North Superior
Workforce Planning Board

Northwestern Energy Sector Labour Demand Report

March 2022

By: Samrul Aahad

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Limitations

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Notes

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Created by NPI, the Northern Analyst Collective is a membership group of organizations, municipalities, charities, chambers, and more. By merging our collective resources, we can ensure that the smallest municipality or local charity can access high-end skills. The expert's salary and benefits are covered in part by NPI/IPN and our sponsors, and in part through the membership fees paid by participating organizations. The end result is members are able to secure the skills they need when needed.

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Executive Summary

Like the previous North Superior Workforce Planning Board (NSWPB) reports on forestry and mining, the focus of this paper was to calculate the projected labour required for Northwestern Ontario for the electricity sector. However, this paper also touches on the larger energy sector. The projected labour demand model will help planning boards, educational institutes, provincial and federal governments, and others alike to make informed decisions about what programs to pursue and offer.

Canada has set an ambitious goal to go net-zero Greenhouse Gas (GHG) emissions by 2050. This has led to a clean energy transition within the electricity sector in Ontario: coal is being completely phased out, and nuclear, hydro, and other renewables are being used more extensively. Therefore, Ontario electricity producers largely use nuclear power plants for electricity generation, followed by hydroelectric power plants.

On the demand side, total energy needs, which include energy uses such as electricity for homes and industry, gas for cars, and so on, have started to recover. Restrictions implemented to limit the spread of COVID-19 resulted in limited commuting and decreased services provided in-person. Thus, energy demand dipped a little, but has subsequently started to pick up again and is getting closer to the pre-pandemic levels.

However, demand for electricity is an exception to the larger energy sector trends and is expected to continue to rise. Sales of electric vehicles and digital asset mining have taken off and could affect future electricity needs. The imminent challenge right now is to find new ways of transitioning to cleaner energy. As a result, electricity generation in Ontario is expected to see a lot of exciting changes.

Given the above trends, a machine learning model was developed to draw a relationship between current and future electricity generation demand in Northwestern Ontario. The model suggests that the future labour demand in the electricity sector, which includes electricity generation, transmission, and distribution, is expected to experience stable growth over the next 10 years. Furthermore, most of the job growth would be in the technical expertise area such as line maintenance and operations. As well, the shifts in consumer preferences could increase employment in supplementary industries such as construction jobs for installing charging stations for electric vehicles.

In conclusion, the electricity sector in Northwestern Ontario is moving into its growth phase, and thus, is expected to see robust labour demand.

Note on Data and Methodology

The year 2022 is an exciting time for data. Statistics Canada will be releasing a series of census datasets throughout the year that researchers, decision-makers, and you can use to understand what is going on in Ontario's northern regions and communities.

Notwithstanding, this paper was written in March 2022 and uses the latest data available. Some of the statistics used were based on the 2016 Census data and the electricity demand and generation figures are Ontario-wide and were published in 2021. Various statistical techniques were used to estimate them for Northwestern Ontario. Nevertheless, armed with information gathered from additional literature, the report provides a detailed picture of current trends and projections that NSWPB and others can utilize until more census data is released.

In addition, a wide range of interested parties contributed to the development of the report by participating in scheduled steering committee meetings.

1.0 Introduction

Canada has set an ambitious goal to go net-zero Greenhouse Gas (GHG) emissions by 2050. This has led to a clean energy transition within the electricity sector in Ontario: coal is being completely phased out, and nuclear, hydro, and other renewables are being used more extensively. On the demand side, total energy needs, which include energy uses such as electricity for homes and industry, gas for cars, and so on, have started to recover. As well, Sales of electric vehicles and digital asset mining have taken off and could affect future electricity needs. Based on these trends, what does this mean for future labour demand in this sector? NSWPB, in partnership with NPI, sought to answer this question. This paper outlines various aspects of the sector and provides a forecast for collective labour needs in the electricity generation, transmission, and distribution industries. It also provides a breakdown of various job categories within an organization operating in areas such as human resources and finance.

In addition to the model and results, a summary is provided on how the industry is shaped and how climate change is affecting the sector.

2.0 From Generator to Cellphone

This section aims to provide a summary of how electricity is transmitted from generators to home appliances based on the energy sector overview provided by the Ontario Energy Board. First off, electricity generators produce the power using nuclear, natural gas, wind, hydro, solar, and other sources. Ontario Power Generation is the largest electricity generation company in Ontario, which operates a variety of power of plants, such as nuclear, hydro, and biomass. The Ontario Energy Board provides licenses to such generation companies and regulates the energy sector in the public interest.

Moving forward, the electricity generated from these power plants is transported and distributed through transmission lines. The Independent Electricity System Operator (IESO) is responsible for directing the flow of electricity through the high-voltage lines, called the transmission grids, from these generators to utility companies. These utility companies usually own and operate the distribution system which delivers electricity to your home or business. For example, Hydro One provides electricity to residents, keeps a count of electricity consumed by a household, and subsequently bills a household the amount that must be paid to Hydro One. There are plenty of other local distribution companies such as Synergy North, and Atikokan Hydro Inc.

3.0 Climate Change

Before diving into the changes happening in the energy sector in Northwestern Ontario, it is important to talk about the impacts of global trends. Climate change has inspired many innovations in the energy sector, such as bringing to light the harms of using fossil fuels. This in turn has opened a larger conversation about what sources of electricity generation should be phased out entirely and, conversely, which ones should be promoted. This change has, therefore, impacted the mix of future labour skills that would be needed by the energy sector.

In December 2015, Canada, along with 194 other countries, formalized the Paris Agreement, through which world leaders aimed to limit the global rise in temperatures to 1.5 degrees Celsius (Government of Canada, 2016). In addition, the Prime Minister of Canada, speaking at the U.S. Climate summit in 2021, said that Canada will aim to reduce its GHG emissions by 40 to 45 per cent below the 2005-levels by 2030 and reach net zero by 2050. The Prime Minister said that this is going to be achieved by adopting clean energy, planting trees, and banning single-use plastics, among other things (Tasker and Wherry, 2021).

On this front, phasing out the use of fossil fuels to generate electricity in Ontario has almost been achieved. Coal and refined petroleum products were used to generate only 0.08 per cent of the total electricity generated in 2020 (Canada Energy Regulator, 2021). Moreover, the Government of Canada has introduced incentives to consumers to buy battery-powered cars over gasoline cars by launching programs such as the Zero-Emission Vehicles Program (iZEV). There are currently 92 vehicles that are eligible under this program and this list is updated regularly. For example, if someone purchases, or gets a 48-month lease, on a BMW i3 base model, which is one of the eligible models, the car owner qualifies for a $5,000 incentive under the iZEV Program (Government of Canada, 2021). Such programs aim to lower out-of-pocket cost of owning electric vehicles and, hence, speed up their adoption. If more and more electric cars continue to replace gasoline cars, this would shift a portion of the demand for gasoline to demand for electricity.

In addition, there are currently 32 remote communities in Ontario that are not connected to the electric grid, and 25 of them are in Northwestern Ontario (wataypower.ca). The electricity consumed in these communities is mainly generated by diesel generators. In the Long-term Energy Plan, the Ontario Government identified connecting remote communities to the grid as a priority. On this front, the Wataynikaneyap Transmission Project, which is expected to be completed by the end of 2023 (Ontario Newsroom, 2019), is intended to connect 25 remote Northwestern Ontario communities to the grid (Pembina Institute, 2021).

In Canada, 19.4 per cent of electricity is generated by burning diesel, oil, natural gas, and coal. In comparison, 62 per cent of the electricity generated in the U.S. is by burning fossil fuels (Environmental Protection Agency, 2019). Due to Canada's lower reliance on diesel, coal, and natural gas to generate electricity, electricity generation emits 10.9 per cent of the total GHG emissions emitted by Canada (Canada Energy Regulator, 2017). Comparatively, in the U.S., this number is 25 per cent (Environmental Projection Agency, 2019). Therefore, to minimize GHG emissions, it is important to critically analyze how electricity is generated and consumed in Northwestern Ontario.

