

Historical Trends in Niagara's Electric Power Generation Sector, 2001 to 2022

The electric power generation sector in Niagara has historically been dominated by hydroelectric power owing to the natural endowment of the Falls. "Hydro" consists of forms of energy generated by leveraging water, usually falling or fast-running water, to produce electricity or to power machines. The sector helped position Niagara as one of the vital centres of Ontario's industrial development and economic growth since the early years of the 20th century.

While power generation in Niagara and the province of Ontario has gone through considerable transformation, hydro still accounts for more than one-third of Ontario Power Generation's (OPG) electricity production. OPG's figures for March 2023 show that hydroelectric power generated 7,613 megawatts of energy for the province, boasting 66 stations, 241 dams on 24 river systems. Some 34.2 terawatt-hours of power was produced in 2022.¹

Although hydroelectric power is a renewable energy source, enjoying the reputation of being a clean, reliable and flexible way to produce energy, it has its complexities. The sector's reliance on water systems intersects with the rights of Indigenous communities, the jurisdictions of local and regional governments, the competing needs of industry and household consumers of electric power, the sensitivities of environmental groups, and the interests of recreational users.

Despite the historic importance of hydroelectric generation to Niagara, the province of Ontario and Canada as a whole, the sector has expanded over the years to include other forms of electric power generation. In this regard, we adopt a broader construct of electric power generation that includes other sources of power, with the aim of reflecting and capturing the changing contours of the power generation sector as dictated by new technologies, including the emergence of wind, solar, and biomass forms of energy in recent decades.

In light of that, for this research we define the electric power generation sector as a composite of industrial activities related to generation, transmission and distribution of electric power. It also encompasses occupations vital to the sector, such as electrical, civil, mechanical, and electronics engineers, power system electricians, electrical power line and cable workers, and power engineers and power systems operators.

Research Method

For purposes of data analysis, we focus on a set of industries and occupations listed under the four-digit North American Industry Classification System (NAICS) and National Occupation Classification (NOC) codes, respectively. The data was sourced from Lightcast's Labor Market Analytics and consists of two distinct sets of data that serve as prisms for analyzing trends in electric power generation, namely, jobs by industry and jobs by occupation. While the distribution of jobs by industry (represented in NAICS codes) gives us a good picture of current trends across Niagara's power generation sector, another lens through which we can view such trends is the distribution of jobs by occupation (represented in NOC codes).

The importance of this occupation lens is that it sheds light on the human and talent dimensions of the electric power generation sector, supplying insights into the nature of skillsets or expertise required. NOC codes can help track changes in the *types* of jobs needed within a sector or industry that NAICS cannot. They supply a framework to understand the composition, skill requirements, labour market trends, and other characteristics of economic sectors. The NOC codes facilitate the identification of emerging job sectors and the decline of traditional occupations. This information in turn allows us to make inferences about the region's existing talent pool, its implications for innovation, adaptability and resilience of the sector, thus allowing for effective policy responses.

¹ Ontario Power Generation. 2023. "Hydroelectric Fleet in Ontario." <https://www.opg.com/powering-ontario/our-generation/hydro>

The data cover a 20-year period (2001 to 2022) and consist of absolute and percentage changes over time. This paper also includes the national location quotients for each of the industries. We included the location quotients because they indicate an area's level of specialization in each industry. Specifically, in this case it allows us to compare a region's job concentration in its electric power generation sector relative to total jobs concentration in Ontario's electric power generation sector. An LQ of 1.5 or higher shows a high degree of specialization. The data largely focuses on Niagara.² However, for comparative reasons, it also includes

provincial and national figures and trends for the same period as well as data from a select number of Census Metropolitan Areas (CMA) within Ontario that have sizeable electric power generation sectors. We chose midsized regions as comparators because in addition to their demographic characteristic as midsized CMAs, they have identified the sector in their economic development strategies as one of their lead economic drivers, have natural endowments favorable to the sector, have built facilities to leverage the potentials of the sector, and have undertaken active promotional activities as part of their economic development strategies.

