M) | \$1,160.9 | \$1,304.5 | \$1,489.7 | \$1,798.6 |
| Taxes – municipal (\$M) | \$46.6 | \$69.6 | \$76.3 | \$117.4 |
| Taxes – provincial (\$M) | \$285.5 | \$428.4 | \$338.8 | \$547.2 |
| Taxes – federal (\$M) | \$231.7 | \$298.3 | \$295.4 | \$410.2 |
| Total taxes (\$M) | \$564.7 | \$798.1 | \$710.5 | \$1,074.1 |
| <i>Relative to GDP contribution</i> | 28% | 30% | 27% | 28% |

Source: Developed by Jupia Consultants Inc. See Appendix A.

3.2.4 Average annual CAPEX impacts

Table 4 shows the estimated CAPEX economic impacts from Project Nujio'qonik GH2 per year spread over the 2024-2026 timeframe.

Table 4: Estimated CAPEX economic impacts – average annual impacts (2024-2026), Project Nujio'qonik GH2

| | Newfoundland and Labrador | Canada-wide | | |
|--------------------------|--------------------------------------|----------------------|--------------------------------------|----------------------|
| | <u>Direct & indirect impacts</u> | <u>Total impacts</u> | <u>Direct & indirect impacts</u> | <u>Total impacts</u> |
| GDP contribution (\$M) | \$654.9 | \$836.6 | \$874.7 | \$1,213.1 |
| Employment income (\$M) | \$536.5 | \$602.5 | \$685.2 | \$826.7 |
| FTE employment | 5,433 | 6,444 | 7,203 | 9,256 |
| Household spending (\$M) | \$387.0 | \$434.8 | \$496.6 | \$599.5 |
| Taxes – municipal (\$M) | \$15.5 | \$23.2 | \$25.4 | \$39.1 |
| Taxes – provincial (\$M) | \$95.2 | \$142.8 | \$112.9 | \$182.4 |
| Taxes – federal (\$M) | \$77.2 | \$99.4 | \$98.5 | \$136.7 |
| Total taxes (\$M) | \$188.2 | \$266.0 | \$236.8 | \$358.0 |

Source: Developed by Jupia Consultants Inc. See Appendix A.

3.2.5 Detailed assessment of supply chain benefits

In general, for every dollar of spending in Newfoundland and Labrador, there is a boost in output in the rest of Canada. This is particularly true for smaller jurisdictions, such as Newfoundland and Labrador, because it is a small province (by population) and relies on supply chains across the country. Statistics Canada reports the interprovincial output multipliers for the four key industries used in this report are:

- Non-residential building construction: \$0.62
- Electric power engineering construction: \$0.42
- Electric power generation, transmission and distribution: \$0.40
- Basic chemical manufacturing: \$0.40

This includes both indirect (supply chain) and induced effects. It means that for every \$1.00 spent in non-residential building construction in Newfoundland and Labrador, output rises in the rest of the country by 62 cents. This results in considerable economic benefits outside of the province as detailed above.

3.2.6 Wind turbine CAPEX example

NOTE to WorldEnergy GH2 team: this may confuse readers as it may be perceived to be your actual supply chain whereas it is based on a modified version of the multipliers associated with similar activity in Newfoundland and Labrador. We could take it out or make it even more high level.

To illustrate the interprovincial economic benefits, the wind turbine CAPEX associated with Project Nujio'qonik GH2 was analyzed at a detailed level for each province. This section is based on the profile of spending in electricity generation and transmission infrastructure in Newfoundland and Labrador (modified to fit a wind energy investment profile) and not necessarily equivalent to Project Nujio'qonik GH2's actual supply chain spending profile.

Based on this assumption, a project such as Project Nujio'qonik GH2 could impact a number of industries across the province and country. The wholesale trade sector receives a substantial boost as project proponents and suppliers are purchasing goods used in the CAPEX phase of the project². The model estimates the wholesale trade sector will generate \$119 million worth of increased output in Newfoundland and Labrador and \$231 million in other provinces for a total of \$350 million across the country. The model predicts there will be increased output in the fabricated metal product manufacturing sector of \$58 million across the country (in addition to the international imports). The truck transportation sector will see a significant rise in output across the country (\$47 million).

Service industries will also benefit from this project. In Newfoundland and Labrador, output in the legal, accounting and architectural, engineering and related services sector is expected to rise by over \$21 million while across the country total output increases by nearly \$41 million.

² Please note this represents increased industry output and not the final GDP contribution by sector.

For a project of this size and scale, the insurance industry can expect a \$32 million increase in output across the country and the IT services and other professional, scientific and technical services will benefit from nearly \$28 million in new sector output.

**Table 5: Total indirect and induced spending by region in Canada, selected industries (\$CDN)
Project Nujio'qonik GH2 wind turbine and related infrastructure construction (\$Million)***

| | <u>NL</u> | <u>ROC**</u> | <u>CAN</u> |
|---|-----------|--------------|------------|
| Wholesale trade margins | \$119.2 | \$230.6 | \$349.8 |
| Retail trade margins | 78.9 | 28.8 | 107.7 |
| Fabricated metal product manufacturing | 16.9 | 41.5 | 58.3 |
| Other finance, insurance and real estate services | 17.1 | 36.2 | 53.4 |
| Truck transportation | 14.7 | 31.9 | 46.5 |
| Information services | 23.3 | 23.0 | 46.4 |
| Banking services | 17.7 | 28.1 | 45.8 |
| Accommodation and food services | 23.7 | 19.0 | 42.7 |
| Legal, accounting and architectural, engineering and related services | 21.1 | 19.7 | 40.9 |
| Electric power generation, transmission and distribution | 22.8 | 10.6 | 33.4 |
| Petroleum and coal product manufacturing | 8.9 | 24.2 | 33.2 |
| Insurance carriers | 7.6 | 24.8 | 32.3 |
| Cement and concrete product manufacturing | 28.8 | 3.3 | 32.1 |
| Administrative and support services | 7.5 | 21.8 | 29.3 |
| IT services and other professional, scientific and technical services | 5.3 | 23.4 | 28.7 |
| Other transportation | 9.4 | 15.5 | 25.0 |
| Electrical equipment and component manufacturing | 0.0 | 20.4 | 20.4 |
| Total | \$642.7 | \$853.7 | \$1,496.5 |

*does not include international imports.

**Rest of Canada.

Source: Jupia Consultants Inc. based on data supplied by Statistics Canada.

The expected economic impacts can be summarized on a provincial basis. For a project of this size and scope, provincial economies outside Newfoundland and Labrador can expect an estimated \$854 million in spending (from indirect and induced effects). How that breaks down by province is shown in Table 6.

Ontario industries are the largest beneficiary with an expected \$310 million in increased industry output, followed by Quebec at \$175 million. Nova Scotia is a significant beneficiary – particularly adjusted for the size of the economy. Firms and industries in that province can expect \$112 million worth of increased industry output. Alberta and New Brunswick firms and industries can expect over \$98 million and \$71 million respectively.

**Table 6: Total indirect and induced spending by region in Canada, selected industries (\$CDN)
Project Nujio'qonik GH2 wind turbine and related infrastructure construction (\$Million)***

| <u>Province:</u> | <u>Output boost:</u> | <u>Top sectors:</u> |
|----------------------|----------------------|--|
| Ontario | \$309.9 | Wholesale trade, finance, insurance, IT services, truck transportation |
| Quebec | \$175.1 | Wholesale trade, fabricated metal, truck transportation, refined oil |
| Nova Scotia | \$111.9 | Wholesale trade, fabricated metal, retail trade |
| Alberta | \$98.2 | Wholesale trade, refined oil, professional services, IT |
| New Brunswick | \$71.0 | Wholesale trade, fabricated metal, truck transportation |
| British Columbia | \$49.6 | Wholesale trade, retail trade, IT services |
| Manitoba | \$15.5 | Wholesale trade, truck transportation |
| Prince Edward Island | \$14.7 | Wholesale trade, fabricated metal |
| Saskatchewan | \$6.7 | Wholesale trade |

Source: Jupia Consultants Inc. based on data supplied by Statistics Canada.

3.2.7 Detailed assessment of NL household spending impacts

An important impact of Project Nujio'qonik GH2 will be the boost to household spending. About 72 percent of all employment income in the province becomes current consumption, meaning it is spent on things like food, shelter, transportation and recreation. The rest goes to income taxes, savings and other non-current consumption. Table 7 shows how the \$1.81 billion in labour income induced by Project Nujio'qonik GH2 becomes household spending in Newfoundland and Labrador. This is based on typical household spending in the province. The amount spent in western Newfoundland will depend on a variety of factors, such as how many local people are working on related projects, how many migrant workers from elsewhere in the province are purchasing goods and services in the local area, etc.

In total, Project Nujio'qonik GH2 CAPEX is expected to boost current consumption by \$1.31 billion. This will include nearly \$186 million on food, \$284 million on shelter, \$245 on transportation, \$70 million on health and personal care and \$83 million on recreation.

How the ongoing operations associated with Project Nujio'qonik GH2 will boost ongoing household spending in Newfoundland and Labrador is developed in Section 3.3.3 below.

Table 7: Household spending in NL induced by Project Nujio'qonik GH2 CAPEX

| <u>Household spending category:</u> | <u>\$M</u> | <u>Household spending category:</u> | <u>\$M</u> |
|-------------------------------------|------------|---|------------|
| Total current consumption in NL | \$1,680.5 | Health care | \$48.3 |
| Food expenditures | \$269.8 | Medicines & pharmaceutical products | \$15.9 |
| Food purchased from stores | \$212.7 | Eye-care goods and services | \$3.1 |
| Food purchased from restaurants | \$57.1 | Dental services | \$5.0 |
| Shelter | \$412.3 | Personal care | \$21.5 |
| Water, fuel and electricity | \$94.0 | Private health and dental plan premiums | \$18.0 |
| Insurance premiums | \$6.5 | Recreation | \$82.6 |
| Household operations | \$143.9 | Entertainment | \$22.5 |
| Communications | \$81.6 | Purchase of recreational vehicles | \$17.8 |
| Pet expenses | \$18.8 | Financial services | \$11.6 |
| Household furnishings/equipment | \$57.2 | Retirement and pension fund payments | \$75.2 |
| Clothing and accessories | \$84.3 | Gifts of money & charitable contributions | \$33.8 |
| Transportation | \$356.4 | | |
| Purchase of automobiles/vans/trucks | \$145.6 | | |
| Automobile/van/truck operations | \$163.9 | | |
| Vehicle insurance premiums | \$49.9 | | |
| Gas and other fuels | \$75.3 | | |

Source: Derived by Jupia Consultants Inc. See Appendix A.

3.3 Project Nujio'qonik GH2: Ongoing OPEX impacts

3.3.1 Annual OPEX economic impacts

After the construction phase, Project Nujio'qonik GH2 will generate substantial ongoing economic benefits in western Newfoundland, the province and the country overall. These impacts involve the operations associated with the wind energy production and transmission, the operations of the hydrogen and ammonia plant and other related operational expenditures. In addition, there will be economic activity in the supply chain (e.g. port activities, etc.) and through induced impacts.

Annual OPEX: Wind energy generation and transmission

Table 8 shows the annual operating cost-related economic impacts associated with just the wind energy operations. All dollar figures are shown in \$2023. The annual operating expenditures are expected to boost provincial GDP by \$28 million per year and the national economy by \$35.5 million. The employment income from direct, indirect and induced effects is projected to be \$13 million per year in Newfoundland and Labrador and \$16.9 million across the country. The wind energy operations will support 101 full-time equivalent (FTE) jobs in the province (mostly western NL) and 146 FTE jobs across the country. These are high wage jobs with an average employment income of \$115,000 per year.

The household spending induced by the wind energy operations is expected to exceed \$9.4 million in the province and \$12.2 million across the country. See Section 3.3.3 for a more detailed assessment of household spending impacts.

The wind energy operations are expected to boost annual tax revenues by \$6.2 million in Newfoundland and Labrador and \$8 million across the country. In addition to the personal income tax, HST and household property taxes supported each year, the project will also face Crown Land reserve and lease fees as well as a wind electricity tax. Combining all these taxes and fees, the provincial government can expect to receive \$9.6 million per year - excluding corporate income tax which is developed in Section 3.3.2 below³.

Municipal government in Newfoundland and Labrador will see \$455,000 in new annual tax revenue and the federal government \$2.4 million. Based on national impacts, the federal government annual tax take will rise to over \$3 million.

Again, it is important to point out that this does not include corporate income taxes which will substantially boost the amount flowing into government coffers starting in 2041. See Section 3.3.2 for a detailed analysis of tax impacts.

³ The Crownland reserve fee is 3.5% of market value of reserved lands and the Crownland lease fee is 7%. The wind electricity tax is \$4,000 per MW.