4.0 Ontario's Electricity Supply & Demand

Conversations around climate change naturally led to discussions about electricity generation, its various sources, and their respective carbon footprints. Currently, Ontario is the largest consumer of energy and the second-largest producer of electricity in Canada. In 2019, the total demand for energy in Ontario was 3,150 petajoules[1], 875 terawatt hours (TWh[2]), which includes demand for natural gas, refined petroleum products (RPP), nuclear, hydro, and other renewables in Canada's four sectors - residential, commercial, industrial, and transportation. In addition, the electricity demand alone in Ontario was 139 TWh.

On the electricity generation front, the province's various power plants generated a combined total of approximately 361 TWh. Ontario exports surplus energy where it makes economic sense. Most of its energy exports are made to Michigan and New York, 53.4 and 31.8 per cent, respectively (Ontario Energy Quarterly, Q1 2020). From time to time, when demand exceeds supply, Ontario also imports energy from its neighbours.

4.1.1 Ontario's Current Electricity Supply

Starting with the past trends of Ontario's electricity generation, for the last decade, the province has largely relied on nuclear power plants– these plants contribute more than 70 per cent of the total electricity generated in Ontario (Canada Energy Regulator, 2021). Currently, there are 3 operational nuclear power plants in Ontario: the Pickering Nuclear Generating Station and the Darlington Nuclear Generating Station are operated by OPG, and Bruce Nuclear Generating Station is run by Bruce Power (Canadian Nuclear Safety Commission, 2022). In addition, all these plants are in Southern Ontario.

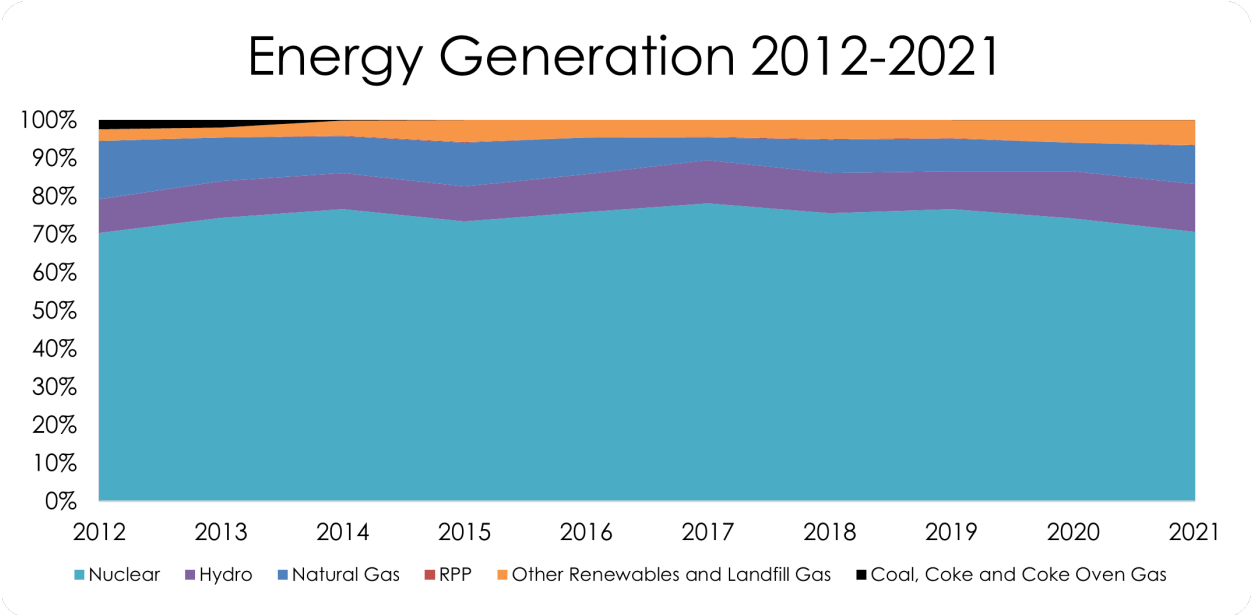
There are many key reasons for using them: nuclear power plants can consistently generate low-cost electricity safely and reliably, with little to no carbon emissions, and therefore, Ontario has one of the "lowest carbon intensive jurisdictions in the world" (Ontario Power Generation). According to the Canadian Nuclear Association (CNA), small modular reactors (SMRs), which rely on nuclear reactions to produce electricity, can reduce carbon emissions by 14 meta tonnes per year, which is equivalent to taking around 3 million cars off the roads (CNA, 2021).

However, nuclear is not the only energy source for Ontario. The province has a diverse range of sources at its disposal for electricity generation and distribution. Figure 1 lists each electricity generation source and their relative contribution to total electricity generation in Ontario for the past 10 years.

[1]Petajoule: A measure of energy that is a quadrillion (1015) joules. According to Statistics Canada, a petajoule is the approximate amount of energy it takes to run the Montreal Metro for one year (Canada Energy Regulator, 2021).

[2]1 TWh = 3.6 petajoule

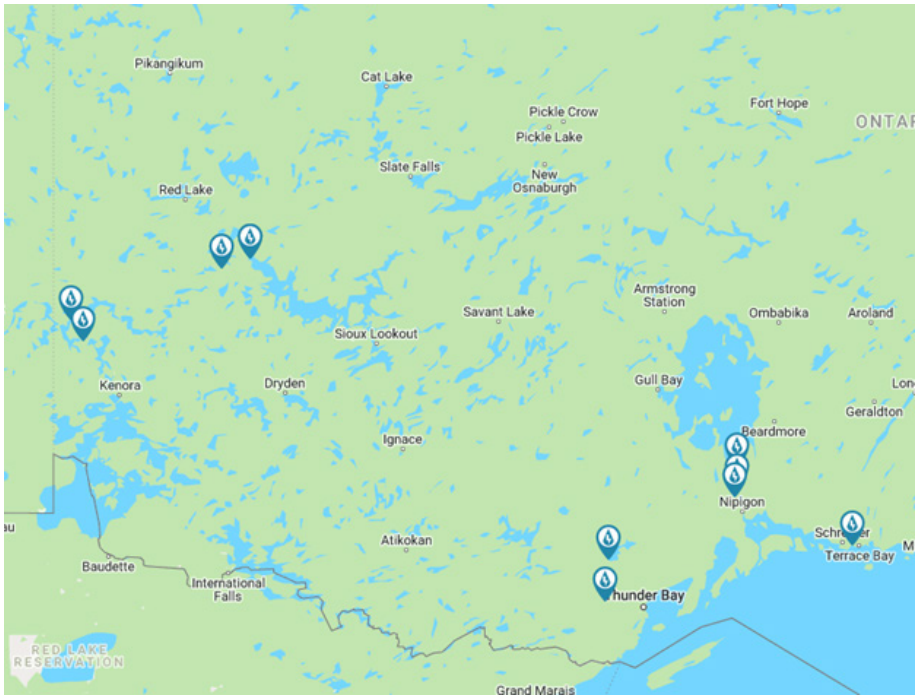
Figure 1: Electricity generation sources and their relative contribution for Ontario from 2012 to 2021



Source: Canada Energy Regulator, 2021.

The second-largest source of electricity generation in Ontario is hydro, which accounts for around 10 per cent of the total electricity generation. Interestingly, the province has more than 65 hydroelectric power plants scattered around Ontario, with Ontario Power Generation (OPG) operating 11 hydroelectric power plants in Northwestern Ontario, such as the Silver Falls Generating Station and Kakabeka Generating Station around Thunder Bay.