SECTION 1: CHANGES IN NIAGARA'S ELECTRIC POWER GENERATION SECTOR, RELATIVE TO ONTARIO AND CANADA

In this section, we examine changes in Niagara's electric power generation sector, comparing trends in the region with those of the province of Ontario and Canada as a whole. The analysis covers both NAICS and NOC data, examining changes in jobs by industry and occupation. The discussion starts with NAICS data on industry trends and then proceeds to the NOC data on changes in occupation.

Table 1 shows the changes in electric power generation jobs³ between 2001 and 2022, comparing Niagara with provincial (Ontario) and national trends. As the table and graph indicate, Niagara has seen an overall decline of one per cent in jobs over the past two decades, against the backdrop of a provincial increase of 16 per cent and national growth of 13 per cent.

Figure 1a indicates that the decline in the sector is marked by a sharp drop from 2004 to 2007, followed by an upswing

until 2011. However, this growth did not offset the earlier decline. Furthermore, that brief increase in jobs was followed by a more gradual decline until about 2017 when the region saw another sharp growth spurt over a span of two years only to see yet another two-year decline.

By the time this roller-coaster ride settled down in 2022, the region had lost overall one per cent of its jobs in the sector compared to 2001. It is a small decrease but one set against positive provincial and national growth trends over the same period. Although the sector is projected to stabilize over the next five years, the trend does not point to any foreseeable growth in the short term. These numbers and projections raise fundamental questions for a sector that been foundational to Niagara's economic development history and one that holds a profoundly symbolic value as the home of the world-renowned Niagara Falls.

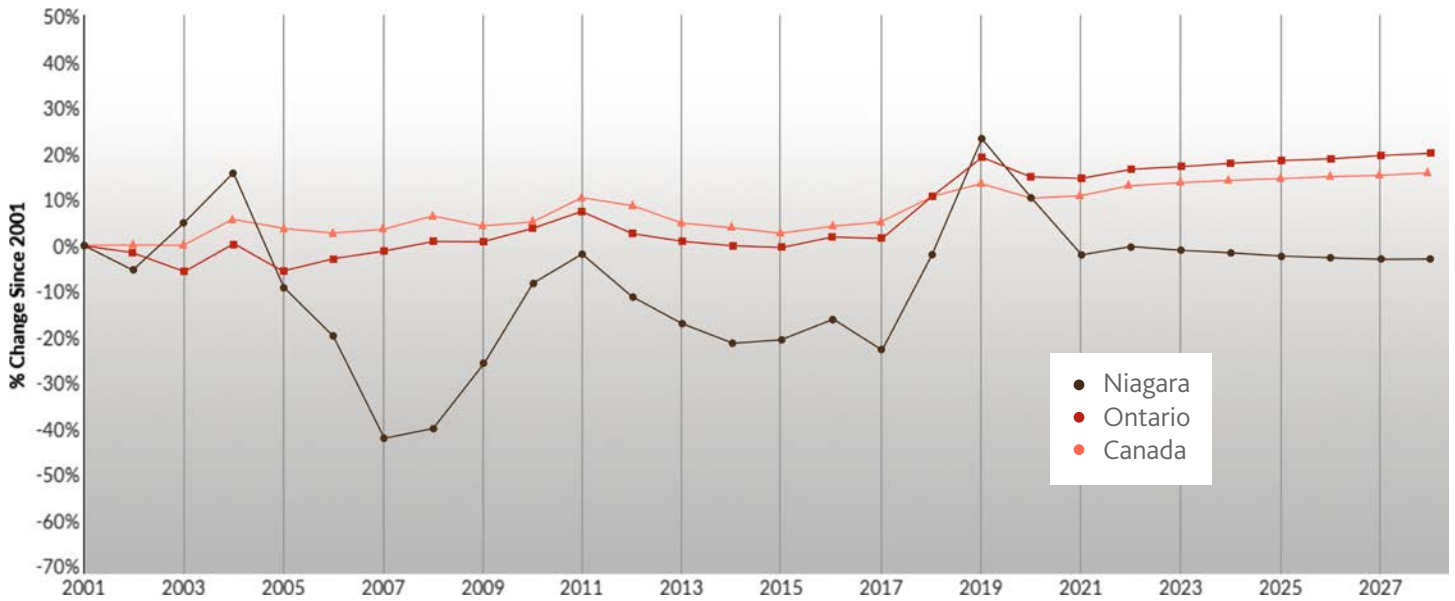
Table 1: Change in electric power generation jobs, 2001–2022; Niagara, Ontario and Canada compared

