

Commentary | August 2024

Labour for Lithium:

Analyzing the availability
of labour for a lithium-
processing facility in
Thunder Bay



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By: William Dunstan, Manson Collagène, and Bogdan Koutsenko

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Editor: Mark Campbell

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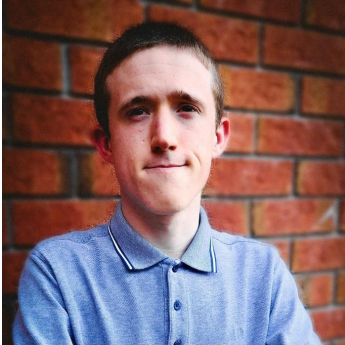
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At the same time, he participated as a project assistant and researcher for an international, professional association called the Vehicular Technology Society. His early exposure to the transportation innovation ecosystem sustained his ongoing interest in the role of public policy for guiding innovation. His later role as a researcher on an adjacent project with the U.S. Department of Transportation gave him the chance to further deepen this interest by engaging with federal legislation in transportation planning.

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Executive Summary

Lithium is one of many "critical minerals" that will be required by an increasingly digital and green economy. As a result, there is growing interest not only in mining lithium in Northwestern Ontario, but also in processing it locally. Particularly in the region's largest city: Thunder Bay. Given aging trends and labour shortages in many fields it is logical for proponents to ask – can the region provide the workforce?

The answer is yes.

At present, labour exists in Northwestern Ontario for all 10 key professions that are associated with lithium processing. In fact, for five of those professions, there are, today, unemployed workers in Northwestern Ontario, indicating a surplus of labour ready and willing to work in this industry. This situation is, of course, not static.

By 2026, labour demand is expected to increase for six of the key professions related to lithium processing:

1. Industrial instrument technicians and mechanics
2. Construction millwrights and industrial mechanics
3. General building maintenance workers and building superintendents
4. Supervisors, mineral and metal processing
5. Central control and process operators, mineral and metal processing
6. Machine operators, mineral and metal processing

While demand for labour grows in these areas, supply of labour is expected to shrink in many of the same areas:

1. Industrial instrument technicians and mechanics
2. Electricians (except industrial and power system)
3. Steamfitters, pipefitters and sprinkler system installers
4. Construction millwrights and industrial mechanics
5. General building maintenance workers and building superintendents

This combination of expanded demand and shrinking supply is a recipe for labour shortage. Action needs to be taken now to avoid this outcome. To fill forecasted labour shortages in key professions, more workers will need to be trained in Northwestern Ontario or will need to be recruited from elsewhere. Lithium processing companies, along with economic development and workforce development organizations in Northwestern Ontario, should partner with local postsecondary institutions and trades associations to increase capacity for training new workers.

Even where we can expect sufficient graduates from existing or new programs to meet forecast labour market needs, additional action needs to be taken. It will be crucial to retain these graduates in the region and in in-demand professions. It will be important to recruit people to these education and training programs, and to the jobs available for them post-graduation, by communicating the opportunities available in these fields here in Northwestern Ontario.





Introduction

Lithium is seen as one of the essential minerals for decarbonizing the world's energy supply, which is vital in the fight against climate change (Alexandra 2023). Several studies have shown that the global lithium market is expected to grow from 0.59 million tonnes of lithium carbonate equivalent (LCE) in 2023 to 1.44 million tonnes LCE by 2028 (Mordor Intelligence 2023). In dollar terms, the market is projected to grow from US \$2.5 billion in 2023 to US \$6.4 billion by 2028 (Lithium Metal Market 2023). Canada is one of the few Western nations that has an abundance of lithium, as well as cobalt, graphite, nickel, and other minerals essential to creating the batteries and electric vehicles of the future (Natural Resources Canada 2022). As a result, there is growing interest in establishing a lithium-processing facility in the City of Thunder Bay.

This commentary aims to identify the necessary labour force for a lithium-processing facility in Thunder Bay and to assess whether Northwestern Ontario can meet these labour requirements. To achieve this, the commentary will evaluate the professions needed by lithium-processing facilities, the current and future supply of workers in these professions in Northwestern Ontario, and relevant education and training programs available in the region.

By 2026, Northwestern Ontario may experience labour shortages in various occupations required for a lithium-processing facility. Fortunately, these shortages can be resolved by graduates from local training and education programs. It will be essential to expand local education and training programs and encourage graduates to stay in the region to meet the labour force requirements of a potential lithium-processing facility in Thunder Bay.

Labour force requirements for lithium processing

To determine the labour force required for lithium processing in Thunder Bay, one can look at existing or proposed projects elsewhere in the world. This section answers two questions. First, what types of workers are needed to support a lithium-processing facility? Second, how many workers are needed?

A 2019 Sayona feasibility study for its, since re-scoped, Authier Lithium Project provides a breakdown of the specific professions required by a lithium-processing facility. The Authier Lithium Project was initially planned to consist of the extraction of spodumene in Northwestern Quebec and the conversion of this material into spodumene (lithium) concentrate (Sayona 2019). A processing facility was expected to produce approximately 110,000 tonnes of spodumene concentrate per year at peak output. In 2021, Sayona abandoned plans for the processing facility discussed in this feasibility study and transformed Authier into a supplier for an established concentrator (Sayona 2023). Nevertheless, the occupation-specific breakdown of labour requirements provided in the 2019 feasibility study is the most detailed currently available for a lithium-processing facility. For this reason, the labour force projections in this commentary are based on this feasibility study.