Figure 2: Locations of Hydroelectric Power Plants in Northwestern Ontario



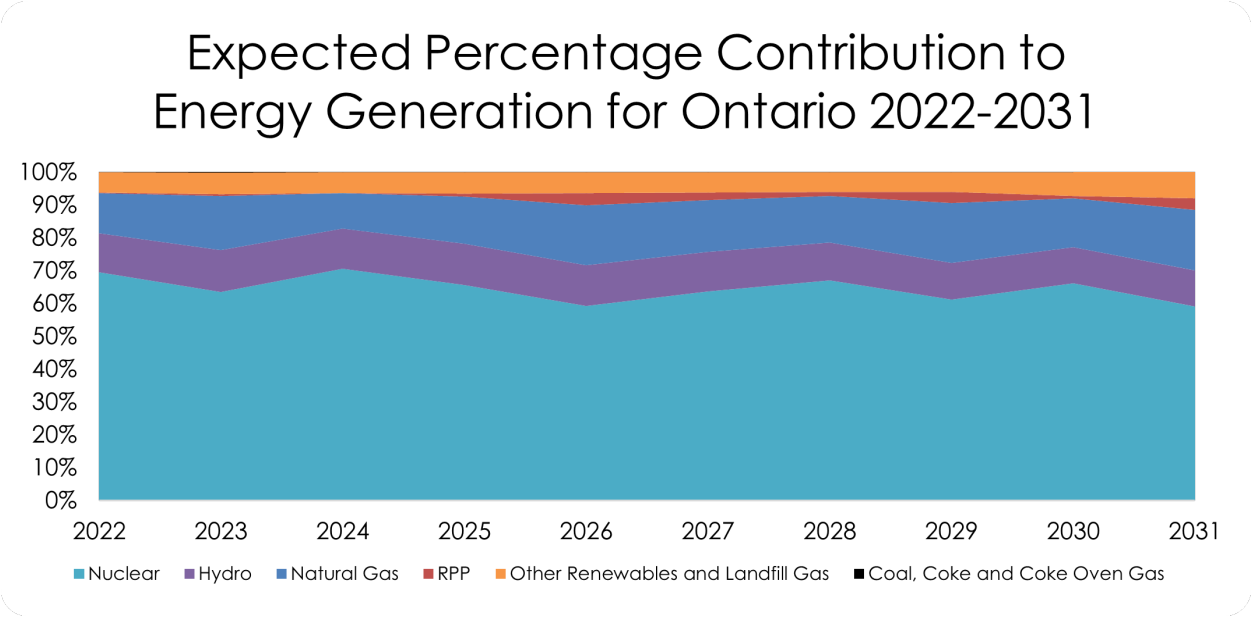
Source: OPG

More importantly, use of high carbon emissions fuels, such as coal and refined petroleum products (RPP) were gradually phased out by the Province. In 2020, coal and RPPs were virtually not used at all: their combined contribution was less than 0.1 per cent.

4.1.2 Ontario's Future Electricity Supply

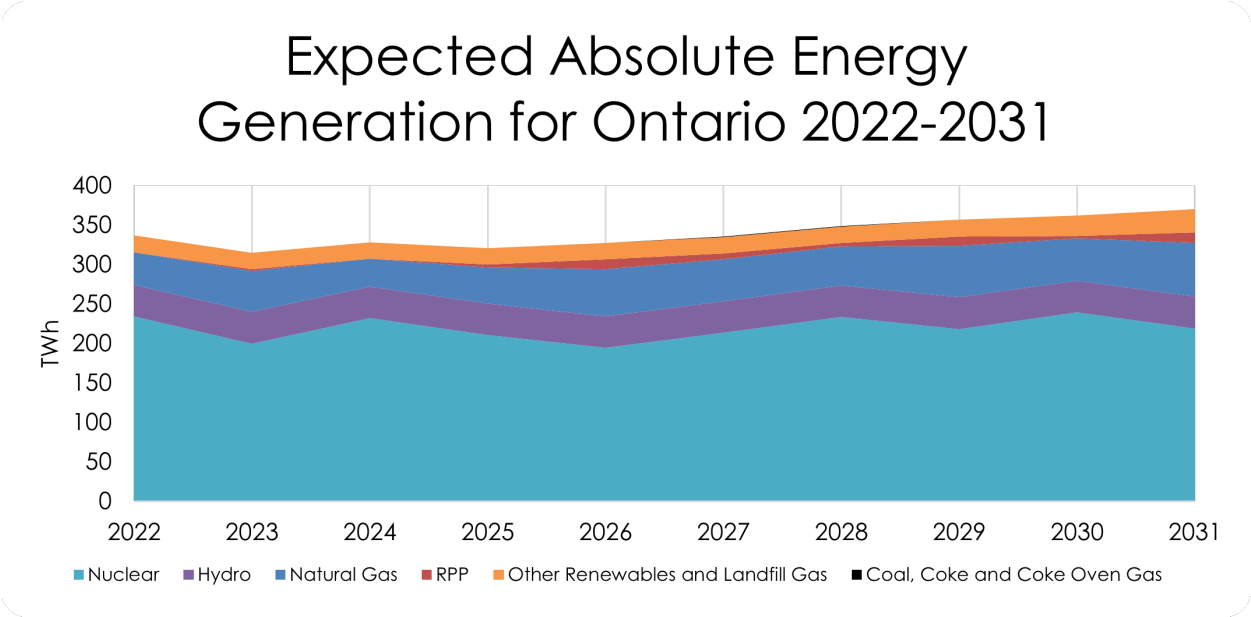
Every year, the Canada Energy Regulator (CER) publishes its forecasts for electricity generation by fuel sources for the next 30 years. These projections are based on the ENERGY2020 model, which is an integrated energy model created by Systematic Solutions Inc. The energy demand and electricity forecast models account for energy supply, energy demand, economic growth, efficiency, prices, and investment (CER, 2020). Using the most recent data, the relative contribution of each fuel source to the total electricity generation in Ontario is mapped out in Figure 3.

Figure 3: Electricity generation sources and their relative contribution for Ontario from 2022 to 2031



Source: Canada Energy Regulator, 2021.

Figure 4: Electricity generation sources and their absolute contribution for Ontario from 2022 to 2031



Source: Canada Energy Regulator, 2021.

Figure 3 shows the relative contribution, which is the portion of the whole presented as a percentage of each source. Figure 4 shows the absolute contribution, which is the actual output of each source in TWh in Ontario. On the nuclear power front, Pickering Nuclear Power Plant will go into retirement in mid-2020 while Bruce and Darlington units will go under scheduled refurbishment (IESO Annual Planning Outlook, 2021). Therefore, CER expects that the electricity generated through nuclear power plants would decrease in Ontario and the relative contribution would go down from a high of 74 per cent in 2020 to 59 per cent by 2031. However, this decrease can be partly attributed, to lower generation from nuclear power plants, but also to greater use of biomass fuels such as wood pellets. For example, the Atikokan Generating Station, located in Northwestern Ontario, stopped burning coal in 2012 and started using wood pellets as fuel in 2014 (IEA Bioenergy, 2018). The trend of increasing use of biomass to generate electricity is expected to continue. As well, the Ontario Government launched its first-ever Forest Biomass Action Plan to promote innovative ways of using leftover low-quality wood such as generating renewable energy. More importantly, this is a national trend: EverGen Infrastructure Corp. has established organic waste processing plants in British Columbia and has plans to make similar acquisitions in Alberta and Quebec to convert waste into fuel (The Globe and Mail, 2022). As well, many forest companies have become energy self-sufficient by burning mill by-products, such as bark and sawdust, and forest fibre to generate electricity (Sustainable Growth: Ontario's Forest Sector Strategy, 2019). The electricity produced by biomass fuels in Ontario alone is expected to increase by approximately 41 per cent over the next 10 years (CER, 2021).