Table 8: Annual OPEX economic impacts – wind energy operations (\$2023)

| Impact (starting in 2027): | NL | CAN |
|------------------------------|----------|----------|
| GDP contribution (\$000s) | \$27,992 | \$35,447 |
| Employment income (\$000s) | \$13,046 | \$16,885 |
| FTE employment | 101 | 146 |
| Household spending (\$000s) | \$9,413 | \$12,241 |
| Taxes – municipal (\$000s) | \$455 | \$825 |
| Taxes – provincial (\$000s)* | \$9,633 | \$10,402 |
| Taxes – federal (\$000s)* | \$2,345 | \$3,041 |
| Total taxes (\$000s) | \$12,433 | \$14,268 |
| Relative to GDP contribution | 44% | 40% |

*Excluding corporate income tax. See Section 3.3.2.

Source: Developed by Jupia Consultants Inc. See Appendix A.

In addition to the wind energy, the operations of the hydrogen and ammonia plant will generate ongoing economic impacts in western Newfoundland, the province and the country.

Annual OPEX: Hydrogen and ammonia plant operations

Table 9 shows the annual economic impacts expected to arise from the operations of the hydrogen and ammonia plant. It is expected to boost provincial GDP by over \$29 million, employment income by over \$10 million and household spending by \$7.3 million while supporting 93 FTE jobs. The hydrogen and ammonia plant operations are expected to boost provincial government tax revenue in the province by nearly \$3 million and municipal taxes by an estimated \$388,000.

Across the country, the operations are projected to boost national GDP by \$35.7 million, employment income by \$13.4 million, employment by 132 FTEs and household spending by \$9.7 million. Across the country, governments can expect to see more than \$7.1 million, excluding the corporate income tax impacts.

Table 9: Annual OPEX economic impacts – hydrogen/ammonia operations (\$2023)

| Impact (starting in 2027): | NL | CAN |
|------------------------------|----------|----------|
| GDP contribution (\$000s) | \$29,102 | \$35,702 |
| Employment income (\$000s) | \$10,112 | \$13,393 |
| FTE employment | 93 | 132 |
| Household spending (\$000s) | \$7,297 | \$9,710 |
| Taxes – municipal (\$000s) | \$388 | \$674 |
| Taxes – provincial (\$000s)* | \$2,984 | \$3,616 |
| Taxes – federal (\$000s)* | \$2,203 | \$2,842 |
| Total taxes (\$000s) | \$5,575 | \$7,132 |
| Relative to GDP contribution | 19% | 20% |

*Excluding corporate income tax. See Section 3.3.2.

Source: Developed by Jupia Consultants Inc. See Appendix A.

Annual OPEX: Other support activities

There are other operating activities associated with the project in addition to the wind energy and the hydrogen/ammonia production (Table 10). This annual spending is expected to add another \$21.6 million to provincial GDP and \$27.3 million to national GDP. Employment income supported in the province will exceed \$10 million and 78 FTE jobs. Household spending in Newfoundland and Labrador will exceed \$7.2 million and total taxes to municipal governments will be \$396,000.

Across the country, the operations are projected to boost annual employment income by \$13 million and support 113 FTEs. Household spending will exceed \$9.4 million and tax revenue will be close to \$7.3 million, excluding corporate income tax.

Table 10: Annual OPEX economic impacts – other operating activities (\$2023)

| <u>Impact (starting in 2027):</u> | <u>NL</u> | <u>CAN</u> |
|-----------------------------------|-----------|------------|
| GDP contribution (\$000s) | \$21,555 | \$27,295 |
| Employment income (\$000s) | \$10,045 | \$13,002 |
| FTE employment | 78 | 113 |
| Household spending (\$000s) | \$7,249 | \$9,426 |
| Taxes – municipal (\$000s) | \$396 | \$699 |
| Taxes – provincial (\$000s)* | \$3,024 | \$3,701 |
| Taxes – federal (\$000s)* | \$2,218 | \$2,875 |
| Total taxes (\$000s) | \$5,637 | \$7,276 |
| Relative to GDP contribution | 26% | 27% |

**Excluding corporate income tax. See Section 3.3.2.*

Source: Developed by Jupia Consultants Inc. See Appendix A.

Annual OPEX: Total activities

Table 11 shows the combined annual operational economic impacts from Project Nujio'qonik GH2. These impacts will be sustained for at least a 30-year period providing a long-term, high wage economic anchor for western Newfoundland. Annually, the operations associated with Project Nujio'qonik GH2 will boost provincial GDP by nearly \$79 million and national GDP by over \$98 million. There will be an estimated 272 FTE jobs (at high average wages) in the province, mostly in western Newfoundland. Across the country, the project will support 390 jobs and over \$43 million in total employment income.

The project will support an estimated \$24 million in annual household spending across the province, again mostly in western Newfoundland. Country-wide, the project will support \$31.4 million in annual household spending. Combined the annual operations from the project will boost tax revenue from operations by \$23.7 million in the province and \$28.7 million across the country – excluding corporate income tax (see Section 3.3.2.).

Table 11: Annual OPEX economic impacts – total operations (\$2023)

| Impact (starting in 2027): | NL | CAN |
|------------------------------|----------|----------|
| GDP contribution (\$000s) | \$78,649 | \$98,444 |
| Employment income (\$000s) | \$33,203 | \$43,280 |
| FTE employment | 272 | 391 |
| Household spending (\$000s) | \$23,959 | \$31,377 |
| Taxes – municipal (\$000s) | \$1,239 | \$2,198 |
| Taxes – provincial (\$000s)* | \$15,641 | \$17,719 |
| Taxes – federal (\$000s)* | \$6,766 | \$8,758 |
| Total taxes (\$000s) | \$23,645 | \$28,676 |
| Relative to GDP contribution | 30% | 29% |

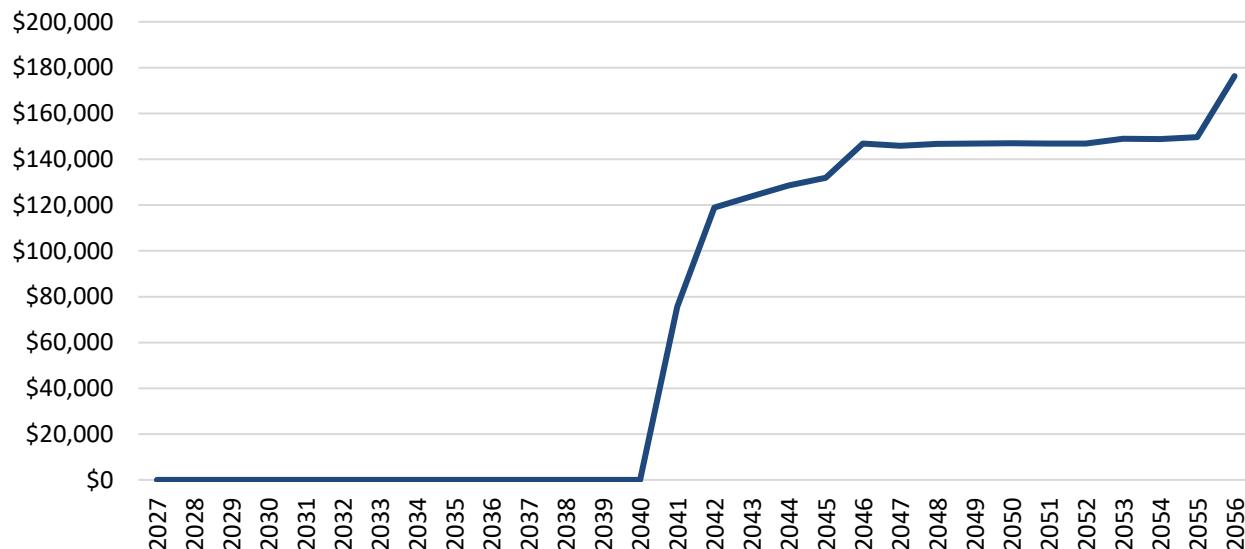
*Excluding corporate income tax. See Section 3.3.2.

Source: Developed by Jupia Consultants Inc. See Appendix A.

3.3.2 Corporate taxation impacts

In the early operating years of the project, the corporate income tax is limited due to the use of investment tax credits. Starting in 2041, the project is expected to start generating substantial corporate income tax. Between 2041 and 2057, Project Nujio'qonik GH2 is projected to generate \$2.97 billion (\$CDN) in cumulative corporate income tax for the provincial and federal governments (Figure 12). Using an annual discount rate of 3.5 percent, the \$2.97 billion is worth \$1.5 billion in 2023 dollars. This equates to an annual average of \$50.4 million per year between 2027 and 2057. Half of this amount goes to the provincial government and the other half to the federal government.

Figure 12: Corporate income tax payments by year, in nominal dollars, federal/provincial combined (\$000s)



Source: World Energy GH2.

Table 12 below shows the combined tax revenue expected to be induced by the operations and corporate income taxes from Project Nujio'qonik GH2 on an annual and cumulative basis between 2027 and 2057. This includes Crownland fees and the wind electricity tax.

In \$2023, municipal governments in Newfoundland and Labrador are expected to see tax coffers boosted by \$1.23 million per year or \$37.2 million over the 30-year period. The Newfoundland and Labrador government is expected to receive an average annual amount of \$40.8 million per year (taxes from operations, Crownland fees, wind electricity fees and corporate income taxes) or \$1.23 billion over the 30-year period. The federal government is expected to receive \$1.02 billion in tax revenue over the 30-year period or an annual average of \$34 million.

Table 12: Annual and cumulative taxes arising from Project Nujio'qonik GH2 operations (\$2023)

| | <u>NL</u> | <u>CAN</u> |
|---|--------------------|--------------------|
| Annual taxes from operations (starting in 2027): | | |
| Municipal (\$000) | \$1,239 | \$2,198 |
| Provincial (\$000) | \$15,641 | \$17,719 |
| Federal (\$000) | <u>\$6,766</u> | <u>\$8,758</u> |
| Total taxes from operations (\$000) | \$23,645 | \$28,676 |
| Corporate income taxes (annual average): | | |
| Provincial (\$000) | \$25,200 | \$25,200 |
| Federal (\$000) | \$25,200 | \$25,200 |
| Average annual taxes (2027-2057) (\$000) | \$74,045 | \$79,076 |
| Cumulative taxes (2027-2057) | | |
| Municipal (\$000) | \$37,170 | \$65,940 |
| Provincial (\$000) | \$1,225,230 | \$1,287,570 |
| Federal (\$000) | <u>\$958,980</u> | <u>\$1,018,740</u> |
| Total (\$000s) | \$2,221,380 | \$2,372,250 |

Source: Developed by Jupia Consultants Inc. See Appendix A.

What about the economic impacts associated with the spending of tax revenue?

The economic impact model does not include the potential economic activity associated with the spending of government tax revenue. This revenue could be used to fund public capital investment (roads, schools, hospitals, etc.) or government operations (teachers' salaries) or even to pay down debt.

3.3.3 Household spending impacts

Just like the CAPEX impacts discussed above, the annual operations of Project Nujio'qonik GH2 will provide a solid boost to household spending in the province, mostly in western Newfoundland. Table 13 shows how the \$24 million in annual labour income induced by Project Nujio'qonik GH2 becomes household spending in Newfoundland and Labrador. This is based on typical household spending in the province.

In total, Project Nujio'qonik GH2 annual operations are expected to boost current consumption by \$17.3 billion. This will include nearly \$2.8 million on food, \$4.2 million on shelter, \$3.7 on transportation, \$1 million on health and personal care and \$1.2 million on recreation.

Table 13: Household spending in NL induced by Project Nujio'qonik GH2 OPEX (\$2023)

| Household spending category: | \$000s | Household spending category: | \$000s |
|-------------------------------------|------------|---|-----------|
| Total current consumption in NL | \$17,288.2 | Health care | \$721.9 |
| Food expenditures | \$2,775.6 | Medicines & pharmaceutical products | \$238.0 |
| Food purchased from stores | \$2,187.8 | Eye-care goods and services | \$46.2 |
| Food purchased from restaurants | \$587.8 | Dental services | \$75.0 |
| Shelter | \$4,241.2 | Personal care | \$321.5 |
| Water, fuel and electricity | \$940.8 | Private health and dental plan premiums | \$321.5 |
| Insurance premiums | \$66.8 | Recreation | \$1,235.5 |
| Household operations | \$1,480.3 | Entertainment | \$336.5 |
| Communications | \$839.0 | Purchase of recreational vehicles | \$265.6 |
| Pet expenses | \$193.3 | Financial services | \$173.9 |
| Household furnishings/equipment | \$588.1 | Retirement and pension fund payments | \$1,124.6 |
| Clothing and accessories | \$867.5 | Gifts of money & charitable contributions | \$506.3 |
| Transportation | \$3,666.3 | | |
| Purchase of automobiles/vans/trucks | \$1,497.7 | | |
| Automobile/van/truck operations | \$1,686.5 | | |
| Vehicle insurance premiums | \$513.0 | | |
| Gas and other fuels | \$774.3 | | |

Source: Derived by Jupia Consultants Inc. See Appendix A.

3.4 Combined CAPEX & OPEX economic impacts

Project Nujio'qonik GH2 represents a large-scale infrastructure investment of nearly \$6 billion. The installation of wind turbines, investment in electricity transmission infrastructure and the building of the hydrogen plant and ammonia facilities along with other capital investment is expected to boost provincial GDP by nearly \$2.5 billion over a three-year period (\$2023). The annual operations of the facilities and energy infrastructure will boost provincial GDP by a total of \$2.4 billion over a 30-year operational period (\$2023). Combined, Project Nujio'qonik GH2 will boost the provincial economy by \$4.9 billion (\$2023).