Table 1 lists the roles and positions identified for facility maintenance and processing in the aforementioned study. It also lists the corresponding National Occupational Classification (NOC) code¹ for each role and position, and how many workers would have been required at peak production. This facility would have also required a small number of administrative staff.

Table 1: Maintenance and processing positions for Authier spodumene concentrate facility

Role / position	NOC	Peak number of workers
Maintenance		
Superintendent	73201	1
Foreman	92010	1
Mechanic	22312	13
Welder	72106	7
Apprentice	<i>Insufficient information</i>	7
Processing		
Mill/processing superintendent	92010	1
Metallurgist	21322	1
Shift supervisor	92010	3
Processing technicians		
• Control room operator	93100	4
• Crushing operator	94100	4
• Grinding operator	94100	4
• Flotation operator	93100	4
• Support	<i>Insufficient information</i>	1
Electrician	72200	1
Instrument mechanic	22312	1
Pipefitter	72301	2
Millwright	72400	2
Total		57

Source: Sayona (2019). NOCs identified by authors.

To situate the Authier project relative to other proposed and existing lithium-processing facilities, Table 2 provides information for various facilities regarding production per year, number of workers, and production per year per worker. It is important to note the production levels of each facility because larger facilities are likely to require more workers. As Table 2 shows, the number of workers required varies by project. Facilities producing lithium hydroxide or lithium carbonate generally require one worker for every 100 to 250 metric tonnes produced annually. Facilities producing spodumene concentrate — an intermediate product that can be transformed into lithium hydroxide or lithium carbonate — generally require one worker for approximately every 1,800 metric tonnes produced annually.

Table 2: Number of workers required by various lithium-processing projects

Project	Location	Production per year (metric tonnes)	# of workers required	Metric tonnes produced per year / # of workers
IGO Kwinana Lithium Hydroxide Processing	Australia	48,000	280	171
Albermale Kemerton Lithium Hydroxide Processing	Australia	100,000	850	118
Piedmont Carolina Lithium Hydroxide Processing	United States	30,000	120	250
Piedmont Carolina Spodumene Concentrate Refining	United States	242,000	131	1,847
Thacker Pass Lithium Carbonate Processing	United States	80,000	500	160
Nemaska Lithium Bécancour Lithium Hydroxide Processing	Quebec	34,000	200	170
Sayona Authier Spodumene Concentrate Refining	Quebec	112,700	61 ²	1,848

Source: Authors' calculations based on figures from Government of Western Australia (2023), IGO Limited (2022), Mining.com (2023), Nemaska Lithium (2023a; 2023b), Piedmont Lithium (2021; 2023), Sayona (2019; 2023), and Tianqi Lithium Energy Australia (2023).

In sum, a lithium-processing facility requires workers with the technical skills to fill a variety of maintenance and processing roles. The number of workers required varies between projects and is strongly influenced by the specific lithium product being produced.

² The 57 maintenance and processing staff outlined in Table 1, plus four administrative positions.

Labour force in Northwestern Ontario

Having identified the professions that are needed for a lithium-processing facility, we can determine the size of the existing labour force in these professions in Northwestern Ontario.

Table 3 shows the available labour force for lithium facilities in the three census divisions (Thunder Bay, Kenora, and Rainy River) of Northwestern Ontario. The Authier Lithium Project feasibility study provided a list of 17 different professions required by a lithium-processing facility. The lack of information provided for certain roles required that this list be narrowed down to 15 professions. Some professions had to be combined and listed under a single NOC code, used by Statistics Canada.

The first column displays the 10 unique professions selected for this study and the second column links them to their NOC codes. Columns 3, 4, and 5 describe the labour pool available in the census divisions of Northwestern Ontario. The final column shows that despite a lack of labour in some regions — for example, Kenora and Rainy River — Northwestern Ontario has a labour force that meets all the NOC codes required for a lithium facility.

Table 3: Total available labour force by census division in Northwestern Ontario (2021)

Profession	NOC	Thunder Bay	Kenora	Rainy River	Northwest Total
Metallurgical and materials engineers	21322	10	0	0	10
Industrial instrument technicians and mechanics	22312	40	25	0	65
Welders and related machine operators	72106	290	120	60	470
Electricians (except industrial and power system)	72200	235	160	35	430
Steamfitters, pipefitters and sprinkler system installers	72301	130	15	15	160
Construction millwrights and industrial mechanics	72400	475	180	90	745
General building maintenance workers and building superintendents	73201	490	335	55	880
Supervisors, mineral and metal processing	92010	10	0	0	10
Central control and process operators, mineral and metal processing	93100	10	0	20	30
Machine operators, mineral and metal processing	94100	10	15	0	25

Source: Community Data Program (2023).



Table 4 is structured in the same way as Table 3. However, instead of showing the total labour force as does Table 3, Table 4 displays the number of unemployed workers in each profession. Using both sets of data, Table 5 calculates the share of the total labour force that a facility producing 110,000 tonnes of spodumene concentrate per year would require at peak production, as well as whether there are enough currently unemployed workers in Northwestern Ontario to meet that demand. This table points to five (5) critical bottlenecks where a facility producing 110,000 tonnes of spodumene concentrate per year would need to hire more than 10 per cent of the current labour force. These professions are:

1. 21322 Metallurgical and materials engineers
2. 22312 Industrial instrument technicians and mechanics
3. 93100 Central control and process operators, mineral and metal processing
4. 94100 Machine operators, mineral and metal processing
5. 92010 Supervisors, mineral and metal processing

There were no unemployed workers in any of the above professions in 2021. Therefore, a lithium-processing facility would need to hire workers from outside the region or from other local employers.