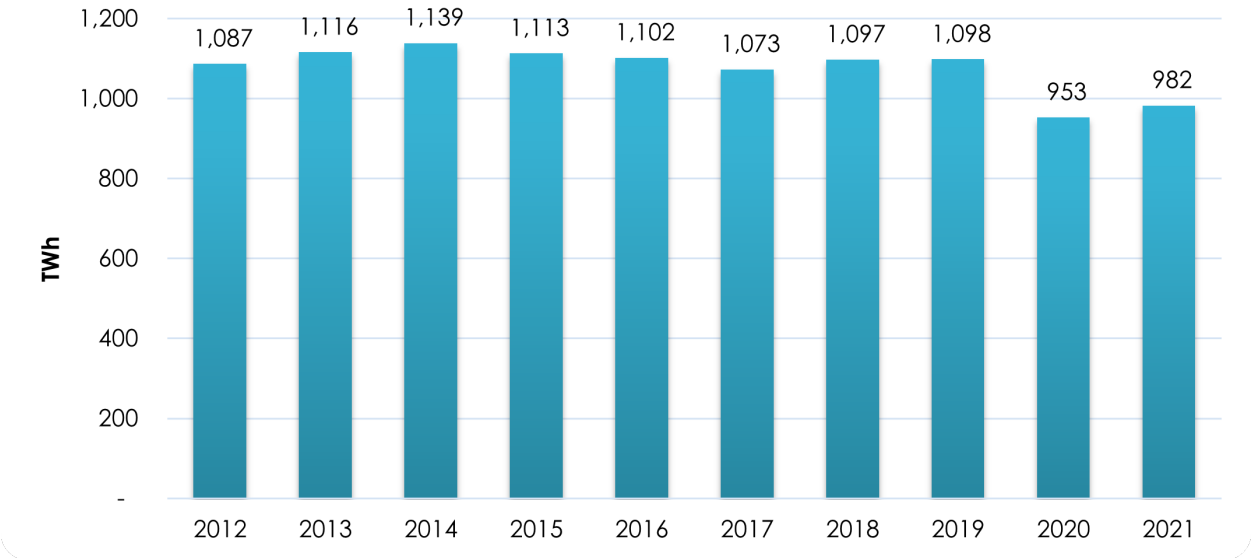
In addition, according to the CER projections, the use of natural gas to generate electricity is expected to sharply rise in the next few years, increasing from 24.19 TWh generated in 2020 to 67.74 generated by 2031. In simpler terms, it would increase by 180 per cent over the 12 years. However, one big reason to continue using natural gas thermal power plants is that these plants can quickly increase or decrease output and help meet peak electricity demand (OPG, 2010).

Overall, electricity generation is expected to increase. At the same time, output from nuclear power plants, due to scheduled shutdowns, would slowly decrease, and in turn, the province's reliance on nuclear energy. On the other hand, biomass and natural gas are expected to be used more. The Ontario Government has declared a moratorium on the creation of any new natural gas generation and is examining options for the non-renewal of the existing gas generators or conversion to other forms of fuel.

4.2 Ontario's Current and Future Electricity Demand

Generally, supply and demand go in tandem, and it is only appropriate to touch on the demand side. Demand for energy by residents of Ontario has been steady for the most part of the last decade, except for the dip in 2020. The decrease in energy demand in 2020 and 2021 could be partly attributed to the spread of the novel coronavirus and the restrictions that followed once it was declared a pandemic. The restrictions limited the services provided physically and pushed people to work from home. People's commutes were limited and therefore decreased the demand for petroleum products. However, it did not decrease electricity consumption by much: in the pre-pandemic year, 2019, the electricity demand for Ontario was 133.26 TWh and, in 2020, it was 133.08 (CER, 2021).

Figure 5: Energy Demand for Ontario for years 2012 to 2021

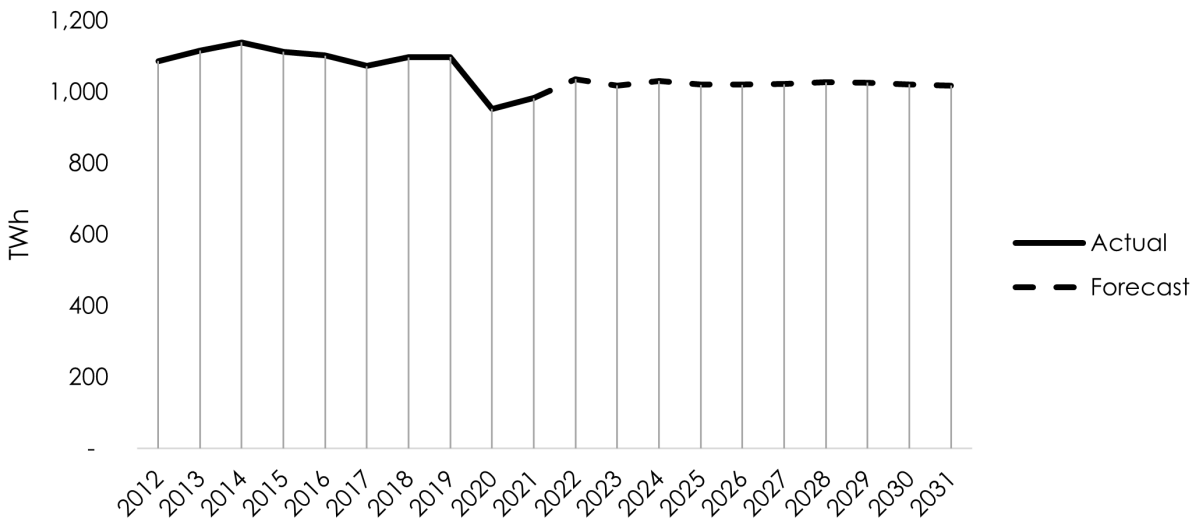


Source: Canada Energy Regulator, 202

For the most part, Ontario's energy demand hovered around 1,100 TWh. However, it dipped down to below 1,000 TWh for 2020 and 2021 for reasons briefly touched upon earlier.

Furthermore, the future total energy demand is not expected to deviate much from the current values in Ontario. This could be attributed to improved efficiency of various sorts of products, ranging from engines to microprocessors. Figure 6 shows the energy demand for the past 10 years and the next 10 years.

Figure 6: Actual Energy Demand for Ontario for years 2012 to 2021 and Projected Energy demand for 2022 to 2031

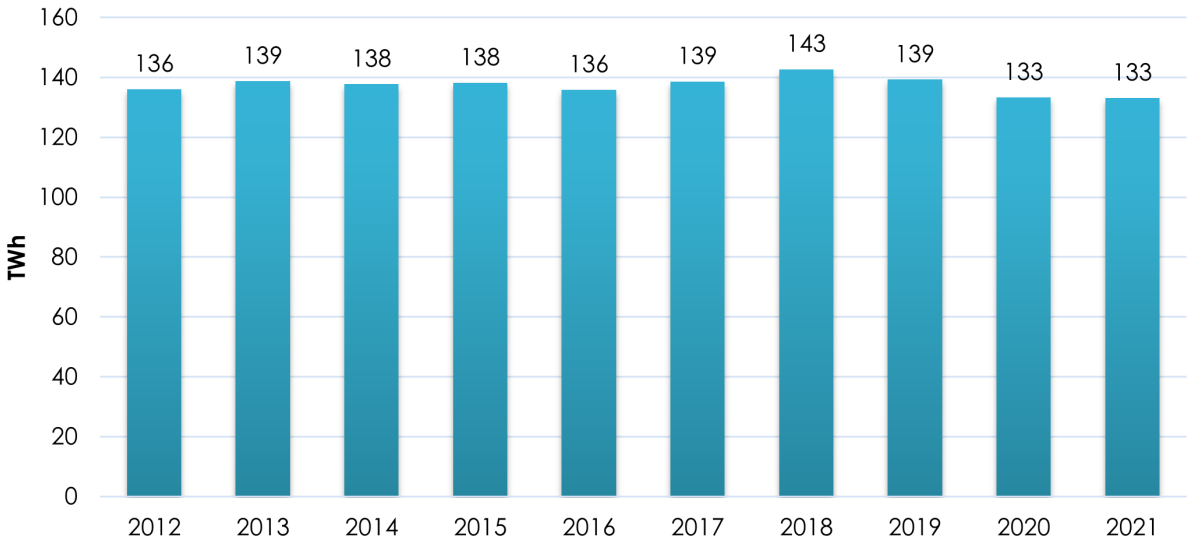


Source: Canada Energy Regulator, 2021.