This economic activity will boost employment income by an estimated \$2.8 billion and support 27,480 full time equivalent person years of employment over the 33-year period.

Municipal governments in the province can expect \$107 million in tax revenue over the 33-year period (CAPEX and OPEX phases), the provincial government will receive an estimated \$1.65 billion and the federal government another \$1.28 billion just from the in-province activity. Adding national economic activity, the federal government can expect \$1.86 billion over the 33-year period.

Table 14: Combined and cumulative economic impacts, Project Nujio'qonik GH2 (\$2023)

In-province impacts only

| | CAPEX | OPEX | 33-year cumulative impacts (\$2023) |
|----------------------------------|---------|---------|-------------------------------------|
| GDP contribution (\$M) | \$2,510 | \$2,359 | \$4,869 |
| Employment income (\$M) | \$1,807 | \$996 | \$2,803 |
| Person years (FTE) employment | 19,332 | 8,149 | 27,481 |
| <i>Average annual employment</i> | 6,444 | 272 | |
| Household spending (\$M) | \$1,305 | \$719 | \$2,024 |
| Taxes – municipal (\$M) | \$70 | \$37 | \$107 |
| Taxes – provincial (\$M) | \$428 | \$1,225 | \$1,653 |
| Taxes – federal (\$M)* | \$298 | \$959 | \$1,257 |
| Total taxes (\$M) | \$798 | \$2,221 | \$3,019 |

*rises to \$1.86 billion with national economic impacts added.

Source: Derived by Jupia Consultants Inc. See Appendix A.

4. THE RELATIVE IMPACT OF PROJECT NUJIO'QONIK GH2 IN THE WESTERN NL ECONOMY

4.1 The economic benefits in context

Project Nujio'qonik GH2 will have a sizable impact on the Newfoundland and Labrador economy both from the capital spending phase and from the ongoing operations. This section highlights just how important this project will be to the regional and provincial economy in a number of areas.

| Economic benefit: | In context: |
|--|--|
| Will substantially boost provincial infrastructure investment | <p>WorldEnergy GH2 is expecting to deploy \$5.99 billion (\$CDN) worth of capital on this project over a three plus year timeframe (most will be spent between 2024-2027). In context, according to Statistics Canada, this is an amount equivalent to 50 percent of all private sector capital expenditures in the province between 2021-2023. To put this another way, Project Nujio'qonik GH2 should boost private sector capital spending by nearly 50 percent per year compared to the baseline spending between 2021-2023.</p> <p>Another way to look at the impact is to compare the annual capital expenditures to past periods of investment in the provincial utilities sector. Over the past 10 years, the utilities sector in Newfoundland and Labrador invested \$1.64 billion per year on capital expenditures. This included almost the entire investment in the Lower Churchill Falls hydroelectricity project. During the 2024-2027 timeframe, the Project Nujio'qonik GH2 is expected to generate an annual average of \$2 billion in capital spending.</p> |
| Adds a top private sector employer in western Newfoundland | <p>This surge in capital investment will leave behind nearly 300 full-time equivalent annual jobs in the province, most in western Newfoundland. As discussed earlier in this report, there is only one other private sector employer with 200 or more employees in all of Census Division #4. While these new jobs will not all be employees of WorldEnergy GH2, they will be employed as a result of the project.</p> <p>Further, the average salary associated with these jobs will be twice the level of the average full-time job in western NL (Census Division #4).</p> <p>Based on 2021 Census data, the \$33 million in expected employment income in the province is an amount equivalent to \$1.00 out of every \$9.00 in employment income earned in Census Division #4. Not all the workers will live in Census Division #4 but this is still a substantial boost to employment income. Even if only 70 percent of the employment income is earned by households in Division #4, it would represent an amount equivalent to \$1.00 out of every \$13.00 in total employment income in the region.</p> |

| Economic benefit: | In context: |
|--|---|
| Supports hundreds of small companies in the region | <p>According to Statistics Canada there are over 600 private sector employers in western NL (Division #4). This includes 99 retail firms, 86 personal services firms and 14 restaurants. Adding between \$15-\$20 million per year to household spending in the region will provide a substantial ongoing boost to the local economy⁴.</p> <p>Assuming most of the household spending is generated in Division #4, this represents a boost of between 5% and 8% of total annual household spending on current consumption⁵. It is likely this substantial new household spending will increase the need for more entrepreneurs in the region.</p> |
| Helps attract highly skilled talent and meet local workforce needs | <p>As discussed in Section 2, these high wage, highly skilled jobs will be attractive to trades workers and professionals looking to advance their careers. Many of these 200+ highly skilled workers will bring with them families that will help support workforce needs in other sectors of the economy.</p> |
| Drives substantial new tax revenue in the province | <p>Newfoundland and Labrador needs new sources of sustained, private sector revenue. The provincial budget is heavily reliant on oil and gas revenues as offshore royalties alone account for nearly 20 percent of own-source revenue each year (not including corporate income tax and induced taxes from the sector). Project Nujio'qonik GH2 is expected to generate an average of more than \$41 million in new tax dollars each year for the provincial government over a 33-year period (in \$2023).</p> <p>Municipal government, mostly in western NL, can expect an average of over \$3 million in tax revenue each year during the life of the project.</p> |
| Creates another major export industry for Newfoundland and Labrador | <p>Project Nujio'qonik GH2 will create another major export sector for Newfoundland and Labrador. Based on international export data by sector tracked by Statistics Canada, green hydrogen will become a top five export sector by value for the provincial economy behind oil and gas, iron ore, refined iron and seafood production.</p> |
| Positions western NL as a Canadian green energy leader | <p>Project Nujio'qonik GH2 will position western NL as a Canadian leader in green energy production.</p> |
| Could lead to a substantially larger project in Phase 2&3 | <p>The economic impact analysis in this report is based only on Phase 1 which includes a 1 GW wind farm and hydrogen/ammonia production. In Phases 2 & 3, the wind energy production could triple with a proportionate increase in green hydrogen/ammonia production.</p> |

⁴ The impact model forecasts \$24 million in household spending per year but that is a provincial-wide figure. It is likely the western NL spending will be at least \$15 million assuming most employees live in the region.

⁵ 8% would represent 100% of current consumption occurring in Census Division #4 while 5% would represent 65% staying in the region.

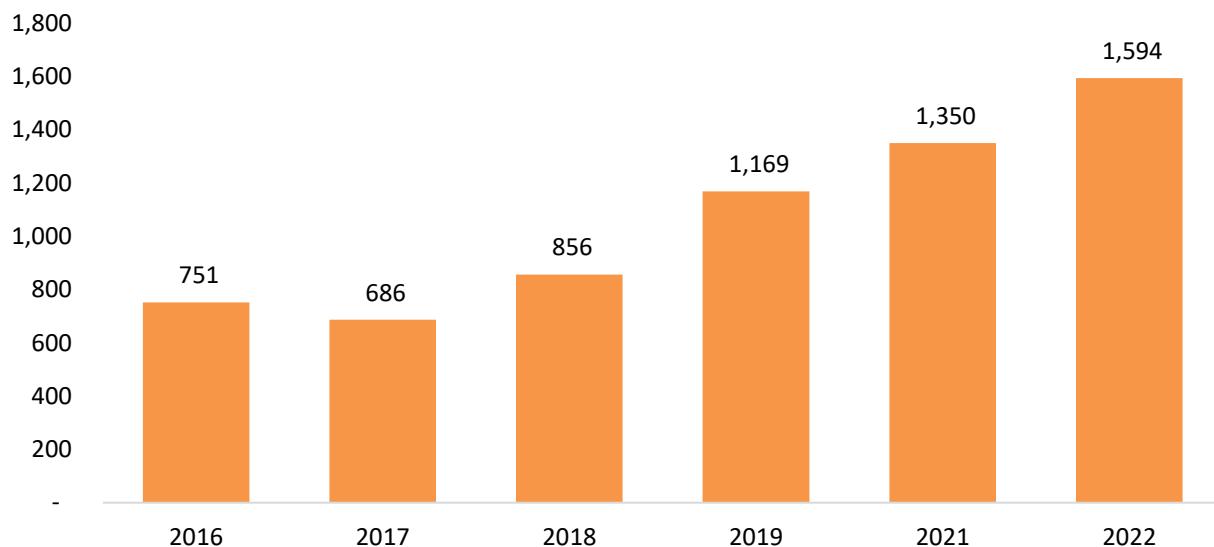
4.2 Maximizing economic benefits

It is important for WorldEnergy GH2, government, education and community stakeholders to work on maximizing the economic benefits from Project Nujio'qonik GH2. Western NL (Census Division #4) is a small economy with a limited population and many of the economic benefits from both the CAPEX and OPEX phases of the project could leave the region as the project proponent and its suppliers may have to bring in workers and purchase a higher level of goods and services outside the region and province relative to the expenditures predicted by the economic impact model.

The region is already facing a tightening labour market. According to Statistics Canada, the economic region that includes Division #4 has seen a 2.3 times increase in the number of vacant jobs between 2017 and 2022 (Figure 13).

A deliberate strategy to ensure the maximum number of Newfoundlanders and Labradorians can work jobs related to both the CAPEX and OPEX should be developed. Further, a detailed supply chain development strategy will ensure that Newfoundland and Labrador companies can maximize the benefits of this project to the local economy.

Figure 13: Average quarterly job vacancies by year, West Coast-Northern Peninsula-Labrador, Newfoundland and Labrador



Source: Statistics Canada Table: 14-10-0326-01.

5. CONCLUSION: PROJECT NUJIO'QONIK GH2 AND THE FUTURE OF WESTERN NL

It is not often a project of this size comes along in places like western Newfoundland. Because the region is ideal for wind energy and downstream hydrogen/ammonia production, the economic case is solid.

Project Nujio'qonik GH2 represents a new anchor industry for western Newfoundland similar to large projects in the past, such as the pulp mill. It will provide substantial economic benefits to the province in the near term and in the long term a source of stable high paying jobs.

It will be important for the project proponent and its partners to ensure the maximum level of economic benefits remain in the province and the ongoing economic benefits accrue to the communities in western Newfoundland.

APPENDIX A: THE ECONOMIC IMPACT MODEL AND SOURCES

The data sources used in the preparation of this report include:

| <u>Statistic:</u> | <u>Source/Description:</u> |
|---|---|
| Indirect and induced GDP, employment and income estimates | Uses Statistics Canada Input-Output multiplier and impact estimates at the M industry level. Provincial Input-Output Multipliers, 2019. Catalogue no. 15F0046XDB. Industry Accounts Division. Statistics Canada. Includes multipliers for: output, gross domestic product (GDP) at market prices, taxes on products, labour income, wages and salaries, employers' social contributions, labour income of unincorporated sector, taxes on production and employment. The specific NAICS industries used are described in Section 2. |
| Tax multipliers | Using a model developed by Jupia Consultants Inc. based on a variety of sources, including: <ul style="list-style-type: none">• Induced HST revenue: Based on the ratio of HST collected to total provincial personal income in 2022 (Source: provincial budget documents and Statistic Canada).• Induced personal income taxes paid: Derived using several sources including Statistics Canada personal tax-related tables and its survey of household spending (SHS) for 2019.• Property taxes paid (from employment income): Derived using Statistics Canada's Survey of Household Spending (SHS) for 2019.• Indirect taxes: Derived using Statistics Canada multipliers for the various sectors used in the model as described in Section 2.1. These indirect taxes are levied on the business activity and include such tax areas as: business property taxes, fuel taxes, vehicle license fees, land transfer taxes and any sales taxes arising out of the corporate activity. |
| | Corporate income tax estimates by year and amount were provided by WorldEnergy GH2. To discount the nominal values to \$2023, an annual discount rate of 3.5% was used. |
| | The Crownland reserve fee (3.5%), Crownland lease fee (7%) and wind electricity tax data was provided by WorldEnergy GH2. |
| Household spending impacts | Derived using Statistics Canada's Survey of Household Spending (SHS) for 2019. |
| Industry GDP statistics | Gross domestic product (GDP) at basic prices by industry. Source: Statistics Canada Table: 36-10-0402-01. |
| Various labour market characteristics | Statistics Canada 2021 Census and annual wage reports. |

| | |
|---|--|
| Municipal and provincial total own-source revenue as well as spending by category | GNL Main Estimates published by the Department of Finance. |
| Business counts | Source: Statistics Canada business counts, June 2022. |
| Export data | Source: Trade Data Online. |
| Occupational wage data | Statistics Canada 2021 Census. |
| Average household spending | Source: Statistics Canada Table: 11-10-0222-01. |
| Capital investment by sector | Capital and repair expenditures, non-residential tangible assets, by industry and geography. Source: Statistics Canada Table: 34-10-0035-01. |
| Employment by sector | Source: Statistics Canada 2021 Census and the annual Labour Force Survey. |

APPENDIX C: ABOUT JUPIA CONSULTANTS INC.