Table 4: Total unemployed labour force by census division in Northwestern Ontario (2021)

Profession	NOC	Thunder Bay	Kenora	Rainy River	Northwest Total
Metallurgical and materials engineers	21322	0	0	0	0
Industrial instrument technicians and mechanics	22312	0	0	0	0
Welders and related machine operators	72106	25	0	0	25
Electricians (except industrial and power system)	72200	25	0	0	25
Steamfitters, pipefitters and sprinkler system installers	72301	10	0	10	20
Construction millwrights and industrial mechanics	72400	40	0	0	40
General building maintenance workers and building superintendents	73201	40	25	0	65
Supervisors, mineral and metal processing	92010	0	0	0	0
Central control and process operators, mineral and metal processing	93100	0	0	0	0
Machine operators, mineral and metal processing	94100	0	0	0	0

Source: Community Data Program (2023).

For the remaining five (5) professions, a facility producing 110,000 tonnes of spodumene concentrate per year would require less than 2 per cent of the current labour force:

1. 72106 Welders and related machine operators
2. 72301 Steamfitters, pipefitters and sprinkler system installers
3. 72400 Construction millwrights and industrial mechanics
4. 72200 Electricians (except industrial and power system)
5. 73201 General building maintenance workers and building superintendents

Additionally, each of the above professions has enough unemployed workers to satisfy the labour requirements of such a facility without creating a labour shortage for other local employers.

Table 5: Labour required for a facility producing approximately 110,000 tonnes of spodumene (lithium) per year and unemployed Northwestern Ontario labour force (2021)

Role / position	NOC	Peak number of workers	Total labour force	Unemployed workers	Total workers to peak number of workers hired	Number of unemployed workers to peak number of workers hired
General building maintenance workers and building superintendents	21322	1	880	65	880	65
Electricians (except industrial and power system)	22312	1	430	25	430	25
Construction millwrights and industrial mechanics	72106	2	745	40	373	20
Steamfitters, pipefitters and sprinkler system installers	72200	2	160	20	80	10
Welders and related machine operators	72301	7	470	25	67	4
Metallurgical and materials engineers	72400	1	10	0	10	0
Industrial instrument technicians and mechanics	73201	14	65	0	5	0
Central control and process operators, mineral and metal processing	92010	8	30	0	4	0
Machine operators, mineral and metal processing	93100	8	25	0	3	0
Supervisors, mineral and metal processing	94100	5	10	0	2	0

Source: Community Data Program (2023) and Sayona (2019).

Projections for future labour demand in Northwestern Ontario

In this section, five years of labour force data is used to forecast labour demand in 2026. Forecasting future labour market conditions is critical to this analysis because any new lithium-processing facility built in Thunder Bay will be hiring workers in the future, not today. This forecasting shows that labour demand is likely to increase for some professions, while decreasing for others.

Table 6 shows forecasts for labour demand in Northwestern Ontario in 2026. "Labour demand in 2021" is the number of employed workers in Thunder Bay, Kenora, and Rainy River for each NOC in 2021. "Forecasted labour demand in 2026" is calculated by multiplying the percentage change in labour demand provided by Lightcast Analyst (2024) for each profession by the number of workers employed in each profession in 2021. The final column, "total labour demand in 2026," shows the sum of forecasted labour demand in 2026 and the number of workers required by a lithium-processing facility producing approximately 110,000 tonnes of spodumene concentrate per year.

By 2026, three of the 10 professions required by a lithium-processing facility are forecast to experience a decrease in labour demand compared to 2021:

1. Welders and related machine operators
2. Electricians (except industrial and power system)
3. Steamfitters, pipefitters and sprinkler system installers

Labour demand is expected to increase for six professions:

1. Industrial instrument technicians and mechanics
2. Construction millwrights and industrial mechanics
3. General building maintenance workers and building superintendents
4. Supervisors, mineral and metal processing
5. Central control and process operators, mineral and metal processing
6. Machine operators, mineral and metal processing

There are too few people employed as "Metallurgical and materials engineers" to make an accurate future labour demand forecast for that profession.