Total energy demand is expected to increase in 2022 and hover around the same level afterwards. Importantly, according to the Canada Energy Regulator, the demand is not going to exceed the pre-pandemic levels.

However, future electricity demand paints a different picture. The electricity demand for Ontario for the last 10 years is presented in Figure 7.

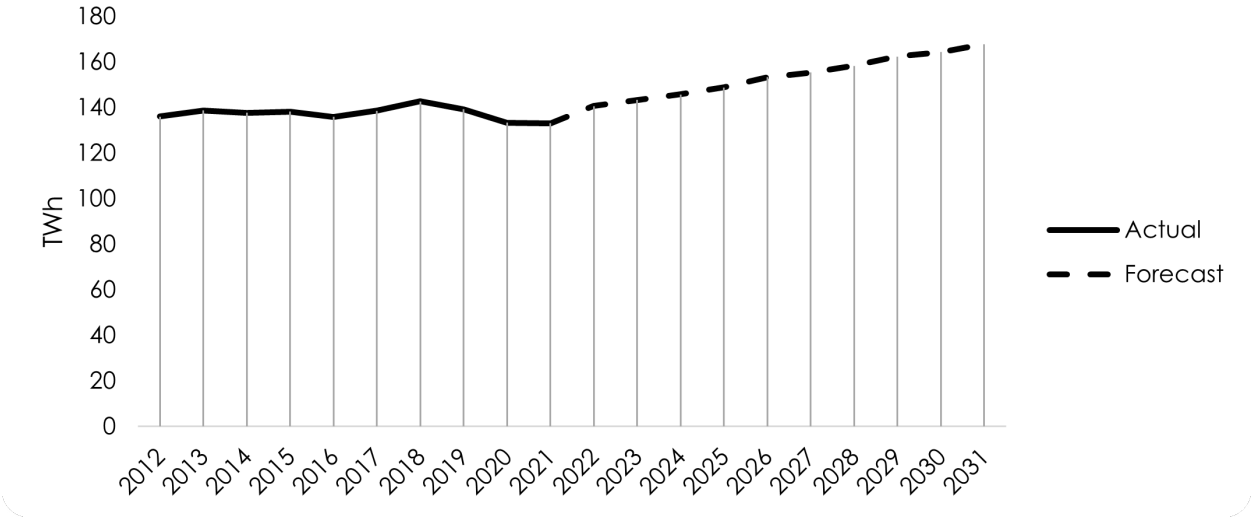
Figure 7: Electricity Demand for Ontario for years 2012 to 2021



Source: Canada Energy Regulator, 2021

Even though total energy demand in Ontario is not likely to increase, the electricity demand is expected to continue to rise over the next 10 years. According to CER, the electricity demand in Ontario is going to increase by almost 26 per cent from 2021 to 2031. The past and future electricity demands for Ontario are set out in Figure 8.

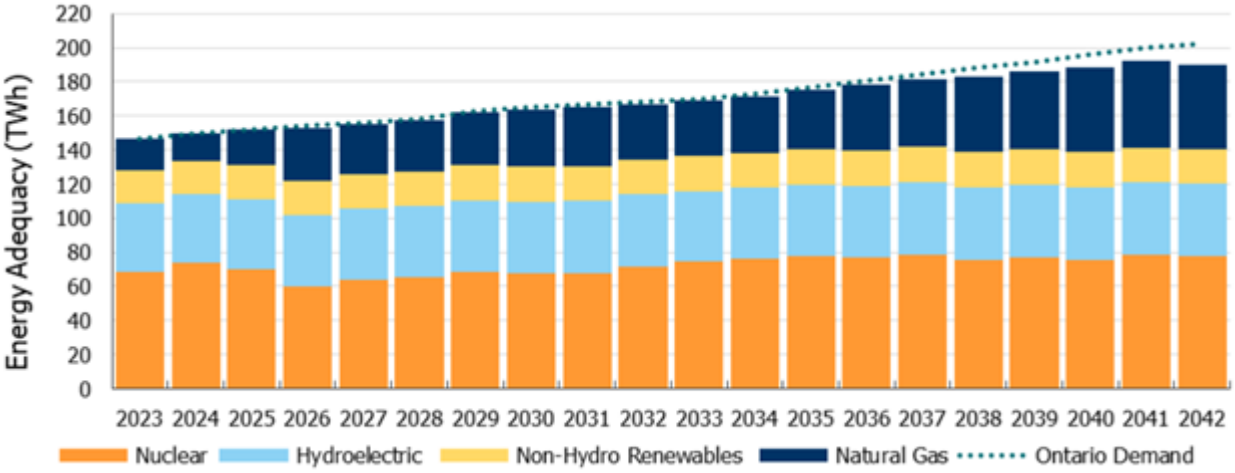
Figure 8: Past and future Electricity Demand for Ontario for years 2012 to 2021



Source: Canada Energy Regulator, 2021.

For comparison, future electricity demand and supply from IESO Annual Planning Outlook (2021) are illustrated in Figure 9. As well, IESO expects nuclear energy generation to remain around the same level, despite scheduled refurbishments of nuclear power plants. The projections provided by IESO and CER are incredibly close; however, for the purpose of this paper, CER data was used due to its publicly available detailed breakdown of energy sources and demand by sectors. This detailed data is essential to run the models.

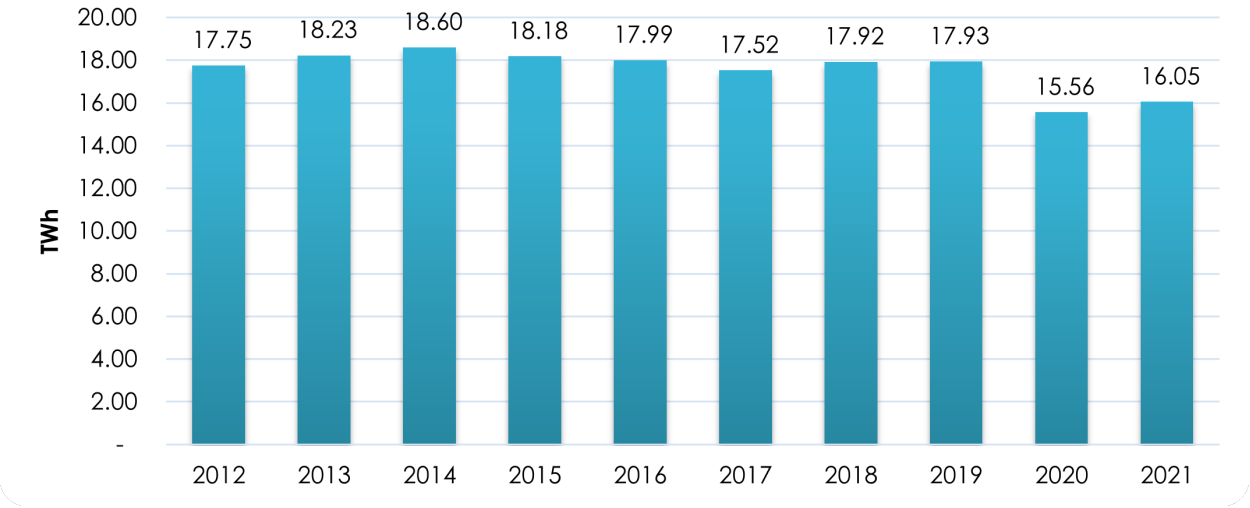
IESO Projections: Electricity Demand and Generation by Energy Source for Ontario 2023 - 2042