New Brunswick, Canada-based Jupia Consultants Inc. is a full-service research and planning support consultancy specializing in the area of economic development. For over two decades the firm has been working with companies, communities, industry associations, economic development agencies and government departments across Canada.

This report was prepared by David Campbell. David is the President of Jupia Consultants Inc. and has more than 25 years' experience as a consultant working with industry, not-for-profit organizations and governments across Canada. His focus areas include economic development strategy, economic impact analysis, population growth, cluster development and investment attraction. David was formerly Chief Economist with the Government of New Brunswick. In that role, he led the development of economic policy and economic development strategy for the provincial government.

David is a columnist with Brunswick News, a published author, and writes weekly for the It's the Economy, Stupid blog as well as co-presenting the weekly podcast Insights with Don Mills and David Campbell. In recent years, he has had the opportunity to collaborate with multiple think tanks and policy research organizations including the Conference Board of Canada, Public Policy Forum and the Donald J. Savoie Institute at the Université de Moncton.

For more information visit www.jupia.ca.

Appendix 1-D

Labour Capacity / Demand Study from Jupia Consultants Inc.

PROJECT NUJIO'QONIK
Environmental Impact Statement



PROJECT NUJIO'QONIK:

Labour capacity/demand report

Prepared by:
Jupia Consultants Inc.



July 2023

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EXECUTIVE SUMMARY

The purpose of this labour capacity/demand report is to profile the workforce required to address the construction/development phase of the project as well as the ongoing operational needs of the project and provide a review of the supply of labour available to meet this demand. Further, the report provides an assessment of how the province can maximize the workforce and income benefits of the project by addressing workforce demand.

| KEY FINDING: | SUMMARY: |
|--|---|
|  Workforce demand | |
| WorldEnergy GH2 has identified over 2,000 direct jobs required in western NL to address the CAPEX phase of Project Nujio'qonik GH2 (Section 2.1) | <ul style="list-style-type: none"> This includes wind turbine infrastructure and related deployment as well as the craft labour needs for the construction of the hydrogen plant and related infrastructure. |
| The ongoing operations phase could require around 130 direct workers and additional indirect workers over the 30-year operations of the project (Section 2.2) | <ul style="list-style-type: none"> This includes a broad range of occupations including wind turbine technicians, maintenance trades, security, operations/management, engineers/technicians, plant operators and transportation. |
|  Workforce supply | |
| NL has a relatively large construction and trades workforce (Section 3.1.1) | <ul style="list-style-type: none"> The NL workforce to support the CAPEX activities associated with Project Nujio'qonik GH2 exceeds 30,000. Currently, the province ranks first in Canada (among the 10 provinces) for the concentration of workers in technical electrical trades, technical equipment operators and heavy equipment operators. NL has a higher share of workers in all six technical trades occupational groups compared to the country overall. |
| The NL construction and trades workforce is relatively old (Section 3.1.2) | <ul style="list-style-type: none"> The workers are on average older than the workforce across the country. 37% of workers in technical construction trades and 34% of heavy equipment operators are 55+. |
| Income levels are comparable (Section 3.1.3) | <ul style="list-style-type: none"> For the vast majority of occupations, trades and construction workers earn similar levels of employment income compared to the country overall. |

EXECUTIVE SUMMARY (CONT.)

| KEY FINDING: | SUMMARY: |
|--|--|
|  Talent pipeline | <p>Overall apprenticeship registrations have plummeted in the past 20 years (Section 3.2)</p> <ul style="list-style-type: none"> • There were 1,005 registered apprenticeship carpenters in 2001 – in 2021 the number was down to 471. • There were 1,050 registered apprenticeship heavy equipment operators in 2001 – in 2021 there were 198. • There were 1,104 registered apprenticeship welders in 2001 – in 2021 there were 324. • However, electrician apprenticeships are up (1,500 in 2021). <p>Red Seal apprenticeship registrations are down substantially</p> <ul style="list-style-type: none"> • Across nine related Red Seal trade groups, the combined apprenticeship registrations are down 23% over the decade and 35% over the 20 year period. <p>College enrolment in trades is also down sharply (Section 3.3)</p> <ul style="list-style-type: none"> • The College of the North Atlantic reports that enrolment in industrial trades programs dropped from nearly 3,900 in 2014-2015 to just over 2,200 in 2021-2022 (a 43% decline). <p>The CoNA sees wind energy and green hydrogen as a growth opportunity for NL</p> <ul style="list-style-type: none"> • The College of the North Atlantic is doing a variety of things to support the growth of this sector including: Rolling out Wind Energy Technician and Hydrogen Technician programs; setting up a \$35M Innovation Hub; hiring Hatch Engineering to complete a large scale workforce demand review. They want to work directly with World GH2 addressing workforce demand for both CAPEX and OPEX phases of the project. |
|  The outlook for the Project Nujio'qonik GH2 workforce | <p>Interviews with key stakeholders indicated a positive outlook (Section 3.4)</p> <ul style="list-style-type: none"> • The trades workforce is currently 95% employed but some of the larger projects will be ending about the time Project Nujio'qonik GH2 ramps up. • Equinor postponing Bay du Nord oil project off Newfoundland for up to three years will free up more potential workers. • West White Rose and its 1,200 construction workforce will be wrapping up by late 2024. • The stakeholders engaged for the development of this report indicated with enough lead time there would be more than enough interest in the western Newfoundland project. One suggested “there will be a lineup” for any job providing stable employment in the province for a sustained period of time. |

EXECUTIVE SUMMARY (CONT.)

| KEY FINDING: | SUMMARY: |
|---|--|
| BuildForce is projecting weakening demand for construction workers in the coming years (Section 3.5) | <ul style="list-style-type: none"> By 2032, BuildForce projects the construction labour force will decline by a net 1,400. However, workforce exits (5,700) will exceed new entrants (3,400) leaving a supply gap even with the overall decline in the size of the workforce. |

|  Recommendations to maximize benefits in NL (Section 5) | |
|---|--|
| #1 Workforce planning/projections need to be aspirational | <ul style="list-style-type: none"> BuildForce is projecting population decline and a relatively weak economic outlook for NL. Premier Furey has an ambitious plan to attract over 5,000 new immigrants per year by 2026. Which is it - a growing province or a declining province? Workforce planning should be based on an optimistic view – it should be aspirational. The worst outcome would be that some residents would have to leave for work. The best outcome is that an available pool of labour supports growing sectors of the economy such as green energy. |
| #2 Expand related college and trades enrolment | <ul style="list-style-type: none"> The province is facing a retirement wave of 30% or more in the next decade or so even as trades-enrolment (and apprenticeships) are way down. |
| #3 Avoid cannibalization of the workforce | <ul style="list-style-type: none"> The municipal infrastructure and health care sectors alone have \$3.5 billion of CAPEX slated over the next few years. Provincial and municipal governments should make an effort not to cannibalize the Project Nujio'qonik GH2 workforce for public sector infrastructure projects. |
| #4 Use immigrant workers to fill gaps in the CAPEX workforce | <ul style="list-style-type: none"> Where necessary, bring in immigrant workers rather than delay project timelines. This aligns with the Premier's vision for immigration, and it will also help secure the long-term workforce needs. |
| #5 Maximizing supply chain benefits in NL | <ul style="list-style-type: none"> Be deliberate in efforts to secure supply chain benefits to NL suppliers and ensure the supply chain can meet workforce demand requirements. |

1. INTRODUCTION TO PROJECT NUJIO'QONIK GH2

WorldEnergy GH2 is proposing to build one of the largest wind farm projects in Canada in western Newfoundland. The project uses the Mi'kmaw name for Bay St. George, Nujio'qonik, which means 'where the sand blows.' Project Nujio'qonik will be Canada's first commercial green hydrogen/ammonia producer created from 3+ gigawatts (GW) of renewable electricity through wind projects in one of the world's best wind resource regions. A 3+ GW wind farm will deliver approximately 250,000 tons/year of hydrogen using 1.5 GW electrolyzers.

The region was chosen because it has one of the best wind profiles for onshore wind in all of North America. There are other reasons to undertake this project in the Stephenville region including the deep-water port, interconnection to the existing grid for mutually beneficial, seasonable exchange of green energy, access industrial water for hydrogen production, favourable response from preliminary community engagement and First Nations' involvement in the project.

Western Newfoundland's economy has struggled in recent years and is facing a number of headwinds including an aging workforce. WorldEnergy GH2's Project Nujio'qonik GH2 could be a game changer bringing substantial economic benefits during the construction phase of the project and sustaining hundreds of jobs and associated economic benefits on an annual basis over at least a three-decade period.

Based on the best available data and on interviews with union representatives, the construction sector and the post-secondary education sector, this report looks at the capacity of the provincial workforce to meet the labour demands of Project Nujio'qonik GH2 both in the capital expenditure phase (CAPEX) and ongoing 30-year operations phase (OPEX).

1.1 Purpose of this report

The labour capacity/demand report will outline:

- The workforce required to address the construction/development phase of the project as well as the ongoing operational needs of the project (working in conjunction with the project proponent).
- The estimated current supply in the province to meet the demand and a gap analysis outlining what occupations/skills will need to be developed.
- An assessment of how the province can maximize the workforce and income benefits of the project by addressing workforce demand.

This report is a companion document to a broad-based economic impact report prepared for Project Nujio'qonik GH2. That report clearly stipulates the potential for significant economic 'leakage' out of the province if a large share of the workforce is imported and/or if provincial supply chain opportunities are not addressed.

2. WORKFORCE DEMAND: PROJECT NUJIO'QONIK GH2

2.1 Capital investment phase

2.1.1 Wind turbine infrastructure deployment

WorldEnergy GH2 has initially grouped its workforce needs for the capital investment phase of the wind turbine infrastructure and related deployment into 11 occupational groups. The company will be further refining this profile in the weeks ahead. Based on current estimates the project will need upwards of 600+ person days on site in early to mid-2025.

| Occupation: | Demand requirements: |
|--------------------------|---|
| Mechanic | The projection model requires 22 person days on site consistently throughout the period from November 2023 to May 2027. |
| Skilled Labourer | The projection model indicates a ramp up of skilled labour from 33 person days on site in late 2023 to early 2024 ramping to more than 100 in April 2024 and then to 133 in July 2024 and then sustaining at a similar level through March 2025 when the person days on site increases to as high as 181 in April 2025 before tapering off to a level of 89 in late June 2025 and sustaining at a similar level through May 2026 and then tapering off through to May 2027. |
| Wind Turbine Tech | The demand for wind turbine technicians begins in August 2024. There will be a demand for 66 person days on site from August 2024 through the end of the CAPEX phase in mid 2027 (with a spike in demand to 132 person days on site in early 2026). |
| Driller | There will be a sustained need for drillers throughout the project ranging from 5 person days on site in early 2024 to 11 person days on site in April/May 2025 and then back down to 5-6 person days on site through May 2026. |
| Blaster | There will be a sustained need for blasters throughout the project for 2-3 person days on site in early 2024 through April/May 2025 and then back down to 1 person day on site through May 2026. |
| Heavy Equipment Operator | There will be a consistent need for heavy equipment operators throughout a three-year timeframe in early 2024-2026. Peak demand will be 118 person days on site in April 2025. |
| Truck Driver | There will be a steady ramp up in the demand for truck drivers from 30-50 person days on site in early-mid 2024 rising to 705 in April 2025 and then tapering down through mid to late 2026. |
| Electrician | There will be a need for several electricians throughout the CAPEX phase. |
| Management | Sustains at 26 person days on site through most of 2025-2026. |
| Survey | Sustains at 8 person days on site through late 2024 to early 2026. |
| Supervision | Sustains at 20 person days on site through late 2024 to early 2026. |

2.1.2 Construction of the hydrogen plant and related activities

WorldEnergy GH2 has provided a high-level assessment of craft labour needs for the construction of the hydrogen plant and related activities based on 12 occupational categories. The project will need a few hundred workers in early 2024, rising to a peak demand of 1,443 by August 2025 and sustaining at a similar level through mid to late 2026 before tapering down by late 2026.

| Occupation: | Demand requirements: |
|------------------------|---|
| Demo/Site Improvements | All demand early in the project (2024) – average monthly demand of 130, peak 148. |
| Piling & Caissons | Needed for four months in 2024 (July-October) – 50-60 workers. |
| Concrete | Needed for 18 months starting in July 2024 and sustaining at well over 200 workers through the winter 2024-early 2025. |
| Structural | Starting in October 2024, needed for 18 months and peaking at 283 in August 2025. |
| Buildings | Over the same 18 month period, less demand – peaking at 71 in August 2025. |
| Equipment | Needed for 16 months starting in December 2024. Peaking at 168 in August 2025. |
| Piping | The largest craft labour component needed for the full length of the project and sustaining a workforce of 300-600 between January 2025 and June 2026 (peaking at 614 in March 2026). |
| Electrical | Needed for almost the full duration of the project (27 months), sustaining at 100-200 per month between June 2025 and June 2026 (peaking at 200 in January 2026). |
| Instrumentation | Starting in December 2024 and needed for 22 months with a peak demand of 68 in March 2026. |
| Paint/Insulation | Starting in December 2024 and needed for 22 months with a peak demand of 103 in October 2025, January 2026 and March 2026. |
| Scaffold/Fw/Hw | Another large labour component, required from January 2024 through September 2026, peaking at 225 but sustaining at least 150 workers from August 2025 to May 2026. |
| Indirect Field Labor | Needed throughout the project, peaking in March 2026 at 257 but sustaining between 150 and 250 from March 2025 to June 2026. |

2.2 Ongoing operations

At this stage there is little information as to the ongoing workforce profile associated with the operations of the wind energy generation and transmission activities (operations and maintenance) or the operations of the hydrogen plant and related facilities. The economic impact model projects a high level profile of FTE jobs for the various activities (direct and indirect/supply chain). Not all NL jobs will be in western NL. The actual breakdown will need to be developed further.

| Activity: | FTE profile: | Potential occupational groups: |
|--|--------------------------|---|
| Wind energy generation and transmission activities | 80 direct 62 indirect | Wind turbine technicians Maintenance trades Security Operations/management |
| Hydrogen plant and related | 59 direct 74 indirect | Engineers/technicians Plant operators Security Office/administration/management Transportation Maintenance |
| Other activities | TBD | TBD |

NOTE: This does not represent induced jobs that will be needed in western NL to meet the increased demand for goods and services as a result of the ongoing operations of Project Nujio'qonik GH2.