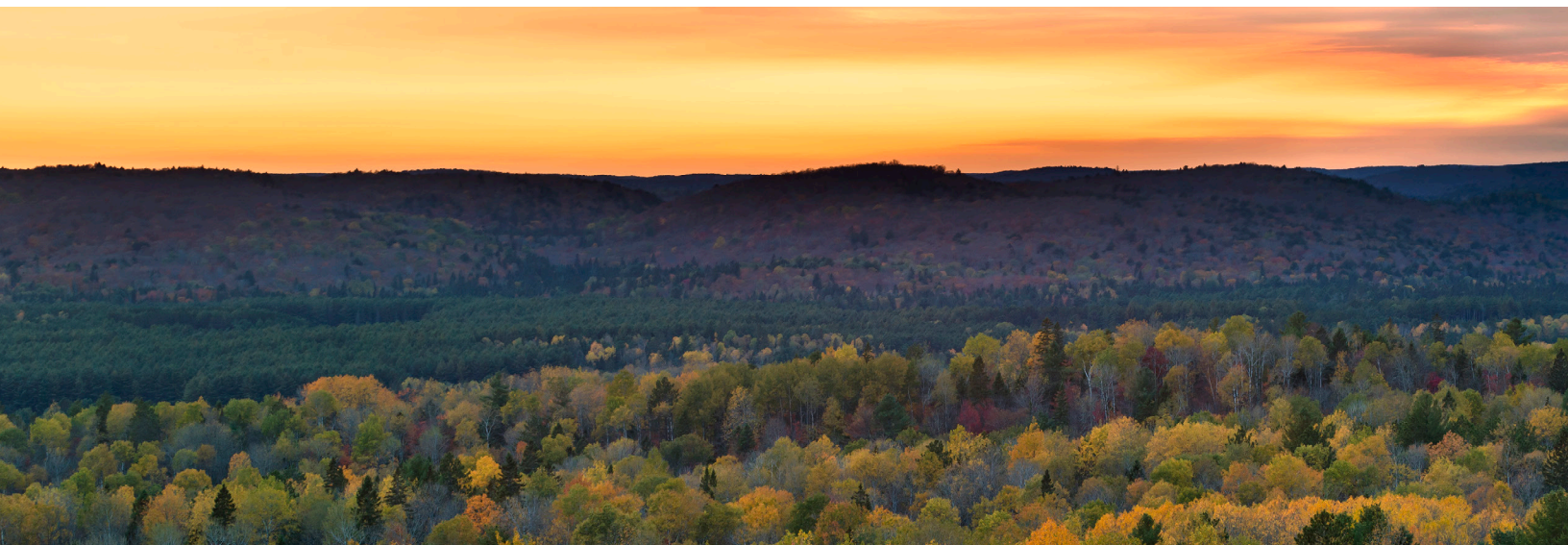
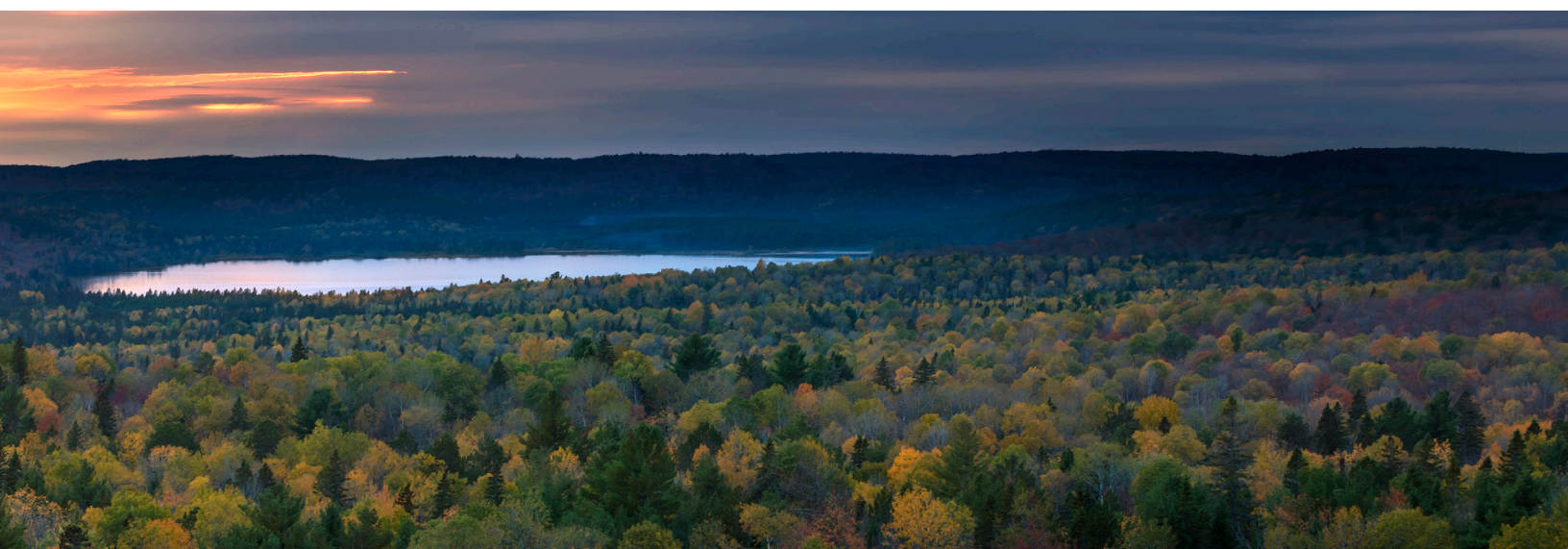


Table 6: Forecasted labour demand in Northwestern Ontario (2021 and 2026)

Profession	NOC	Labour Demand in 2021	Forecasted labour demand in 2026	Number of workers required by a lithium-processing facility	Total forecasted labour demand in 2026
Metallurgical and materials engineers	21322	10	<i>Insufficient Information</i>	4	<i>Insufficient Information</i>
Industrial instrument technicians and mechanics	22312	65	53	13	66
Welders and related machine operators	72106	470	398	7	405
Electricians (except industrial and power system)	72200	430	403	1	404
Steamfitters, pipefitters and sprinkler system installers	72301	160	138	2	140
Construction millwrights and industrial mechanics	72400	745	761	2	763
General building maintenance workers and building superintendents	73201	880	965	1	966
Supervisors, mineral and metal processing	92010	10	10	4	14
Central control and process operators, mineral and metal processing	93100	30	24	8	32
Machine operators, mineral and metal processing	94100	25	29	8	37

Source: Authors' calculations using data from Community Data Program (2023), Lightcast Analyst (2024), and Sayona (2019).