Region	2001 Jobs	2022 Jobs	Change	Percentage Change
Niagara	863	859	(5)	(1%)
Ontario	34,973	40,725	5,752	16%
Canada	87,661	99,283	11,622	13%

² It is important to note that for this study, we used the geographical area of the St. Catharines-Niagara CMA, which does not include Grimsby and West Lincoln. This was necessary to be able to compare the local sector to other CMAs (the geographic unit of economic analysis) in Ontario.

³ Jobs by industry in electric power generation consist of only one industry within the NAICS code system, namely: "Electric power generation, transmission and distribution." However, as we will see further below, the NOC data have several occupations listed under the sector.

Figure 1a: Industry job growth in electric power generation, 2001–2022; Niagara, Ontario and Canada compared



To shed light on more recent trends in the sector, Figure 1b shows the job changes in electric power generation over the past decade (between 2011 and 2022). Niagara, along with the province and the country, all report growth, with Niagara’s growth of two per cent lagging the provincial and national rates.

Figure 1b: 10-year industry job growth in electric power generation, 2011–2022; Niagara, Ontario and Canada compared

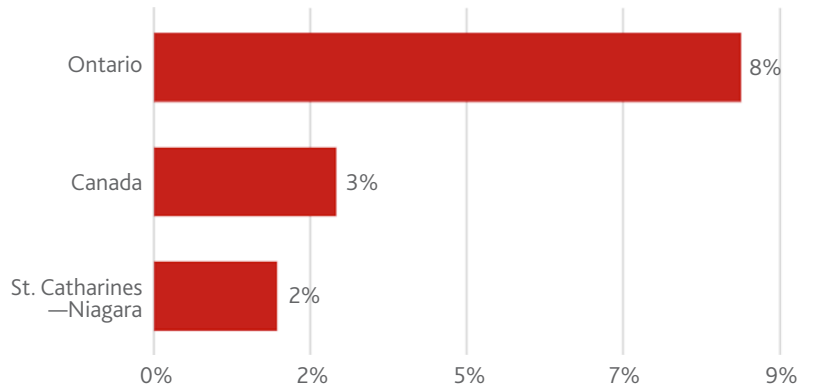


Table 2 shows percentage changes in the sector’s number of jobs between 2001 and 2022. It is worth highlighting that for the NAICS data, only one industry is included under the electric power generation sector. As reported above, between 2001 and 2022, comparing Niagara with provincial (Ontario) and national trends, the region has seen an overall decline of one per cent in sector jobs over the past two decades, against the backdrop of a provincial increase of 16 per cent and national growth of 13 per cent.

Table 2: Percentage change in electric power generation jobs by industry, 2001–2022; Niagara, Ontario and Canada compared

Industry	Niagara	Ontario	Canada
Electric power generation, transmission and distribution	(1%)	16%	13%

Competitiveness (Location Quotient Scores)

Table 3 indicates that over the past two decades Niagara has seen mildly increased competencies in the electric power generation sector, with an uptick in LQ score from 0.84 to 0.88. However, it remains below the national average of 1.0.