3. ASSESSMENT OF WORKFORCE SUPPLY (CAPEX)

3.1 Profile of the workforce

3.1.1 Number and concentration

The size of the workforce with skills needed to support the CAPEX phase of Project Nujio'qonik GH2 depends on which occupations are included. For the purposes of this report, the workforce definition includes potentially relevant engineering occupations, technical construction-related trades, general construction trades and heavy equipment operators. There will be other specific skills needed beyond this group.

As listed in Table 1, there are just under 30,000 people in the NL workforce that are in occupations somewhat related to the workforce profile needed to support the CAPEX phase of Project Nujio'qonik GH2. The table also shows the Location Quotient value for each occupation to show how the size of the workforce compares to the country overall. An LQ value greater than 1.00 means there are more workers in that occupational group in NL compared to the country overall, as a share of total employment (i.e. a higher concentration). The table also shows how that concentration compares to the rest of the country.

On the engineering front, NL has below average workers in most engineering-related occupations. The province ranks 5th out of 10 provinces for the concentration of civil and mechanical engineers, 7th for the concentration of electrical, electronics and computer engineers and 8th for the concentration of chemical engineers (talent needed for both CAPEX and OPEX phases). When it comes to the construction-related trades and other occupations, NL fares much better ranking 1st among the 10 provinces for the concentration of technical electrical trades and technical equipment operation trades and 2nd for the share of technical construction trades. There are 47 percent more working in this area in NL compared to the country overall (LQ=1.47).

The province ranks 4th for the concentration of workers in technical maintenance trades and 5th for the share of workers in technical trades contractors and supervisors and technical industrial trades. NL has the highest concentration of heavy equipment operators among the 10 provinces in Canada - by a fairly wide margin. There are over three times as many working in this occupational group relative to the overall size of the workforce compared to the country overall (LQ = 3.04). The next closest province is Saskatchewan (LQ=1.85).

By contrast, NL ranks last among the 10 provinces for the concentration of workers in general construction trades.

Table 1: The NL construction/trades workforce by occupational group, 2021

| <u>Occupational group (NOC):</u> | Workforce (2021) | LQ* (CAN=1.00) | Provincial Rank** |
|--|---------------------|-------------------|----------------------|
| 2130 Civil and mechanical engineers | 1,505 | 0.91 | 5 |
| 2131 Electrical, electronics and computer engineers | 550 | 0.59 | 7 |
| 21320 Chemical engineers | 70 | 0.43 | 8 |
| 22100 Chemical technologists and technicians | 80 | 0.45 | 10 |
| 22300 Civil engineering technologists and technicians | 425 | 1.33 | 3 |
| 22301 Mechanical engineering technologists & technicians | 315 | 0.75 | 6 |
| 720 Technical trades contractors and supervisors | 2,990 | 1.12 | 5 |
| 721 Technical industrial trades | 2,585 | 1.01 | 5 |
| 722 Technical electrical trades | 3,315 | 1.41 | 1 |
| 723 Technical construction trades | 5,920 | 1.47 | 2 |
| 724 Technical maintenance trades | 5,960 | 1.13 | 4 |
| 725 Technical equipment operation trades | 420 | 2.03 | 1 |
| 731 General construction trades | 1,600 | 0.80 | 10 |
| 73400 Heavy equipment operators | 4,025 | 3.04 | 1 |

*Location Quotient value. Anything above 1.00 means a higher concentration of workers in that occupation compared to the country overall.

** out of 10 provinces.

See Appendix A for a detailed list of related occupations by age group.

Source: Statistics Canada 2021 Census.

3.1.2 Age profile

One of the challenges facing the workforce is that a large share is over the age of 55. This is a challenge across the country but there are some specific occupations where the issue is more pronounced in NL. Table 2 shows the workforce overall and the share aged 55 and older. The table also shows the occupations where NL has a higher or lower concentration over the age of 55 compared to the country overall.

In general, the engineering related workforce is younger in NL compared to the country overall. Only 16 percent of civil and mechanical engineers and 22 percent of electrical, electronics and computer engineers were over 55 as of the 2021 Census. None of the province's 70 chemical engineers were over 55.

Most of the occupational groups in the trades have a larger share over 55 in NL compared to the country overall. In the core technical trades (NOCs 721-725), nearly 6,300 are over the age of 55 or 30 percent of the total. Among those working in technical construction trades, 62 percent more are 55 and older in NL compared to the country overall. One third of all heavy equipment operators and general construction trades workers are over 55.

Table 2: Age profile of the NL workforce by related occupation, 2021

| <u>Occupational group (NOC):</u> | <u>Workforce</u> | <u>55+</u> | <u>% of total</u> | <u>CAN=1.00*</u> |
|--|------------------|------------|-------------------|------------------|
| 2130 Civil and mechanical engineers | 1,505 | 245 | 16% | 0.75 |
| 2131 Electrical, electronics and computer engineers | 550 | 120 | 22% | 0.93 |
| 21320 Chemical engineers | 70 | 0 | 0% | - |
| 22100 Chemical technologists and technicians | 80 | 20 | 25% | 1.08 |
| 22300 Civil engineering technologists and technicians | 425 | 70 | 16% | 0.89 |
| 22301 Mechanical engineering technologists & technicians | 315 | 60 | 19% | 0.79 |
| 720 Technical trades contractors and supervisors | 2,990 | 1,155 | 39% | 1.30 |
| 721 Technical industrial trades | 2,585 | 575 | 22% | 0.90 |
| 722 Technical electrical trades | 3,315 | 590 | 18% | 0.95 |
| 723 Technical construction trades | 5,920 | 2,190 | 37% | 1.62 |
| 724 Technical maintenance trades | 5,960 | 1,655 | 28% | 1.08 |
| 725 Technical equipment operation trades | 420 | 130 | 31% | 1.20 |
| 731 General construction trades | 1,600 | 550 | 34% | 1.48 |
| 73400 Heavy equipment operators | 4,025 | 1,350 | 34% | 1.09 |

**an index score higher than 1.00 means a larger share of NL workers are 55 and older compared to the country overall.*

Source: Statistics Canada 2021 Census.

3.1.3 Income profile

Competitive wages are important to ensure the workforce stays and is employed in the province. In general wages in these occupational groups are competitive with the rest of the country. Table 3 shows the breakdown of median employment income by occupational group compared to the country overall for both the total workforce and for those who worked full-time and year-round.

Among those who worked year-round, the median employment income in NL was close to or above the level across the country. Those working in technical industrial trades earned a median income 26 percent above the Canadian average and those in other technical trades earned 18 percent more. For those working in engineering-related occupations, the median employment income was above the rest of the country.

Table 3: Median income comparison, NL & Canada, related occupations, 2021

| <u>Occupational group:</u> | Median employment income (\$) | | Compared to Canada overall (CAN = 1.00) | |
|--|-------------------------------|---------------------------|---|---------------------------|
| | Total workforce | Full time, full year only | Total workforce | Full time, full year only |
| 2130 Civil and mechanical engineers | \$103,000 | \$114,000 | 1.21 | 1.19 |
| 21310 Electrical and electronics engineers | \$106,000 | \$119,000 | 1.12 | 1.12 |
| 21320 Chemical engineers | \$116,000 | \$0 | 1.29 | - |
| 22100 Chemical technologists and technicians | \$57,600 | \$73,000 | 1.01 | 1.09 |
| 22300 Civil engineering technologists and technicians | \$64,000 | \$74,000 | 1.03 | 1.01 |
| 22301 Mechanical engineering technologists and technicians | \$79,000 | \$85,000 | 1.13 | 1.08 |
| 22310 Electrical and electronics engineering technologists and technicians | \$76,500 | \$90,000 | 1.13 | 1.13 |
| 720 Technical trades contractors/supervisors | \$63,600 | \$75,500 | 0.94 | 0.97 |
| 721 Technical industrial trades | \$53,200 | \$76,000 | 1.01 | 1.26 |
| 722 Technical electrical trades | \$61,600 | \$82,000 | 0.97 | 1.07 |
| 723 Technical construction trades | \$33,200 | \$53,600 | 0.75 | 0.96 |
| 724 Technical maintenance trades | \$57,600 | \$67,500 | 0.99 | 1.01 |
| 725 Technical equipment operation trades | \$79,000 | \$90,000 | 1.06 | 1.10 |
| 729 Other technical trades | \$67,000 | \$67,500 | 1.48 | 1.18 |
| 731 General construction trades | \$24,000 | \$44,400 | 0.77 | 0.95 |
| 751 Helpers and labourers | \$23,400 | \$47,600 | 0.67 | 0.96 |

Source: Statistics Canada 2021 Census.

3.1.4 Employment by industry

There are three industries that are most relevant to the CAPEX phase of Project Nujio'qonik GH2: NAICS¹ 236 Construction of buildings, NAICS 237 Heavy and civil engineering construction and NAICS 238 Specialty trade contractors. Table 4 shows the occupational employment within those sectors as a percentage of total employment. The point is to show that there are more than just engineering and construction workers employed in these sectors. The heavy and civil engineering construction sector has a much higher share of workers in transport and heavy equipment operation and related maintenance occupations compared to the other two related NAICS industries.

In all three of the industries, between 10-20 percent of the workforce is in professional, administrative, customer service and other occupations.

¹ North American Industrial Classification System (NAICS).

Table 4: Occupational employment by major industry group, NL, 2021

| <u>Occupational group:</u> | NAICS 236 <u>Construction of buildings</u> | NAICS 237 Heavy and <u>civil engineering construction</u> | NAICS 238 <u>Specialty trade contractors</u> |
|---|---|--|---|
| Industrial, electrical and construction trades | 43% | 21% | 54% |
| Trades helpers, construction labourers and related occupations | 20% | 23% | 13% |
| Management | 9% | 4% | 3% |
| Transport and heavy equipment operation and related maintenance occupations | 7% | 24% | 7% |
| Administration and administrative support occupations | 5% | 5% | 5% |
| Technical and paraprofessional occupations | 4% | 5% | 4% |
| Maintenance and equipment operation trades | 4% | 9% | 6% |
| Professional occupations | 2% | 3% | 1% |
| Personal and customer information services occupations | 2% | 1% | 1% |
| Other occupations | 3% | 5% | 6% |

Source: Statistics Canada 2021 Census.

3.2 The talent pipeline: Apprenticeships

The following table shows the number of apprenticeship registrations by occupation and year in Newfoundland and Labrador, specifically for occupations related to Project Nujio'qonik GH2. Twenty years ago, when the province was in the early stages of developing its offshore oil and gas sector, there was a big push on building the technical trades and related workforce. As shown in the table, there has been a steep decline in the number of apprenticeship registrations across most related occupational groups in the 20-year period. This is particularly concerning given the large share of the workforce that is over the age of 55.

Table 5: Number of apprenticeship registrations by occupation and year, NL

| <u>Occupational group:</u> | <u>2021</u> | <u>2011</u> | <u>2001</u> | <u>1991</u> |
|--|-------------|-------------|-------------|-------------|
| Carpenters | 471 | 480 | 1,005 | 372 |
| Electricians | 1,500 | 2,298 | 960 | 585 |
| Exterior finishing | 33 | 36 | 63 | 39 |
| Heavy duty equipment mechanics | 324 | 255 | 417 | 102 |
| Heavy equipment and crane operators | 198 | 252 | 1,050 | 15 |
| Interior finishing | 39 | 84 | 12 | 15 |
| Millwrights | 342 | 318 | 564 | 165 |
| Plumbers, pipefitters and steamfitters | 402 | 774 | 462 | 234 |
| Refrigeration and air conditioning mechanics | 108 | 54 | 87 | 48 |
| Welders | 324 | 486 | 1,104 | 216 |
| Stationary engineers and power plant operators | 9 | 12 | 12 | 9 |

Source: Statistics Canada Table: 37-10-0219-01.