Projections for future labour supply in Northwestern Ontario

Whereas the previous section looked at forecasted labour demand in 2026, this section considers forecasted labour supply. Comparing forecasted labour demand to forecasted labour supply allows us to determine if a profession is likely to meet the labour needs of a lithium-processing facility in 2026. In this forecast, data on employment by age group is used to estimate how many currently employed workers are likely to retire by 2026 and how many young people are likely to enter each profession full-time between 2021 and 2026.

Labour force data by age range from 2021 can be used to forecast how new entrants to the labour force and workers retiring from the labour force are likely to affect labour supply in 2026. In this forecast, people ages 25 to 64 are considered to be of working age and available for full-time employment. Accordingly, it is assumed that workers ages 25 to 54 in 2021 will remain in the workforce in 2026. Workers ages 55 to 64 in 2021 are approaching retirement age and are considered likely to retire by 2026. Workers ages 15 to 24 in 2021 are expected to enter the workforce full time by 2026.

In Table 7, the number of working-age individuals per profession in 2026 is forecasted by subtracting the number of workers ages 55 to 64 in 2021 by the number of workers ages 25 to 64 in the same years, then adding the number of workers ages 15 to 24. The final column in Table 7 shows the forecasted change in labour supply between 2021 and 2026.

The resulting forecasts suggest that only two professions will have a larger labour supply in 2026 than in 2021. They are:

1. 94100 Machine operators, mineral and metal processing
2. 72106 Welders and related machine operators

Nevertheless, when considering the projected changes to labour demand shown in Table 6, these increases will not be enough to meet the labour demand in these two professions of 37 and 405 workers, respectively, in 2026.

The following professions are expected to see no change in the size of their working-age labour forces between 2021 and 2026:

1. 92010 Supervisors, mineral and metal processing
2. 93100 Central control and process operators, mineral and metal processing

In both professions, however, labour demand is forecasted to increase by 2026. This means that the labour supply remaining constant will be insufficient to meet demand.

Many more professions are projected to see a decrease in the size of the working-age labour force between 2021 and 2026:

1. 22312 Industrial instrument technicians and mechanics
2. 72200 Electricians (except industrial and power system)
3. 72301 Steamfitters, pipefitters and sprinkler system installers
4. 72400 Construction millwrights and industrial mechanics
5. 73201 General building maintenance workers and building superintendents

Although labour demand is forecasted to decrease for "Electricians (except industrial and power system)" and "Steamfitters, pipefitters and sprinkler system installers," reductions in labour supply can still be expected to produce a labour shortage for both professions. The other three professions listed are likely to see an increase in labour demand along with a decrease in supply, producing a labour shortage in 2026.

Table 7: Available labour force by age group in Northwestern Ontario in 2021 and 2026

Role / Position	25-64 (working age in 2021)	15-24	55-64	Working age in 2026	Change in labour supply
Machine operators, mineral and metal processing	10	10	0	20	+10
Welders and related machine operators	355	90	85	360	+5
Supervisors, mineral and metal processing	10	0	0	10	0
Central control and process operators, mineral and metal processing	30	0	0	30	0
Metallurgical and materials engineers	0	0	0	0	0
Industrial instrument technicians and mechanics	60	0	10	50	-10
Steamfitters, pipefitters and sprinkler system installers	140	0	35	105	-35
Electricians (except industrial and power system)	355	45	85	315	-40
Construction millwrights and industrial mechanics	640	55	185	510	-130
General building maintenance workers and building superintendents	735	100	300	535	-200