Furthermore, as Table 4 indicates, Niagara is below the provincial LQ score of 1.05. For a region that boasts the presence of Niagara Falls and for a sector with such historic and symbolic value, this modest competency compared to the national and provincial averages raises questions about how the tide of change could have proven so unkind to the region and its electric power generation sector. Another way to think about it is that Niagara's relative underperformance could point to advances in other parts of the province and country in newer sources of power generation, including wind, solar, and biomass forms of energy in recent decades.

Occupations in Electric Power Generation

As noted earlier, while the distribution of jobs by industry gives us a good picture of current trends in Niagara's electric power generation sector, another lens through which we can view such trends is the distribution of jobs by occupation. The importance of this lens is that it sheds light on the human and talent dimensions of the electric power generation sector, supplying insights into the nature of skillsets or expertise required. This information in turn allows us to make inferences about the region's existing talent pool and its implications for innovation, adaptability and resilience in the sector. Moreover, unlike the NAICS data which lists only one industry, the NOC data includes several occupations, which allow for a more nuanced analysis of jobs trends.

Table 5 presents a breakdown of Niagara's percentage change in the number of electric power generation jobs by occupation over the past two decades.⁴ The region has seen growth in the occupations "Power system electricians" (213 per cent), "Electrical power line and cable workers" (59 per cent), "Contractors and supervisors, electrical trades and telecommunications occupations" (59 per cent) and "Civil engineers" (39 per cent). However, as illustrated by Figure 2, the region registers a decline in "Electrical and electronics engineers" (-25 per cent), "Mechanical engineers" (-33 per cent) and "Power engineers and power systems operators" (-46 per cent).

Table 3: Niagara's national location quotient for electric power generation jobs by industry, 2001 vs. 2022

Industry	2001	2022
Electric power generation, transmission and distribution	0.84	0.88

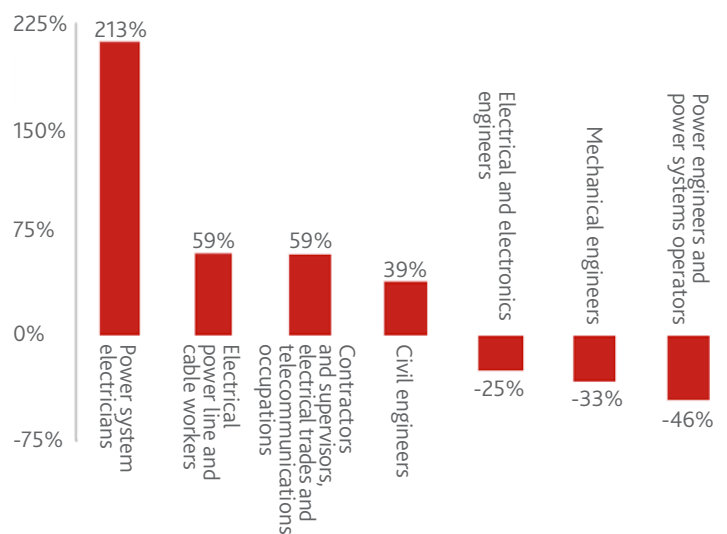
Table 4: Niagara's national location quotient for electric power generation jobs by industry, 2022, compared with Ontario

Industry	Niagara	Ontario
Electric power generation, transmission and distribution	0.88	1.05

Table 5: Niagara's percentage growth in electric power generation jobs by occupation, 2001–2022

Occupation	Niagara
Power system electricians	213%
Electrical power line and cable workers	59%
Contractors and supervisors, electrical trades and telecommunications occupations	59%
Civil engineers	39%
Electrical and electronics engineers	(25%)
Mechanical engineers	(33%)
Power engineers and power systems operators	(46%)

Figure 2: Niagara's percentage growth in electric power generation jobs by occupation, 2001–2022



⁴The NOC data lists several occupations, which allow for a more nuanced analysis of jobs trends in the sector.