Source: IESO, 2021

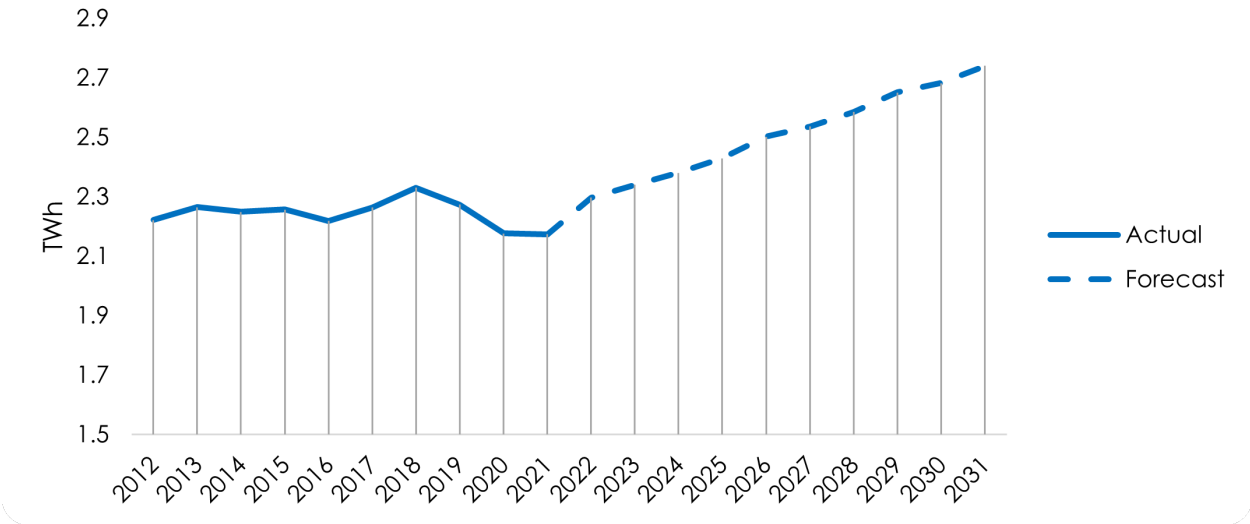
In addition, 1.6 per cent of the Ontario population resides in Northwestern Ontario. If we assume that the electricity consumption is uniform across residents of the province, then electricity demand for Northwestern Ontario would be 1.6 per cent of the total electricity demand. Based on this assumption, the demand for electricity in Northwestern Ontario is shown in Figures 9 and 10 below.

Figure 9: Electricity Demand for Northwestern Ontario for years 2021 to 2021



Source: Author's own Calculations based on data provided by Canada Energy Regulator (2021) and Statistics Canada Census 2021.

Figure 10: Past and future electricity demands for Northwestern Ontario for years 2012 to 2021

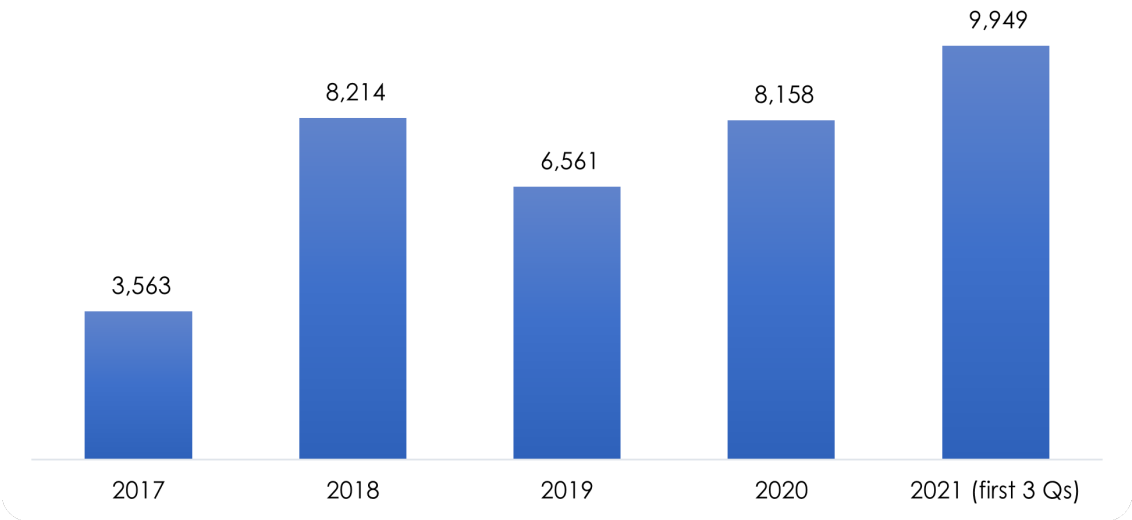


Source: Canada Energy Regulator, 2021.

There are many significant shifts in the electricity sector that should be touched upon which could be the reasons for the increase in future electricity usage. In the Northwest, with 35 major mining exploration and development projects currently underway, the largest growth in electricity demand will be in the mining sector. The Common Voice Northwest Energy Task Force has calculated that an additional load of 485 MW will be required by 2027. As new mines located to adjacent communities come on stream, there will also be increased demand to respond to the economic growth in the area. This can range between 20 MW and 40 MW per community. The shift to producing electricity from biomass can directly contribute to the economic development of a community. The Whitesand First Nation Biomass Centre, which is a 6.5 MW combined heat and power plant, supported by a wood pellet plant as well as a processing and merchandizing yard, will create 77 direct and 55 indirect full-time jobs in the communities of Armstrong and Whitesand First Nation.

Finally, there is a rise in popularity in the use of zero-emission cars. The increasing gasoline prices have arguably made them even more attractive. Battery-powered electric vehicle sales for the last five years in Ontario are presented in Figure 11.

Figure 11: Battery Powered Electric-Vehicle Sales in Ontario by Year



Source: Statistics Canada, 2021

The biggest year for battery-powered electric vehicles (BEV) sales in Ontario was 2021. In the first three quarters of 2021, the sales exceeded the previous high set in 2018. As well, 2 per cent of all cars registered in Ontario in 2021 were BEVs (Statistics Canada 2022) and if the strong sales trend is to continue growing over the next couple of years, it would increase the cumulative number of electric vehicles on the road, and thus, the demand for electricity. As previously mentioned, increase in oil prices due to global events would also tempt consumers to consider buying BEVs. Therefore, decision makers in the provincial government need to continue planning accordingly.

On the planning front, the Ontario Government, in partnership with Hydro One and OPG, plans on introducing 69 fast chargers at all 23 ONroute locations. As of writing this paper, six are already up and running in Cambridge South, Cambridge North, West Lorne, Dutton, Odessa, and Napanee. As well, Thunder Bay Community Economic Development Commission (CEDC) launched a $ 1 million Plug in Thunder Bay program, which is a cost-sharing program for procuring and installing charging stations in Thunder Bay (gotothunderbay.ca). Of course, further research is recommended on current and potential e-vehicle infrastructure in Northern Ontario to best ascertain electricity demand.

Another notable measure taken was the joint $10 million investment by the federal and provincial governments to help set up North America's first cobalt refinery in Northern Ontario. This will speed up the production of battery-grade cobalt sulfate, which is an essential raw material for producing batteries of long-range electric vehicles (Government of Canada, 2020). In short, the number of BEVs on the road is increasing rapidly, and the key players are ready to seize the day on this shifting consumer demand.

Furthermore, crypto mining, which is the process of generating digital assets and verifying transactions, has started to pick up in the province and due to Ontario's largely clean electricity, has become an attractive location for setting up crypto mining farms. For example, a North Bay power plant will be resuming operations to support digital asset mining in the area (Dawson, 2021). As well, Compass mining company announced that they plan on doubling its capacity by opening a 140 megawatts (MW) bitcoin mining facility in Ontario (Khatri, 2021). These mining activities are energy hogs and are expected to increase demand for electricity. For perspective, New York Times reports that bitcoin mining consumes 0.5 per cent of all electricity consumed in the world. Hence, these positive shocks should be taken into consideration when planning.