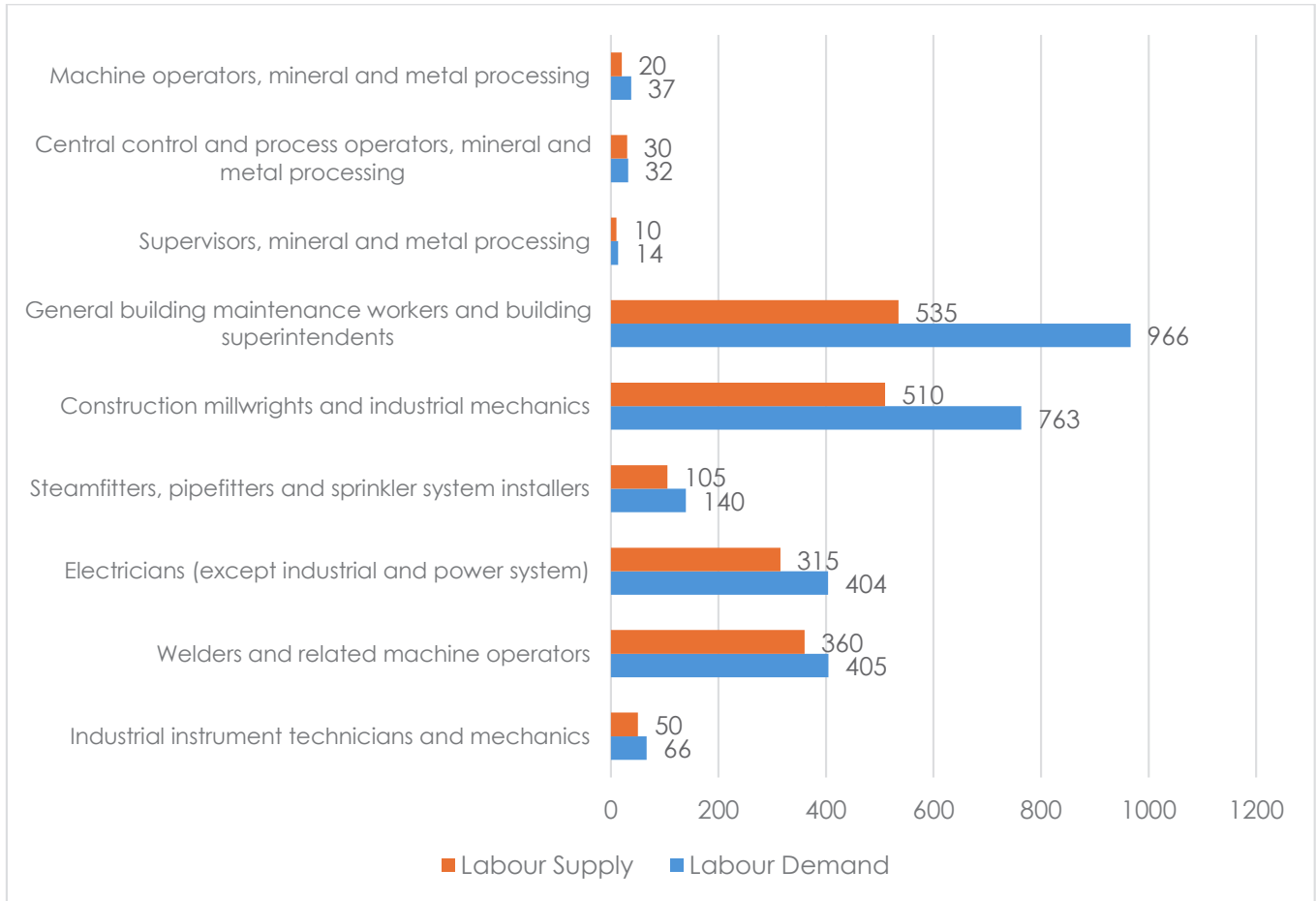
Source: Community Data Program (2023), authors' calculations.

Note: Because of the way data are rounded in the original dataset, "Metallurgical and materials engineers" reads as "10" when selected category is "Total" and "0" when selected categories are "25-64," "15-24," and "55-64." The count for this profession is likely in the low single digits for each of the categories.



Figure 1 provides a visual comparison of forecasted labour demand and forecasted labour supply in 2026, considering the age composition of the workforce for each profession. For all professions, labour demand exceeds labour supply, albeit by varying amounts.

Figure 1: Comparison of forecasted labour demand (2026) and forecasted labour supply considering age composition of the workforce³



Source: Authors' calculations based on data presented in Table 6 and Table 7.

³ "Metallurgical and materials engineers" is not included in Figure 1 because there are too few people employed in this profession to produce accurate forecasts.



Increasing labour supply: programs and training available in Northwestern Ontario

This commentary has shown that Northwestern Ontario will need an increased supply of workers in all 10 required professions to meet the forecasted labour demands of a lithium-processing facility and other employers in the region. Fortunately, local education and training programs are producing qualified workers in these professions. Graduates of these programs will be able to fill most of the forecasted labour shortages in 2026 if Northwestern Ontario can retain most of them.

Table 8 shows the postsecondary programs available in Northwestern Ontario to train people to work in the professions that are required by lithium-processing facilities. It also shows how many people graduated from each program between 2021 and 2023. Only one of the 10 required professions does not have a relevant postsecondary training program in Northwestern Ontario: “Machine operators, mineral and metal processing.” Crucially, however, most jobs in this profession do not require a postsecondary education; instead, they require a secondary school diploma, with employers providing on-the-job training (Statistics Canada 2023b).

Table 8: Northwestern Ontario training programs and number of graduates for professions required by a lithium-processing facility

Profession	NOC	Program	Number of graduates (Total - 2021 to 2023)
Metallurgical and materials engineers	21322	Chemical Engineering Degree - Lakehead University	70
		Chemical Engineering Diploma - Lakehead University	27
Industrial instrument technicians and mechanics	22312	Mechanical Engineering Technician - Confederation College	38
		Mechanical Engineering Technology - Confederation College	15
Welders and related machine operators	72106	Welding Techniques - Confederation College	126
Electricians (except industrial and power system)	72200	Electrical Engineering Technology - Confederation College	50
Steamfitters, pipefitters and sprinkler system installers	72301	Mechanical Engineering Technician - Confederation College	38
		Mechanical Engineering Technology - Confederation College	15
Construction millwrights and industrial mechanics	72400	Mechanical Engineering Technician - Confederation College	38
		Mechanical Techniques - Confederation College	28
General building maintenance workers and building superintendents	73201	Carpentry and Renovation Techniques - Confederation College	51
Supervisors, mineral and metal processing	92010	Mechanical Techniques - Confederation College	28
Central control and process operators, mineral and metal processing	93100	Instrumentation Engineering Technician - Confederation College	44
Machine operators, mineral and metal processing	94100	No local training program	N/A

Source: Data received from Lakehead University and Confederation College.