Table 6 shows changes in Niagara’s top electric power generation occupations, comparing those in 2001 with those in 2022. In 2001, “Electrical power line and cable workers” and “Power engineers and power systems operators” led with 103 and 102 jobs respectively. In 2022, these two occupational categories still lead the pack at 130 and 53 jobs respectively. However, the latter has seen a considerable drop over the past two decades.

Table 7 compares the growth by percentage in top occupations in electric power generation between 2001 and 2022. “Electrical power line and cable workers” increased 27 per cent whereas all other occupations declined, with “Power engineers and power systems operators” leading the drop at -48 per cent.

Table 8 provides a comparative picture of the Niagara sector’s national location quotient of jobs broken down by occupation between 2001 and 2022. The region has seen a loss of competencies in “Power engineers and power systems operators”, “Mechanical engineers”, “Civil engineers” and “Electrical and electronics engineers”. However, it has gained modest competencies in “Electrical power line and cable workers”, “Contractors and supervisors, electrical trades and telecommunications occupations”, and “Power system electricians.”

Moreover, as Table 9 reveals, Niagara outpaces the provincial scores in all of its five most competitive occupations in the electric power generation sector, namely “Power system electricians,” “Electrical power line and cable workers”, and “Contractors and supervisors, electrical trades and telecommunications occupations”.

Table 6: Niagara’s top occupations in the electric power generation sector by job numbers, 2001 vs 2022

Occupation	2001
Electrical power line and cable workers	103
Power engineers and power systems operators	102
Electrical and electronics engineering technologists and technicians	43
Electrical and electronics engineers	40
Supervisors, petroleum, gas and chemical processing and utilities	37
Occupation	2022
Electrical power line and cable workers	130
Power engineers and power systems operators	53
Supervisors, petroleum, gas and chemical processing and utilities	31
Electrical and electronics engineers	22
Electrical and electronics engineering technologists and technicians	20

Table 7: Percentage change in Niagara’s top electric power generation jobs by occupation, 2001–2022

Occupation	Occupation Change 2001–2022	Percentage Change
Electrical power line and cable workers	27	27%
Supervisors, petroleum, gas and chemical processing and utilities	(6)	(17%)
Electrical and electronics engineers	(18)	(45%)
Electrical and electronics engineering technologists and technicians	(23)	(54%)
Power engineers and power systems operators	(49)	(48%)

Table 8: Niagara’s national location quotient for electric power generation jobs by occupation, 2001 vs. 2022

Occupation	2001	2022
Power engineers and power systems operators	1.14	0.69
Mechanical engineers	1.10	0.61
Electrical power line and cable workers	1.00	1.33
Contractors and supervisors, electrical trades and telecommunications occupations	0.96	1.07
Civil engineers	0.78	0.71
Power system electricians	0.68	1.56
Electrical and electronics engineers	0.54	0.4

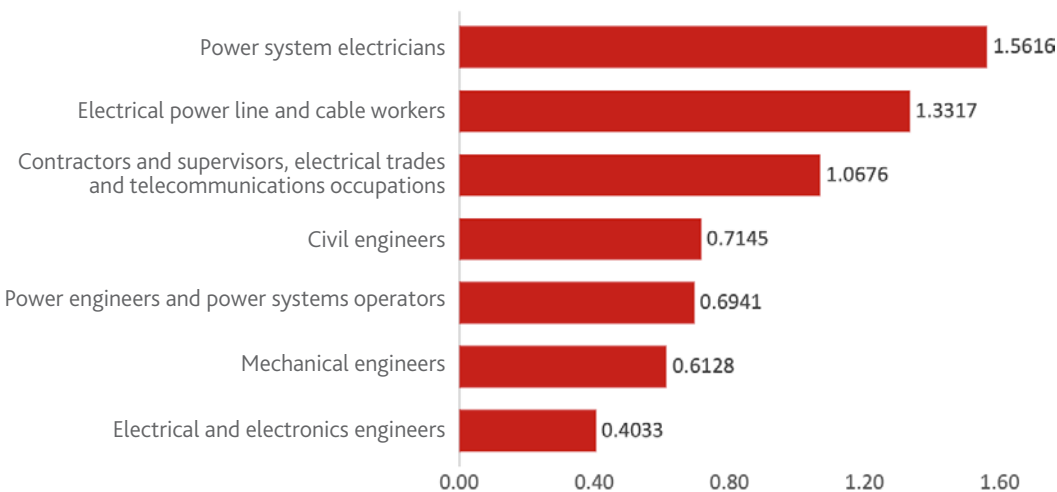
Table 9: Niagara’s national location quotient for electric power generation jobs by occupation, 2022, compared with Ontario