To summarize, there are consumer shifts that would imply more extensive use of electricity, and according to the Canada Energy Regulator, the electricity demand in Ontario is going to keep increasing. Moreover, this suggests that to cater to the increase in electricity demand, the province would have to increase electricity generation within the province to meet this increased demand while maintaining low dependence on importing electricity from outside the province.

5.0 Northwestern Ontario Energy Sector Employment Model

5.1 Introduction to the Model

By referring to the labour requirements in the energy sector, the paper covers labour needs for electricity power generation, transmission, and distribution. To be thorough, the projections are provided two different ways; first for the whole industry, and then by various job roles, given the general industry growth. This report provides projections based on the most recent data available.

5.2 Data and Methodology

The model calculates both the macro level projections for the whole sector, and demand by individual job roles within the industry. This paper uses the electricity generation data provided by the Canada Energy Regulator (CER) and the employment figures for the electricity sector for Ontario provided by Statistics Canada. The model is built using data for the period 2005 to 2021. Using the projections for electricity generation for 2022 to 2031 provided by CER, using the model, the paper calculates the labour supply required to generate the projected amount of electricity for Ontario, and for Northwestern Ontario. A machine learning method called ridge regression is used to draw a relationship between labour demand against each year's electricity generation using past values and provides a labour demand forecast using future values of electricity generation. In other words, data for 2005 to 2021 is used to train the model, and the forecast for future labour demand for the years 2022 to 2031 is calculated based on the projected energy generation figures for years 2022 to 2031.

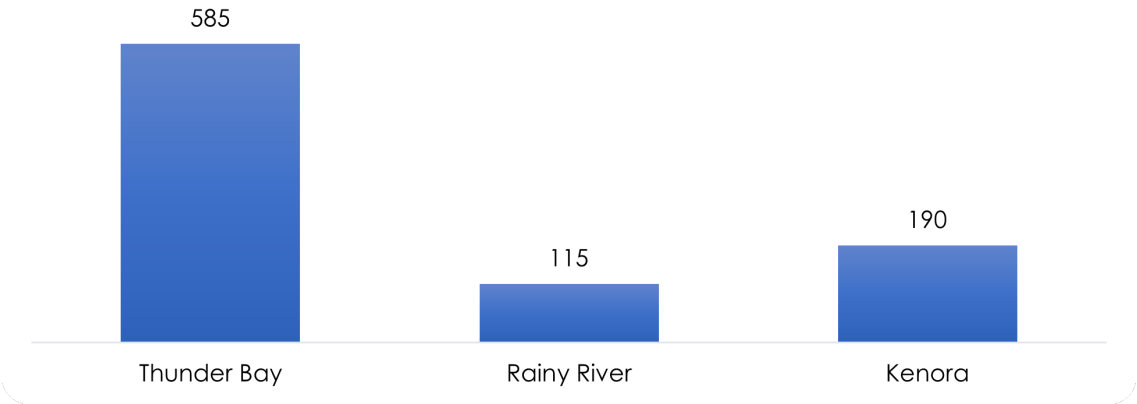
As well, once the industry level forecasts are calculated, the split by job roles is produced using the number of job roles by various departments, including administration, human resources, and operations. The past numbers were gathered by reaching out to various energy sector organizations and by getting their employee breakdown by job roles for the current period, and for the next 10 years. The increase in numbers of employees needed in each department did not change much and so, for this model, it was taken into consideration.

5.3 Results

5.3.1 Industry Level Projections

According to the Census 2016 figures, the electricity sector, which constitutes electricity generation, transmission, and distribution operations, employed 890 people in Northwestern Ontario, with most of the jobs located around Thunder Bay. Major projects such as East-West Tie and Wataynikaneyap Transmission projects were started after the 2016 census and therefore the employment data was extrapolated based on past trends to show what current employment was more likely to resemble. Figure 12 shows the employment in the electricity generation, transmission, and distribution sector in Northwestern Ontario broken down into the three census divisions.

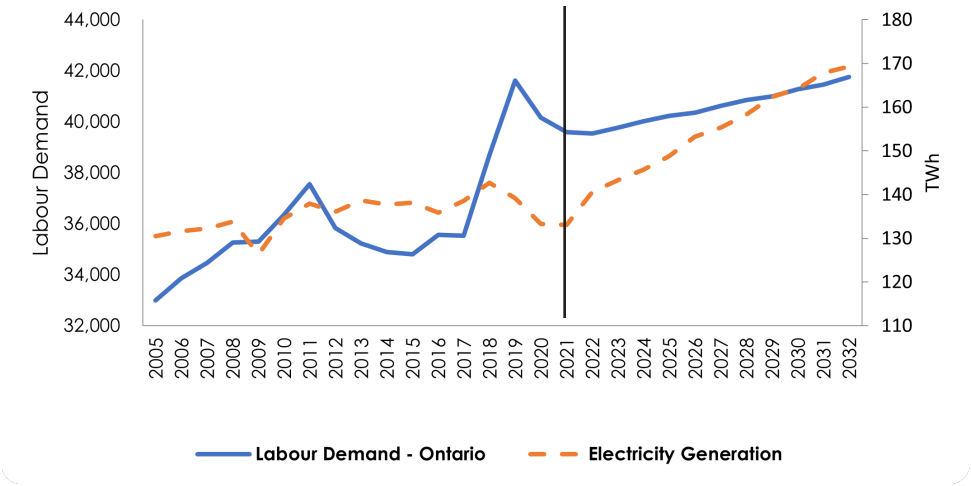
Figure 12: Number of People Employed in Northwestern Ontario in the Electric Generation, Transmission, and Distribution Sector



Source: Census 2016, Statistics Canada.

Furthermore, according to the model, the past trend and future projections of employment in the energy sector in Ontario and electricity generation in Ontario are illustrated in Figure 13. The black line on the graph separates the past values and projections. In addition, 2.5 per cent of the total employment in Ontario in the energy sector is in Northwestern Ontario. Assuming Northwestern Ontario would continue to maintain employment levels at the same amount for the next 10 years, the projected labour demand in the Northwestern region would be 2.5 per cent of the Ontario-level forecast.

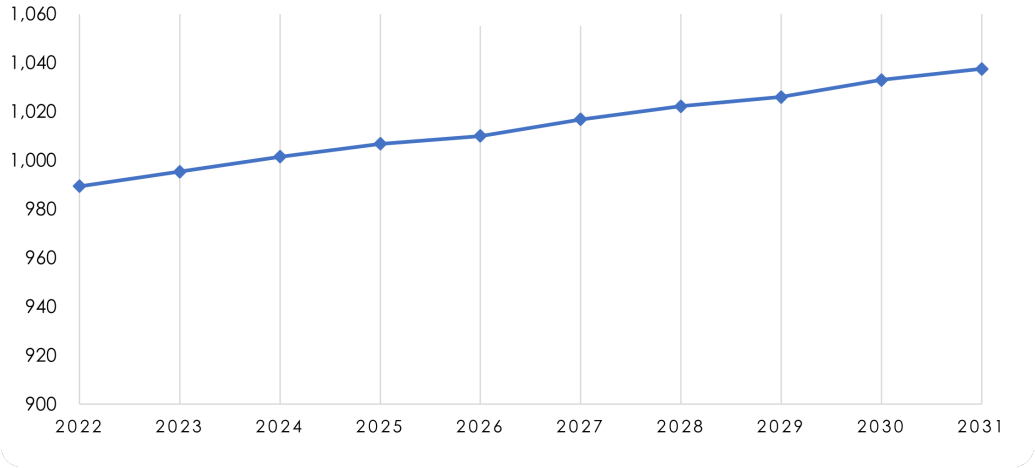
Figure 13: Past and Projected Trend of Labour Demand and Electricity Generation for Ontario. The black line separates the past and forecasted values



Source: Author's own calculations based on data provided by the Canada Energy Regulator and Statistics Canada

That said, according to the model, labour demand in Northwestern Ontario is expected to gradually increase over the next 10 years – starting from 989 jobs in 2022 and reaching 1,038 jobs in 2031. This comes to around 0.5 per cent year-over-year annual growth rate. In other words, the industry would add five more jobs each year while retaining the old ones. This job growth could come from new projects that are being set up in Northwestern Ontario, such as the Wataynikaneyap Transmission Project and East-West Tie Transmission Project, or from refurbishment and expansion of current projects. The introduction of new biomass generation facilities may increase the employment opportunities.