Another way to consider the apprenticeship data is to compare it to the rest of the country. Table 6 shows the share of national apprenticeship registrations in Newfoundland and Labrador (out of every 10,000 registrations). With the exception of electricians, there has been a 58 percent to 94 percent decline in the relative number of apprenticeship registrations in construction trades and related occupational groups located in Newfoundland and Labrador.

Table 6: Apprenticeship registrations in NL per 10,000 across the country

| <u>Occupational group:</u> | <u>2001</u> | <u>2021</u> | <u>% change</u> |
|--|-------------|-------------|-----------------|
| Carpenters | 431 | 95 | -78% |
| Electricians | 271 | 218 | -20% |
| Exterior finishing | 87 | 29 | -67% |
| Heavy duty equipment mechanics | 592 | 244 | -59% |
| Heavy equipment and crane operators | 1428 | 147 | -90% |
| Interior finishing | 12 | 22 | +90% |
| Millwrights | 636 | 269 | -58% |
| Plumbers, pipefitters and steamfitters | 248 | 88 | -64% |
| Refrigeration and air conditioning mechanics | 217 | 91 | -58% |
| Welders | 1184 | 280 | -76% |
| Stationary engineers and power plant operators | 280 | 17 | -94% |

Source: Statistics Canada Table: 37-10-0219-01.

Statistics Canada also tracks apprenticeship registrations specifically for Red Seal trades by year across Canada. As shown in Table 7, there has been a decline in most related Red Seal trades apprenticeship registrations as well. Across nine trade groups, the combined apprenticeship registrations are down 23 percent over the decade and 35 percent over the 20-year period.

Table 7: Number of apprenticeship registrations by Red Seal trade and year, NL

| <u>Red Seal trade:</u> | <u>2021</u> | <u>2011</u> | <u>2001</u> | <u>1991</u> |
|----------------------------------|--------------|--------------|--------------|-------------|
| Construction electrician | 1,095 | 1,989 | 675 | 387 |
| Carpenter | 471 | 480 | 1,005 | 372 |
| Plumber | 162 | 213 | 135 | 135 |
| Welder | 324 | 489 | 1,104 | 219 |
| Steamfitter/pipefitter | 213 | 534 | 312 | 90 |
| Heavy duty equipment technician | 324 | 255 | 420 | 102 |
| Industrial mechanic (millwright) | 342 | 321 | 561 | 165 |
| Industrial electrician | 255 | 180 | 165 | 105 |
| Other trades | <u>1,119</u> | <u>1,104</u> | <u>2,214</u> | <u>549</u> |
| Total | 4,305 | 5,565 | 6,591 | 2,124 |

Source: Statistics Canada Table: 37-10-0219-01.

Again, relative to the national situation, the province has seen a steep decline in Red Seal trade apprenticeship registrations over the past 20 years. In 2001, 118 welder apprenticeships out of 10,000 across the country were in Newfoundland and Labrador. By 2021, the share had dropped to 29 out of 10,000. The share of plumber apprentices is down 66 percent. The share of carpenter apprentices down 79 percent.

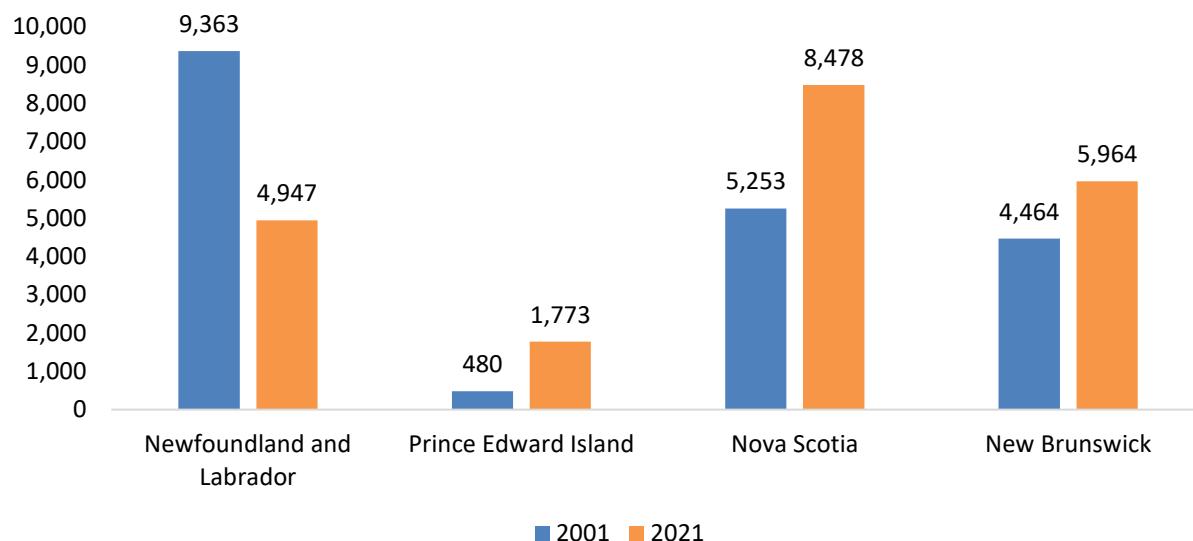
Table 8: Red Seal trade apprenticeship registrations in NL per 10,000 across the country

| <u>Red Seal trade:</u> | <u>2001</u> | <u>2021</u> | <u>% change</u> |
|----------------------------------|-------------|-------------|-----------------|
| Construction electrician | 27 | 22 | -21% |
| Carpenter | 44 | 9 | -79% |
| Plumber | 22 | 8 | -66% |
| Welder | 118 | 29 | -75% |
| Steamfitter/pipfitter | 37 | 21 | -43% |
| Heavy duty equipment technician | 72 | 32 | -56% |
| Industrial mechanic (millwright) | 67 | 35 | -48% |
| Industrial electrician | 20 | 19 | -3% |
| Other trades | 26 | 6 | -78% |

Source: Statistics Canada Table: 37-10-0219-01.

The other three Atlantic Provinces have seen a steep increase in the number of apprenticeship program registrations in Red Seal trades over the past 20 years. As shown in Figure 1, while the number in Newfoundland and Labrador is down 47 percent, the number is up 269 percent on Prince Edward Island, 61 percent in Nova Scotia and 34 percent in New Brunswick.

Figure 1: Red Seal trade apprenticeship registrations, Atlantic Canada, 2001 and 2021

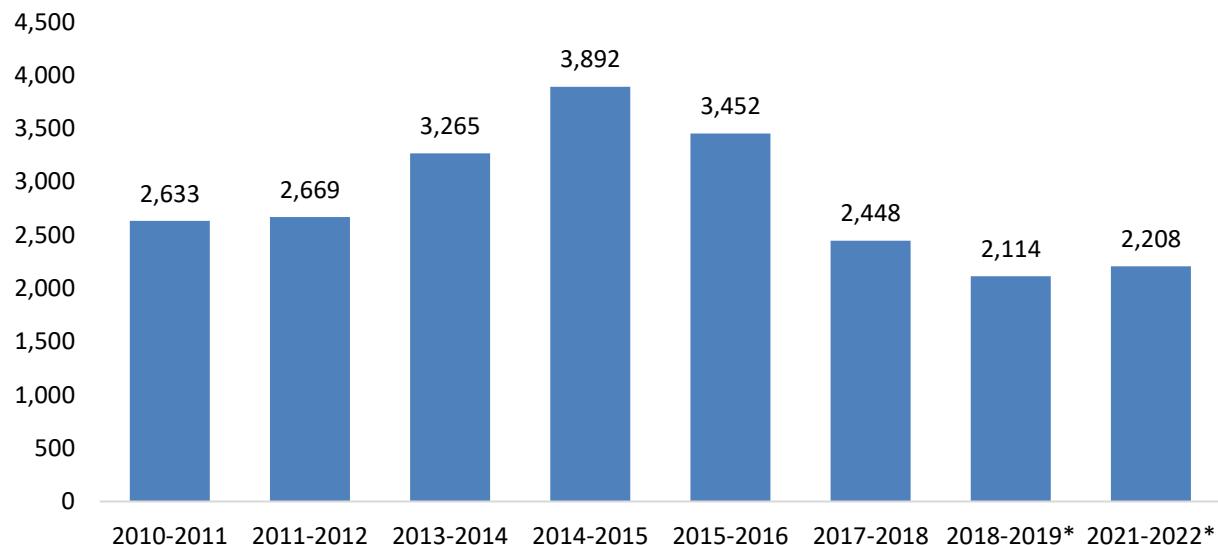


Source: Statistics Canada Table: 37-10-0219-01.

3.3 The talent pipeline: College enrolment

The College of the North Atlantic (CoNA) reports that enrolment in industrial trades programs has dropped from nearly 3,900 in 2014-2015 to just over 2,200 in 2021-2022*. This represented a 43 percent decline in enrolment. Figure 2 shows the annual enrolment numbers by year.

Figure 2: College of the North Atlantic enrolment in industrial trades programs by year



*Before 2018-2019, the reporting category was Industrial Trades. Starting in 2018 it was labelled “Natural Resources and Industrial Trades”.

Source: CNA annual reports.

An interview with a representative of the college indicated they are investing significant time, effort and money into the wind energy and hydrogen cluster opportunity. Here are a few highlights from that interview:

There is decidedly less interest in studying trades

- The CoNA started to see a decline in student interest nearly a decade ago and since enrolment has declined substantially. There doesn't seem to be an interest in a number of trades – steamfitter, pipefitter, etc. Some programs aren't even run due to a lack of interest - even plumbing – only 5-6 students enrolled this year.
- By contrast, there is high demand for heavy equipment operators – wait list 160+. The problem here is the program is very demanding. Each student needs 60 hours on three large equipment. It is very cost intensive and there are not enough instructors.

International students could fill the gap but...

- Many of the programs are one year or less and that does not qualify the international student for a post-graduate work permit.
- The College has been able to attract hundreds of international students into programs that result in a post-graduate work permit (over 800 new enrolments this fall). They seem to enjoy living in St. John's and Happy Valley/Goose Bay but not so much Stephenville. Community needs to be more welcoming and there needs to be better accommodation options.

The CoNA is rolling out programs related to Project Nujio'qonik GH2 OPEX

- Stephenville campus - Wind turbine technician program has 16 students – one year program – fully subscribed with a wait list. WorldEnergy GH2 is sponsoring all the 16 students.
- Corner Brook campus - Launching Hydrogen technician program - 16 students – two year program – fully with a wait list. WorldEnergy GH2 is sponsoring all the 16 students.

Some concern there will not be enough workers to meet the CAPEX demand for the development of the cluster

- Students still moving to Alberta for work. Most of the graduating class from the heavy equipment operator program last year moved to Alberta.
- They would come back for stable, multi-year work but not necessarily for shorter term projects.
- They realize the challenges associated with the age of the trades workforce and have been in discussions with the provincial government about finding ways to boost enrolment in related programs.

The CoNA is doing their own study of market demand

- Have hired Hatch Engineering to do a large scale labour market study that will be available next year. The study specifically focuses on the wind energy and hydrogen opportunity (not just Project Nujio'qonik GH2).
- Also skeptical of the BuildForce NL trades demand forecast.

The CoNA is developing a \$35 million wind and hydrogen innovation and training hub

- This large scale initiative will be located likely in St. John's or Clarenville.
- Meant to help position NL as a centre of excellence for wind energy and green hydrogen development.
- Partnering with Memorial University on applied research. A number of big firms have already signed on to support the initiative.

The CoNA wants to fully engage with Project Nujio'qonik GH2

- Excited about the WorldEnergy GH2 partnership related to wind turbine techs and hydrogen techs.
- Want to engage WorldEnergy GH2 in the wind and hydrogen innovation and training hub.
- Can offer customized training for specific skills required in the CAPEX and OPEX phase.
- Can support specific research requirements.

3.4 Outlook for the workforce in 2024-2027: Stakeholder interviews

Project Nujio'qonik GH2 will require a workforce of several thousand workers during the CAPEX phase. What is the outlook for addressing this demand from the NL workforce?

Based on interviews with the industry and trades representatives, the NL trades workforce is currently mostly in work. One industry expert indicated that 95 percent were presently employed somewhere in Canada. Currently, the NL trades workforce is distributed across a number of projects including the White Rose project, Voisey's Bay and IOC expansion in Labrador, Come By Change Refinery refurbishment and the building of the Holyrood Marine Base. A relatively small share of the workforce is employed in western Canada as well.

The stakeholders engaged for the development of this report indicated that with enough lead time there would be more than enough interest in the western Newfoundland project. One suggested "there will be a lineup" for any job providing stable employment in the province for a sustained period of time.

Equinor postponing the Bay du Nord oil project off Newfoundland for up to three years will free up more potential workers.

There was some concern raised about any targets related to female, Indigenous or other specific workforce groups. This has been a challenge in the past. Also, wages have to be reasonably competitive, or workers have shown a willingness to migrate for work elsewhere in Canada and beyond.