Occupation	Niagara	Ontario
Power system electricians	1.56	1.04
Electrical power line and cable workers	1.33	0.95
Contractors and supervisors, electrical trades and telecommunications occupations	1.07	0.94
Civil engineers	0.71	0.90
Power engineers and power systems operators	0.69	0.73
Mechanical engineers	0.61	1.15
Electrical and electronics engineers	0.40	1.27

As Figure 3 illustrates, Niagara shows a national comparative advantage in the occupation “Power system electricians” (1.56) and a relatively strong showing in “Electrical power line and cable workers” (1.33) and “Contractors and supervisors,

electrical trades and telecommunications occupations” (1.07). While the latter two occupation categories are below the critical comparative advantage threshold of 1.5, they are nevertheless above the national average of 1.

Figure 3: Niagara’s national location quotient for jobs by occupation in electric power generation, 2022 (sorted by highest to lowest)



SECTION 2: CHANGES IN ELECTRIC POWER GENERATION, NIAGARA & OTHER ONTARIO MIDSIZED REGIONS COMPARED

In this section, we examine changes in Niagara’s electric power generation sector, comparing trends in the region with those in a select midsized region, Sudbury. This region was selected due its relative strength in the sector as well as demographic similarity to Niagara, also a midsized region. For simplicity, the analysis focuses on the NOC data, examining changes in jobs by occupation.⁵

In Table 10, we see a change in overall job numbers, comparing trends in Niagara with those of Greater Sudbury over the past two decades. Niagara has witnessed an overall growth of two per cent whereas Greater Sudbury saw an increase of 79 per cent over the same period.

Figure 4 illustrates job trends over the past two decades, with Niagara showing some positive growth in recent years, though below that of Sudbury.

Table 10: Change in electric power generation job numbers by occupation, 2001–2022; Niagara and Greater Sudbury Compared

Region	2001 Jobs	2022 Jobs	Change	Percentage Change
St. Catharines—Niagara	1,708	1,742	34	2%
Greater Sudbury	692	1,239	547	79%

Figure 4: Change in electric power generation job numbers by occupation, 2001–2022; Niagara and Sudbury compared