Table 9 compares a forecast of the number of graduates for each profession between 2021 and 2026 with the forecasted gap between labour demand and labour supply in 2026. Recognizing that more students will graduate between 2024 and 2026, we estimate the total number of graduates for each profession by assuming that graduation rates for the three-year period from 2024 to 2026 will be the same as for the three-year period from 2021 to 2023. There are only two professions in which the forecasted gap between labour demand and labour supply exceeds the forecasted number of graduates between 2021 and 2026. These are:

1. 72400 Construction millwrights and industrial mechanics
2. 73201 General building maintenance workers and building superintendents

As shown in Table 7, both of these professions have many workers approaching retirement and comparatively fewer workers ages 15 to 24. These trends are likely to produce labour shortages even in the absence of a local lithium-processing facility.

For all other professions that require postsecondary credentials, there are enough recent graduates that, if all of them remain in the region, there will be sufficient labour supply to meet labour demand in 2026.⁴

This remains true even after accounting for the occasional overlap of relevant programs between professions. For example, “Steamfitters, pipefitters and sprinkler system installers” and “Industrial instrument technicians and mechanics” have the same two training programs, and one of these training programs also supports “Construction millwrights and industrial mechanics.” Assuming that each of these two professions receives half the graduates of Confederation College’s program in Mechanical Engineering Technology and one-third of the graduates of Confederation College’s Mechanical Engineering Technician program, the number of forecasted graduates (approximately 40) still exceeds the forecasted gap between labour demand and labour supply.

There is no guarantee, however, that all graduates will remain in the region or work in the professions that are required by a lithium-processing facility. If lithium-processing companies and other actors in Thunder Bay wish to recruit graduates to fill looming labour shortages in key professions, they will need to convince them to choose to work in these professions, and in Thunder Bay.

Table 9: Comparison of the forecasted gap between labour demand and labour supply in 2026 and the forecasted number of graduates between 2021 and 2026

Profession	Forecasted labour demand in 2026	Forecasted labour supply in 2026	Gap between labour demand and labour supply in 2026	Forecasted number of graduates between 2021 and 2026
Metallurgical and materials engineers	<i>Insufficient information</i>	<i>Insufficient information</i>	N/A	194
Industrial instrument technicians and mechanics	66	50	16	106
Welders and related machine operators	405	360	45	252
Electricians (except industrial and power system)	404	315	89	100
Steamfitters, pipefitters and sprinkler system installers	140	105	35	106
Construction millwrights and industrial mechanics	763	510	253	132
General building maintenance workers and building superintendents	966	535	431	102
Supervisors, mineral and metal processing	14	10	4	56
Central control and process operators, mineral and metal processing	32	30	2	88
Machine operators, mineral and metal processing	37	20	17	N/A

Source: Authors’ calculations using data from tables 6, 7, and 8.

⁴ While it was not possible to forecast labour demand and labour supply in 2026 for “Metallurgical and materials engineers,” we can be confident that enough graduates will be available for that profession. Total labour demand for “Metallurgical and materials engineers” in 2021 was 10. Even if labour demand doubled between 2021 and 2026, the 194 forecasted graduates should be more than sufficient to provide a matching increase in labour supply.

Conclusion and recommendations

Lithium-processing facilities require labour from a wide range of professions. The information available from proposed and existing projects suggests that lithium-processing facilities need workers from 17 professions. However, due to a lack of information, only 15 professions could be linked to NOC codes. Some of these positions were categorized under the same code and consequently combined under that category, producing 10 unique professions that were analyzed in this commentary.

At present, labour exists in Northwestern Ontario for all 10 professions. In fact, for five professions, there are unemployed workers in Northwestern Ontario, indicating a surplus of labour.

The labour market situation in 2026 was analyzed by assessing forecasted changes to labour demand, forecasted changes to labour supply considering the age composition of the labour force, and graduation rates for relevant training programs in Northwestern Ontario. Considering all these factors, this commentary concludes that sufficient labour can likely be recruited locally in 2026 for all but two professions: (1) "Construction millwrights and industrial mechanics," and (2) "General building maintenance workers and building superintendents."

To fill forecasted labour shortages in these two professions, more workers will need to be trained in Northwestern Ontario or will need to be recruited from elsewhere. Lithium-processing companies, along with economic development and workforce development organizations in Northwestern Ontario, should partner with local postsecondary institutions and trades associations to increase capacity for training new workers. In addition to increasing training capacity, it will be important to recruit people to these education and training programs by communicating the opportunities available in these fields. In the short term, labour shortages could be mitigated by convincing some qualified workers to delay retirement, possibly through employers offering higher wages.

Action is also needed for professions where graduates from local postsecondary institutions will likely be sufficient to meet labour market needs. It will be crucial to retain these graduates in the region and in in-demand professions. This will also require coordinated efforts from lithium-processing companies, economic development and workforce development organizations, education and training providers, and other local actors to convince graduates both to work in these professions and to stay in Northwestern Ontario.