3.5 Outlook for the workforce 2024-2027: BuildForce NL

BuildForce NL prepares a detailed projection of construction workforce supply and demand in the province. The BuildForce Canada LMI system uses a scenario-based forecasting system to assess future construction labour requirements in the heavy industrial, residential and non-residential construction markets. The system tracks 34 trades and occupations and validates the scenario with industry stakeholders, including owners, contractors and labour groups. The information is then distilled into labour market condition rankings to help industry employers with the management of their respective human resources. In cases where the workforce samples are too small, those trades are suppressed due to limited statistical reliability. For Newfoundland and Labrador, 10 residential and 20 non-residential trades are reported².

Table 9 shows the high-level forecast for residential and non-residential workforce demand. The non-residential projects include the Bay du Nord project which was supposed to commence in 2025. This project was expected to require several thousand workers for a three-year period.

BuildForce assumes 5,700 will retire over the 10-year period even as only 3,400 will join the workforce, leaving a nominal recruitment gap of 1,700. However, the forecast calls for a decline in the workforce of 1,400 by 2023.

While BuildForce NL uses a rigorous modelling approach, it is based on underlying assumptions related to population growth and other factors. See Section 5.1 for a review of BuildForce's approach to modelling and why it could be underestimating the potential of the NL economy over the next decade.

² Methodology taken from the BuildForce NL website.

Table 9: BuildForce NL construction workforce supply/demand profile 2023-2032

| Summary of 2023–2032 Outlook | | | |
|-------------------------------------|--------------|--------------------|------------------------|
| Growth | <u>Total</u> | <u>Residential</u> | <u>Non-residential</u> |
| Employment | -944 | -638 | -306 |
| Labour Force | -1,400 | -800 | -700 |
| Hiring | | | |
| Labour Force Growth | -1,400 | -800 | -700 |
| Retirements | 5,700 | 1,800 | 3,900 |
| Hiring Requirement | 4,300 | 1,000 | 3,200 |
| Recruitment | | | |
| Retirements | 5,700 | 1,800 | 3,900 |
| New Entrants | 3,400 | 1,000 | 2,400 |
| Recruitment Gap | 1,700 | 800 | 1,500 |
| Mobility | | | |
| Labour Force Growth | -1,400 | -800 | -700 |
| Recruitment Gap | 2,300 | 800 | 1,500 |
| Mobility Requirement | 900 | 0 | 800 |

Source: BuildForce NL.

3.6 Example: West White Rose will free up a considerable amount of workers

The West White Rose Project is the largest user of industrial and construction trades workers right now in Newfoundland and Labrador. As shown in Table 10, as of Q1 2023, 65 percent of the direct project employment is accounted for by residents of Newfoundland and Labrador. The project is relying on a relatively large share of non-Canadian workers (33%). It is unclear how much of that imported labour is specific to the oil and gas sector. Over 90 percent of the purchase orders have gone to Canadian firms and 62 percent of total expenditures have gone to Newfoundland and Labrador-based firms.

Table 10: Workforce and expenditure profile, West White Rose Project (as of Q1 2023)

Direct Project Employment (persons)

| Residency Status at Time of Hire | Gender | Onshore | Offshore | Total | % |
|--|----------|--------------------------------------|----------|-------|-----|
| Newfoundland & Labrador | Male | 655 | 0 | 655 | 54% |
| | Female | 140 | 0 | 140 | 11% |
| | Subtotal | 795 | 0 | 795 | 65% |
| Other Canadian | Male | 19 | 0 | 19 | 2% |
| | Female | 7 | 0 | 7 | 1% |
| | Subtotal | 26 | 0 | 26 | 2% |
| Non-Canadian | Male | 380 | 0 | 380 | 31% |
| | Female | 21 | 0 | 21 | 2% |
| | Subtotal | 401 | 0 | 401 | 33% |
| Total | | 1,222 | 0 | 1,222 | |
| Purchase Orders | | Location of Point of Purchase | | | |
| Total Number of Purchase Orders | 63 | Newfoundland & Labrador | | 17 | 27% |
| Total Value (5M) | \$16.3 | Other Canadian | | 41 | 65% |
| | | Non-Canadian | | 5 | 8% |
| Awarded Contracts Valued Over \$250,000 | | Location of Contract Awards | | | |
| Number of Awarded Contracts | 1 | Newfoundland & Labrador | | 0 | |
| | | Other Canadian | | 0 | |
| | | Non-Canadian | | 1 | |
| Expenditures | | Content Estimates | | | |
| Total | \$125.6 | Newfoundland & Labrador | | 62% | |
| | | Other Canadian | | 16% | |
| | | Non-Canadian | | 22% | |

Source: C-NLOPB.

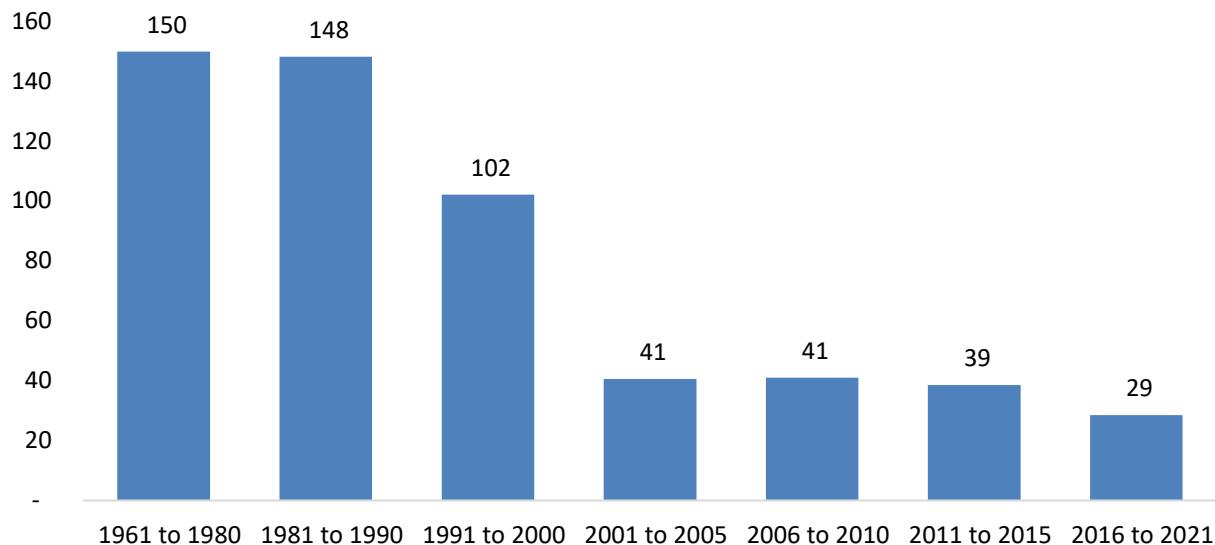
4. ADDRESSING THE OPEX WORKFORCE NEEDS

As discussed in Section 2.2, the profile of the ongoing workforce needed for the operations of the wind energy generation and transmission activities (operations and maintenance) and the operations of the hydrogen plant and related facilities has not been finalized. The economic impact model projects there will be a need for 142 workers in the province (mostly western NL) to support wind energy generation and transmission activities and another 133 to support the hydrogen plant and related activities. These include both direct and indirect jobs (Section 2.2 shows some potential occupational groups).

Because there is lead time, the project proponent can work with the College of the North Atlantic, the provincial government immigration team and other stakeholders to ensure there is a proper supply as these projects come online in 2027.

There will be a number of issues related to settlement for those moving in from elsewhere in Newfoundland and Labrador, the rest of Canada or elsewhere in the world. An example of this is housing. In the region in which Project Nujio'qonik GH2 is being developed (Census Division #4), housing starts have been very low for a long period of time. From the 1960s to the 1990s, the region saw an average of 149 new housing starts per year. By 2016-2021, there were only 29 new units constructed in an average year. This project should considerably boost the demand for housing³.

Figure 3: Average annual housing starts by year, NL Census Division #4



Source: Statistics Canada 2021 Census.

³ Temporary and permanent.

5. MAXIMIZING THE ECONOMIC BENEFITS IN NL

There is considerable economic potential in Newfoundland and Labrador from Project Nujo'qonik GH2. It represents one of the larger private sector capital investment projects in the province's history. There will be thousands of jobs created during the three plus years capital investment phase and nearly 300 supported per year for the next 30 years.

5.1 Workforce planning/projections need to be aspirational

One of the main problems in Atlantic Canada generally is that the region pre-pandemic had fallen into a pattern of weak economic growth, population stagnation and workforce decline. Enrolment in post-secondary education had declined. Governments were planning more school closures. There was a general view among many that the region was in structural decline.

This attitude has also started to be baked into future forecasts, which is dangerous because it can become a self-fulfilling prophecy. If government, industry and other stakeholders are anticipating long term stagnation, that will be reflected in investment and workforce planning.

The provincial government in Newfoundland and Labrador, like other provincial governments in Atlantic Canada has clearly signaled its intention to grow the economy and population. Premier Furey has stated a goal of attracting over 5,000 immigrants per year by 2026.

Construction forecasts have not kept up. BuildForce Canada, the national organization that develops provincial construction workforce trends and projections, is continuing to report that growth demand will be soft in the province. In its 2023-2032 forecast for Newfoundland and Labrador, BuildForce projects the construction workforce will decline between 2022 and 2032. Again, the main problem with the BuildForce projections is that it is based on a very weak outlook for Newfoundland and Labrador. The provincial government has said it intends to significantly grow the population whereas the BuildForce projection assumes *population decline* through the forecast period.

As a result, the forecast projects a decline in housing starts and states that "starts are expected to finish the decade at below 900 units" compared to 1,500 units in 2022. This is completely at odds with the provincial government ambition. If the construction workforce actually does shrink over the next decade, it will curtail the ability to build residential units, pushing up prices – and, again, risking a self-fulfilling prophecy.

BuildForce is projecting some increase in demand for non-residential workers through 2028 and then a steep decline thereafter (Table 12). This is another signal to the educational institutions, the potential workforce and other stakeholders that the longer-term career potential in construction and trades is limited.

Table 12: Projected changes in non-residential employment by sector, NL

| | <u>2023-2025</u> | <u>2026-2028</u> | <u>2029-2032</u> |
|--|------------------|------------------|------------------|
| Total non-residential employment | +1% | +6% | -9% |
| ICI* buildings | | | |
| Industrial | +8% | +17% | -13% |
| Commercial, institutional and government | -15% | -1% | -4% |
| Engineering | | | |
| Highways and bridges | -4% | -4% | -6% |
| Heavy industrial | +9% | +11% | -15% |
| Other engineering | -13% | +3% | 0% |
| Maintenance | +3% | 0% | 0% |

**industrial, commercial, institutional.*

Source: BuildForce Canada.

This is the main reason why workforce planning projections should be aspirational - similar to the late 1990s and early 2000s when the province was turning out an above average level of talent (see Section 3.2). Instead of forecasting weak economic growth and population decline, the government should determine its aspirations for economic and population growth and workforce development projections should be developed based on those aspirations.

If the aspirations are not met, it could result in an over-supply of workers in critical sectors such as construction, but it is *better to have over-supply than under-supply*. A surplus of workers means that some might have to move to other jurisdictions. A deficit of workers will restrain economic growth with all the downstream implications (such as a weakening tax base from which to fund public services).

Note on the seasonal workforce:

One of the oft-cited reasons for not increasing the size of the construction workforce is that it has a 'high' unemployment rate. It is true that the unemployment rate is higher in construction, but much of that is due to lifestyle choices. In fiscal 2022, there were 350,000 construction workers across the country who collected EI at some point during the year even as there was a more than 100 percent increase in job vacancies in the construction sector. In fact, the construction sector has more workers collecting EI during the year than any other industry. Unless the EI program changes eligibility, a large share of the construction workforce will take time off during the year, pushing up the nominal unemployment rate. This should not be an excuse to not focus on growing the workforce.

5.2 Expand related college and trades-related enrolment

There is a strong argument to be made that Newfoundland and Labrador needs a structural increase in the number enrolled in college and other trades-related programs. As discussed earlier in this report, 34 percent of all workers in NOC 7 occupations are 55 and older and headed towards retirement. This means that over 18,000 are likely to retire in the next decade or so even as demand is rising.

Enrolment in industrial trades programs has dropped from nearly 3,900 in 2014-2015 to just over 2,200 in 2021-2022*. This represents a 43 percent decline in enrolment.

One of the challenges has been a lack of students interested in industrial trades. Industry, government and educational institution stakeholders should put a major focus on expanding enrolment in related programs by stressing to young people the importance of the construction sector and trades and the value of those careers. Further, as is happening elsewhere in the country, international students should be brought in to study related programs to bolster total enrolment.

Newfoundland and Labrador has over \$25 billion in large capital projects on the books. Further, it will need to see substantial expansion of housing starts if the province is to meet the population growth targets set out by the provincial government.

5.3 Avoid cannibalization of the workforce

Newfoundland and Labrador has a significant public infrastructure development program. According to the provincial government, there is \$18.3 billion worth of major capital spending projects planned or underway in the province⁴. This includes both the public and private sector. The municipal infrastructure and health care sectors account for \$3.5 billion of that investment. Provincial and municipal governments should make an effort not to cannibalize the workforce for public sector infrastructure projects.