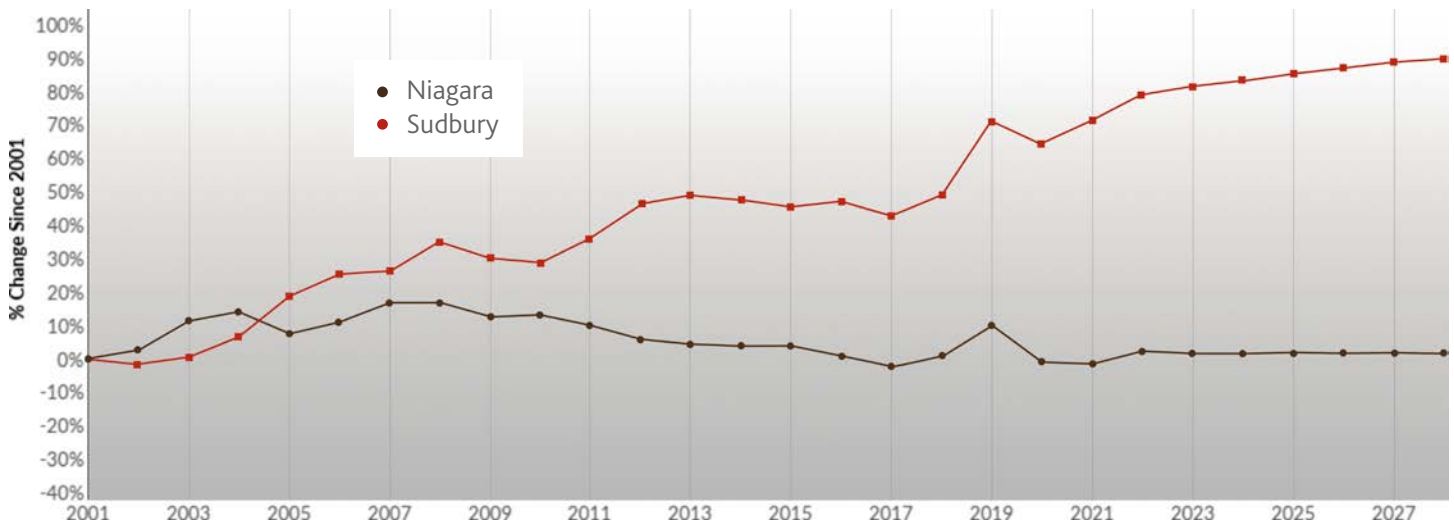


Table 11 shows percentage growth between 2001 and 2022 in electric power generation jobs by occupation, comparing Niagara with Greater Sudbury. We can see that in all the occupations where Niagara registered a positive growth, it is outpaced by Sudbury. Moreover, Niagara experienced declines in “Electrical and electronics engineers”, “Mechanical engineers” and “Power engineers and power systems operators”

whereas Sudbury reported growth in all of these occupational categories. However, for an even clearer picture of how Niagara is faring in each of these electric power generation occupations compared to other regions in Ontario, we juxtapose Niagara’s LQ scores with Sudbury in Table 12. Here we see that among Niagara’s top performers in terms of occupational competencies, Sudbury outpaces Niagara in all three.

⁵ Because only one industry is included under the electric power generation sector for the NAICS data, we decided to focus on the NOC data in this section since it lists several occupations that present an opportunity for a more nuanced inter-regional comparison.

Table 11: Percentage change in electric generation jobs by occupation, 2001–2022; Niagara and Sudbury compared

Occupation	Niagara	Sudbury
Power system electricians	213%	379%
Electrical power line and cable workers	59%	93%
Contractors and supervisors, electrical trades and telecommunications occupations	59%	116%
Civil engineers	39%	101%
Electrical and electronics engineers	(25%)	70%
Mechanical engineers	(3%)	84%
Power engineers and power systems operators	(46%)	14%

Table 12: National location quotient of electric power generation jobs by occupation, 2022; Niagara and Sudbury compared

Occupation	Niagara	Sudbury
Power system electricians	1.56	2.11
Electrical power line and cable workers	1.33	1.63
Contractors and supervisors, electrical trades and telecommunications occupations	1.07	1.31
Civil engineers	0.71	0.78
Power engineers and power systems operators	0.69	1.31
Mechanical engineers	0.61	1.25
Electrical and electronics engineers	0.40	0.81

Wages

Another lens for determining the vitality of Niagara’s electric power generation sector is to compare the wage distribution of the sector to those of similar regions. As indicated in Figure 5, Niagara reported a median wage of \$42.72 per hour, higher than Sudbury’s \$41.84 per hour. Niagara’s performance in the wage distribution of this sector is interesting given that Sudbury has outpaced the region in occupation growth trends over the past two decades.

Figure 5: Electric power generation median hourly wages; Niagara and Sudbury compared