Figure 14: Labour Demand for the Energy Sector for the Years 2022 to 2031



Source: Author's own calculations based on projections provided by the Canada Energy Regulator, 2021.

Moreover, the model suggests that the increase in electricity demand would mean an increase in the number of workers needed in the electricity sector. However, the growth would be minimal.

5.3.2 Job Roles Level Projections

The industry would not see much growth in the top management jobs, as jobs for CEO and Vice Presidents are expected to stay at the same level. On the other hand, maintenance leads and power line technician roles are expected to each increase by two over the next 10 years. Labour demand by job roles for the next five years, and the five years after that for Northwestern Ontario are given in Tables 1 and 2, respectively.

Table 1: Labour Demand for each job role in the energy sector for the years 2022 to 2026, Northwestern Ontario (part A)

Administration, Finance & Management	2022	2023	2024	2025	2026
President/CEO	8	8	8	8	8
Vice President	41	41	41	41	41
Finance & Administration Manager	16	16	16	17	17
Business Analyst	24	24	25	25	25
Finance Clerk	16	16	16	17	17
Accountant	8	8	8	8	8
Communications & Community Relations Manager	8	8	8	8	8
Executive Assistant	24	24	25	25	25
Accounts Payable Clerk	8	8	8	8	8
Clerk	24	24	25	25	25
Environment					
Customer & Renewable Energy Coordinator	8	8	8	8	8
Health & Safety					
Health, Safety & Training Manager	8	8	8	8	8
Human Resources					
Human Resources Manager	8	8	8	8	8
Employee Relations Coordinator	8	8	8	8	8
Information Technology					
IT Superintendent / Manager	8	8	8	8	8
IT Data Analyst	32	33	33	33	33
Plant Maintenance					
Light Duty Mechanic	8	8	8	8	8
Heavy Duty Mechanic	16	16	16	17	17
Operations					
Operations Superintendent	8	8	8	8	8
Electrical & Maintenance Supervisor	8	8	8	8	8
Meter Technicians	16	16	16	17	17
Station Electrician Technician	24	24	25	25	25
System Control Supervisor	8	8	8	8	8
System Operator	57	57	57	58	58
Protection & Control Technician	8	8	8	8	8
General Labourer (Plant Trainees)	8	8	8	8	8
Line Maintenance					
Maintenance Supervisors	24	24	25	25	25
Maintenance Lead Hands	138	139	140	140	141
Distribution Technician	8	8	8	8	8
Equipment Operator	8	8	8	8	8
Utility Arborist	8	8	8	8	8
Line Construction					
Line Construction Supervisor	16	16	16	17	17
Construction Lead Hands	16	16	16	17	17
Powerline Technicians	97	98	99	99	99
Project Engineer	8	8	8	8	8
Supply Chain					
Supply Chain Manager	8	8	8	8	8
Senior Buyer	8	8	8	8	8
Warehouse Technician	16	16	16	17	17
Purchasing Clerk	8	8	8	8	8
Technical Services					
Distribution Engineer	8	8	8	8	8
GIS Technician	8	8	8	8	8
Program Engineer	8	8	8	8	8
Locator Drafter	16	16	16	17	17
Locator	24	24	25	25	25
Design Engineer	16	16	16	17	17
Distribution Designers	41	41	41	41	41
Additional Jobs					
Customer Service Supervisor	8	8	8	8	8
Customer Service Clerks	41	41	41	41	41
Billing Supervisor	8	8	8	8	8
Billing Clerks	32	33	33	33	33

Source: Author's own calculations based on projections provided by Canada Energy Regulator, 2021.

5.3.2 Job Roles Level Projections

Table 2: Labour Demand for each job role in the energy sector for the years 2027 to 2033, Northwestern Ontario (part B)

Administration, Finance & Management	2027	2028	2029	2030	2031
President/CEO	8	8	8	8	9
Vice President	42	42	42	42	43
Finance & Administration Manager	17	17	17	17	17
Business Analyst	25	25	25	25	26
Finance Clerk	17	17	17	17	17
Accountant	8	8	8	8	9
Communications & Community Relations Manager	8	8	8	8	9
Executive Assistant	25	25	25	25	26
Accounts Payable Clerk	8	8	8	8	9
Clerk	25	25	25	25	26
Environment					
Customer & Renewable Energy Coordinator	8	8	8	8	9
Health & Safety					
Health, Safety & Training Manager	8	8	8	8	9
Human Resources					
Human Resources Manager	8	8	8	8	9
Employee Relations Coordinator	8	8	8	8	9
Information Technology					
IT Superintendent / Manager	8	8	8	8	9
IT Data Analyst	33	34	34	34	34
Plant Maintenance					
Light Duty Mechanic	8	8	8	8	9
Heavy Duty Mechanic	17	17	17	17	17
Operations					
Operations Superintendent	8	8	8	8	9
Electrical & Maintenance Supervisor	8	8	8	8	9
Meter Technicians	17	17	17	17	17
Station Electrician Technician	25	25	25	25	26
System Control Supervisor	8	8	8	8	9
System Operator	58	59	59	59	60
Protection & Control Technician	8	8	8	8	9
General Labourer (Plant Trainees)	8	8	8	8	9
Line Maintenance					
Maintenance Supervisors	25	25	25	25	26
Maintenance Lead hands	142	142	143	144	145
Distribution Technician	8	8	8	8	9
Equipment Operator	8	8	8	8	9
Utility Arborist	8	8	8	8	9
Line Construction					
Line Construction Supervisor	17	17	17	17	17
Construction Lead Hands	17	17	17	17	17
Powerline Technicians	100	101	101	102	102
Project Engineer	8	8	8	8	9
Supply Chain					
Supply Chain Manager	8	8	8	8	9
Senior Buyer	8	8	8	8	9
Warehouse Technician	17	17	17	17	17
Purchasing Clerk	8	8	8	8	9
Technical Services					
Distribution Engineer	8	8	8	8	9
GIS Technician	8	8	8	8	9
Program Engineer	8	8	8	8	9
Locator Drafter	17	17	17	17	17
Locator	25	25	25	25	26
Design Engineer	17	17	17	17	17
Distribution Designers	42	42	42	42	43
Additional Jobs					
Customer Service Supervisor	8	8	8	8	9
Customer Service Clerks	42	42	42	42	43
Billing Supervisor	8	8	8	8	9
Billing Clerks	33	34	34	34	34

Source: Author's own calculations based on projections provided by Canada Energy Regulator, 2021.

6.0 Recommendations

The principle aim of the study was to develop a model to forecast labour requirements for the energy sector. There are some high-level recommendations which could be taken from this report:

- Clean energy transition is underway, and hence the current labour force should try to seek training to upskill and stay competitive.
- Advent of BEVs would lead to a need for electric chargers' infrastructure and electric car mechanics. Educational institutes should try to offer programs which will provide the potential workers with the necessary skills to work in this emerging industry. However, further research into current and potential e-vehicle infrastructure in Northern Ontario is a must.
- Research in renewable energy and alternate fuels is looking very exciting and should be a possible area of study for upcoming graduates.

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