5.4 Use immigrant workers to fill gaps in the CAPEX workforce

One of the more important ways to address short and longer term gaps in the workforce involves attracting international talent to Newfoundland and Labrador. Premier Furey has set an ambitious target for immigration, looking to bring more than 5,000 per year by 2026 (permanent resident admissions)⁵. This represents an immigrant attraction rate of nearly 100 per 10,000 population and represents a six-fold increase compared to the current level.

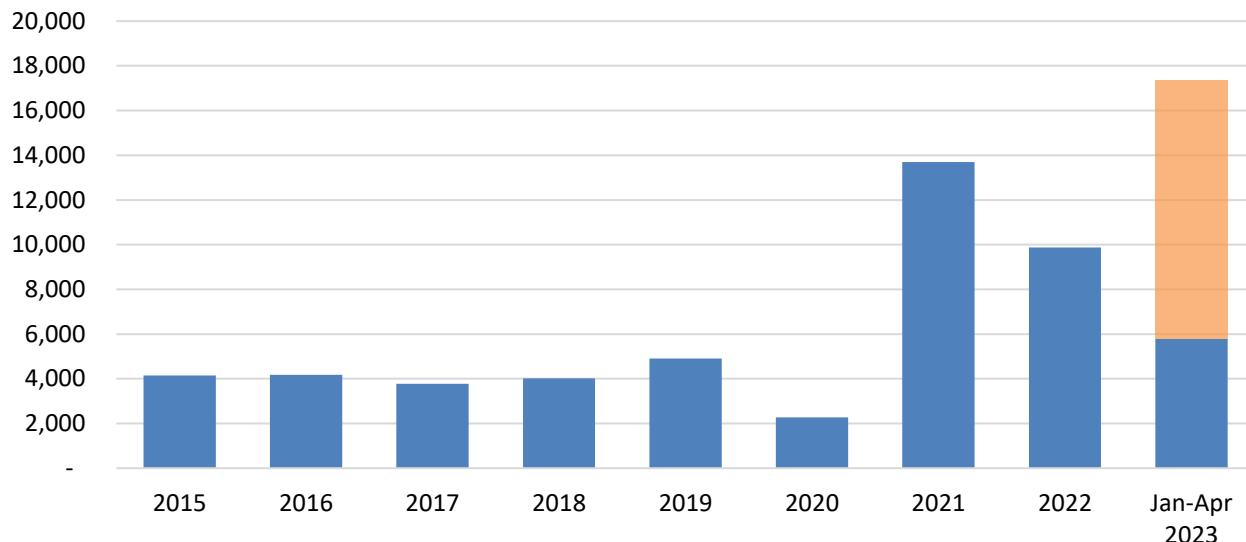
Attracting construction trades and related workers should be a tool used to ensure the province's large capital projects have enough talent to meet timelines. Canada is already admitting considerable international construction-related talent. Using the National Occupation Coding system (NOC), most construction-related occupations are grouped under NOC 7 - Trades, transport and equipment operators and related occupations. This group includes industrial, electrical and construction trades, maintenance and equipment operation trades, transport and heavy equipment operators, trades helpers, construction labourers and related occupations.

⁴ Capital projects valued at \$25 million or more. Source: NL Department of Finance.

⁵ <https://www.cbc.ca/news/canada/newfoundland-labrador/nl-immigration-investments-1.6077138>

As shown in Figure 4, the number of permanent residents admitted under NOC 7 occupations has been rising from an average of around 4,000 per year through 2019 to being on pace to admit nearly 17,500 in 2023. In Newfoundland and Labrador, only 20 permanent residents were admitted under NOC 7 occupations in 2022.

Figure 4: Number of permanent resident admissions, construction-related occupations, Canada-wide



Source: IRCC. The figure for 2023 is projected based on admissions as of the end of April.

Using temporary foreign workers (TFWs) could be another important way to ensure the Project Nujio'qonik GH2 has enough talent to meet its development cycle and ensure maximum economic benefits occur in western Newfoundland. Even though the workers brought in under the program send much of their income back to their home country, it is still far preferable to bring in workers compared to the alternative – either long project delays or even downsizing. Further, as above, many of these workers could be eventual targets to stay in Canada for the long-term ensuring Newfoundland and Labrador has the talented construction workforce it needs for the future.

Across Canada in 2022, more than 15,000 TFWs were brought in under NOC 7 occupations – triple the amount admitted in 2018. Employers in Newfoundland and Labrador have brought in some NOC 7 workers under the temporary foreign worker program. Table 13 shows the breakdown by four-digit NOC 7 occupation. In total, there were 215 admitted in 2022 or 1.4 percent of the national total.

Table 13: Temporary foreign workers admitted to Newfoundland and Labrador in 2022 by selected occupational group

| NOC Occupation: | # |
|--|-----|
| 7202 - Contractors and supervisors, electrical trades and telecommunications occupations | 10 |
| 7237 - Welders and related machine operators | 5 |
| 7242 - Industrial electricians | 15 |
| 7302 - Contractors and supervisors, heavy equipment operator crews | 25 |
| 7311 - Construction millwrights and industrial mechanics | 10 |
| 7371 - Crane operators | 15 |
| 7384 - Other trades and related occupations, n.e.c. | 85 |
| 7521 - Heavy equipment operators (except crane) | 5 |
| 7532 - Water transport deck and engine room crew | 35 |
| 7612 - Other trades helpers and labourers | 10 |
| Total temporary workers (under NOC 7 occupations) | 215 |

Source: IRCC.

5.5 Maximizing supply chain benefits in NL

As detailed in the companion economic impact report, in both the CAPEX and OPEX phases of Project Nujio'qonik GH2 there will be substantial supply chain opportunities. Much of the product inputs – turbines, electronics, steel, cabling, etc. will be imported but the proponent would like to see work go to NL based suppliers and Canada-based suppliers.

The Construction Association can work with the proponent to host supplier conferences, workshops and other activities to expose suppliers to potential work opportunities.

6. CONCLUSION: ENABLING A GAME CHANGER

Project Nujio'qonik GH2 will be a game changer for the economy in western Newfoundland. It will induce hundreds of millions of dollars in tax revenue for government and support thousands of jobs during construction and several hundred during the 30-year operations phase.

This report has provided an overview of the workforce situation related to this project. There is considerable optimism among the stakeholders that NL-based workers will be able to meet most of the demand in the CAPEX phase, but there are red flags. Much of the workforce is aging out and the talent pipeline is much smaller than it was in the past.

Beyond the project proponent, there are many beneficiaries from a project such as this. Local municipalities receive a boost in tax revenues and a source of long-term, stable employment in the communities. Local businesses receive a boost in revenue as there are more purchases of goods and services. The provincial and federal governments receive a boost in tax coffers and benefit from the stability of a long-term industry. Further, this project specifically supports provincial and national goals related to transitioning to a green economy.

The fact there are broadly dispersed benefits provides a strong case for an all-hands approach to planning and support. A coordinated approach will maximize the benefits to western NL and the province overall.

APPENDIX A: NL WORKFORCE BY DETAILED OCCUPATION AND AGE GROUP

| Five-digit occupation: | Workforce | 55+ | % of total | CAN = 1.00* |
|---|-----------|-----|------------|-------------|
| 21300 Civil engineers | 940 | 180 | 19% | 0.82 |
| 21301 Mechanical engineers | 565 | 70 | 12% | 0.62 |
| 21310 Electrical and electronics engineers | 460 | 95 | 21% | 0.80 |
| 21320 Chemical engineers | 70 | 0 | 0% | - |
| 22100 Chemical technologists and technicians | 80 | 20 | 25% | 1.08 |
| 22213 Land survey technologists and technicians | 50 | 0 | 0% | - |
| 22300 Civil engineering technologists and technicians | 425 | 70 | 16% | 0.89 |
| 22301 Mechanical engineering technologists and technicians | 315 | 60 | 19% | 0.79 |
| 22310 Electrical and electronics engineering technologists and technicians | 890 | 195 | 22% | 0.77 |
| 70010 Construction managers | 805 | 270 | 34% | 1.34 |
| 70012 Facility operation and maintenance managers | 915 | 325 | 36% | 0.96 |
| 72011 Contractors and supervisors, electrical trades and telecommunications occupations | 430 | 165 | 38% | 1.39 |
| 72012 Contractors and supervisors, pipefitting trades | 75 | 15 | 20% | 0.75 |
| 72013 Contractors and supervisors, carpentry trades | 320 | 130 | 41% | 1.44 |
| 72014 Contractors and supervisors, other construction trades, installers, repairers and servicers | 375 | 155 | 41% | 1.39 |
| 72020 Contractors and supervisors, mechanic trades | 285 | 85 | 30% | 0.99 |
| 72021 Contractors and supervisors, heavy equipment operator crews | 805 | 315 | 39% | 1.36 |
| 72106 Welders and related machine operators | 1460 | 340 | 23% | 1.05 |
| 72200 Electricians (except industrial and power system) | 1710 | 330 | 19% | 1.14 |
| 72201 Industrial electricians | 655 | 80 | 12% | 0.47 |
| 72202 Power system electricians | 145 | 40 | 28% | 1.45 |
| 72203 Electrical power line and cable workers | 415 | 50 | 12% | 0.80 |
| 72320 Bricklayers | 180 | 65 | 36% | 1.44 |
| 72321 Insulators | 205 | 80 | 39% | 2.02 |
| 72400 Construction millwrights and industrial mechanics | 1295 | 375 | 29% | 0.92 |
| 72401 Heavy-duty equipment mechanics | 955 | 250 | 26% | 1.13 |
| 72402 Heating, refrigeration and air conditioning mechanics | 220 | 35 | 16% | 0.87 |
| 72422 Electrical mechanics | 25 | 10 | 40% | 2.08 |
| 72500 Crane operators | 410 | 130 | 32% | 1.23 |

*an index score higher than 1.00 means a larger share of NL workers are 55 and older compared to the country overall.

| <u>Five-digit occupation:</u> | <u>Workforce</u> | <u>55+</u> | <u>% of total</u> | <u>CAN = 1.00*</u> |
|---|------------------|------------|-------------------|--------------------|
| 72999 Other technical trades and related occupations | 215 | 30 | 14% | 0.44 |
| 73100 Concrete finishers | 175 | 50 | 29% | 1.57 |
| 73102 Plasterers, drywall installers and finishers and lathers | 330 | 135 | 41% | 1.91 |
| 73110 Roofers and shinglers | 285 | 55 | 19% | 1.48 |
| 73111 Glaziers | 75 | 10 | 13% | 0.67 |
| 73112 Painters and decorators (except interior decorators) | 540 | 240 | 44% | 1.45 |
| 73113 Floor covering installers | 160 | 60 | 38% | 1.46 |
| 73300 Transport truck drivers | 4555 | 1780 | 39% | 1.07 |
| 73400 Heavy equipment operators | 4025 | 1350 | 34% | 1.09 |
| 73402 Drillers and blasters - surface mining, quarrying and construction | 190 | 40 | 21% | 1.72 |
| 74204 Utility maintenance workers | 175 | 85 | 49% | 2.33 |
| 75100 Longshore workers | 275 | 85 | 31% | 1.07 |
| 75101 Material handlers | 2230 | 585 | 26% | 1.19 |
| 75110 Construction trades helpers and labourers | 5140 | 1970 | 38% | 2.14 |
| 90011 Utilities managers | 110 | 25 | 23% | 0.86 |
| 92011 Supervisors, petroleum, gas and chemical processing and utilities | 195 | 70 | 36% | 1.31 |
| 92100 Power engineers and power systems operators | 815 | 350 | 43% | 1.42 |
| 93101 Central control and process operators, petroleum, gas and chemical processing | 320 | 85 | 27% | 1.24 |
| 94110 Chemical plant machine operators | 20 | 0 | 0% | - |
| 95102 Labourers in chemical products processing and utilities | 95 | 40 | 42% | 1.44 |

**an index score higher than 1.00 means a larger share of NL workers are 55 and older compared to the country overall.*

Source: Statistics Canada 2021 Census.

APPENDIX B: ABOUT JUPIA CONSULTANTS INC.

New Brunswick, Canada-based Jupia Consultants Inc. is a full-service research and planning support consultancy specializing in the area of economic development. For over two decades the firm has been working with companies, communities, industry associations, economic development agencies and government departments across Canada.

This report was prepared by David Campbell. David is the President of Jupia Consultants Inc. and has more than 25 years' experience as a consultant working with industry, not-for-profit organizations and governments across Canada. His focus areas include economic development strategy, economic impact analysis, population growth, cluster development and investment attraction. David was formerly Chief Economist with the Government of New Brunswick. In that role, he led the development of economic policy and economic development strategy for the provincial government.

David is a columnist with Brunswick News, a published author, and writes weekly for the It's the Economy, Stupid blog as well as co-presenting the weekly podcast Insights with Don Mills and David Campbell. In recent years, he has had the opportunity to collaborate with multiple think tanks and policy research organizations including the Conference Board of Canada, Public Policy Forum and the Donald J. Savoie Institute at the Université de Moncton.

For more information visit www.jupia.ca.