References

- Community Data Program. "National Occupational Classification (NOC) 2021 (821A), Highest certificate, diploma or degree (16), Age (15A), Gender (3) and Labour force status (3), 2021 Census, 25% Sample data." Accessed January 18, 2024. <https://communitydata.ca/data/national-occupational-classification-noc-2021-821a-highest-certificate-diploma-or-degree-16>.
- . "Occupation - National Occupational Classification (NOC) 2011 (691), class of worker (5), age groups (13B) and sex (3) for the employed labour force aged 15 years and over, in private households, NHS, 2011." Accessed January 18, 2024. <https://communitydata.ca/data/occupation-national-occupational-classification-noc-2011-691-class-worker-5-age-groups-13b-and>.
- Confederation College. "Carpentry and Renovation Techniques." Accessed January 25, 2024. <https://www.confederationcollege.ca/program/carpentry-and-renovation-techniques>.
- . "Confederation College Partners with North Shore Mining Training Strategy to Provide Free Training Opportunities." Confederation College press release, July 27, 2022. <https://www.confederationcollege.ca/news-events/confederation-college-partners-north-shore-mining-training-strategy-provide-free>.
- . "Programs & Courses." Accessed January 19, 2024. <https://www.confederationcollege.ca/programs-courses>.
- Government of Western Australia. "Kemerton lithium hydroxide plant set to expand." Government of West Australia press release, May 3, 2023. <https://www.wa.gov.au/government/media-statements/McGowan-Labor-Government/Kemerton-lithium-hydroxide-plant-set-to-expand-20230503>.
- Gowans, Richard M, Christopher Jacobs, Bruce Pilcher, Jane Spooner, Steven R Aiken, Kevin E Hawton, and William Mercer. 2018. *NI 43-101 Technical Report on the Preliminary Economic Assessment of*. Avalon Advanced Materials. https://avalonadvancedmaterials.com/_resources/reports/Separation-Rapids-PEA-NI-43-101-10Nov16.pdf.
- IGO Limited. 2022. *Kwinana Lithium Hydroxide Refinery Site Visit Presentation*. Presentation at Winana Lithium Refinery, Kwinana, July 30, 2022. <https://www.igo.com.au/site/PDF/5689dd29-0fec-480d-8bc1-3cab878469ea/KwinanaSiteVisitPresentation>.
- Kaufman, Ian. "Avalon announces bigger plans for Thunder Bay lithium plant site." *Northern Ontario Business*, September 18, 2023. <https://www.northernontariobusiness.com/industry-news/mining/avalon-announces-bigger-plans-for-thunder-bay-lithium-plant-site-7559641>.
- Lakehead University. "Programs." Accessed December 11, 2023. <https://www.lakeheadu.ca/programs>.
- Lightcast Analyst. "Occupation Overview." Accessed April 24, 2024. <https://analyst.lightcast.io/analyst/?t=495mJ#h=nLDqD&page=home&vertical=standard&nation=ca>.
- Lopez-Pacheco, Alexandra. "Lithium exploration ramp up." *CIM Magazine*, March 20. <https://magazine.cim.org/en/environment/lithium-exploration-ramp-up-en/>.
- Markets and Markets. "Lithium Metal Market by source (Salt Lake brine, Lithium Ores), Application (Lithium-ion anode material, Alloy, Intermediate), End-Use Industry (batteries, Metal processing, Pharmaceuticals), & Region (APAC, North America, Europe, RoW)- Global Forecast to 2008." Accessed December 11, 2023. <https://www.marketsandmarkets.com/Market-Reports/lithium-metal-market-48900800.html>.
- Mining.com. "Lithium Americas kicks off construction at Thacker Pass." March 2, 2023. <https://www.mining.com/lithium-americas-kicks-off-construction-at-thacker-pass/>.
- Mordor Intelligence. "Lithium Market Size & Share Analysis - Growth Trends & Forecasts (2023 - 2028)." Hyderabad: Mordor Intelligence. <https://www.mordorintelligence.com/industry-reports/lithium-market>.
- Nemaska Lithium. "Bécancour Conversion Facility." What We Do. Accessed December 12, 2023. <https://nemaskalithium.com/en/becancour-conversion-facility/>.
- . "Sustainable development." Accessed December 12, 2023. <https://nemaskalithium.com/en/sustainable-development/>.

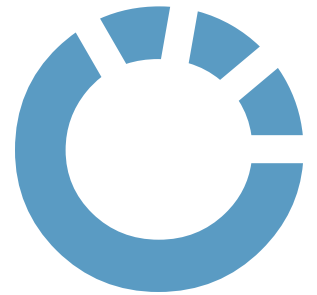
- Natural Resources Canada. *The Canadian Critical Minerals Strategy*. Ottawa: Government of Canada, 2022. <https://www.canada.ca/en/campaign/critical-minerals-in-canada/canadian-critical-minerals-strategy.html>.
- OCAS. "Machinist." Accessed December 11, 2023. <https://www.ontariocolleges.ca/en/programs/professions-and-trades/machinist>.
- Piedmont Lithium. "Carolina Lithium." Accessed December 12, 2023. <https://piedmontlithium.com/projects/carolina-lithium/>.
- . "Piedmont Completes Bankable Feasibility Study Of The Carolina Lithium Project With Positive Results." Piedmont Lithium press release, December 14, 2021. <https://piedmontlithium.com/piedmont-completes-bankable-feasibility-study-of-the-carolina-lithium-project-with-positive-results/>.
- Sayona. *Authier Lithium Project - Updated Definitive Feasibility Study*. La Motte: Sayona, 2019. <https://www.ree.environnement.gouv.qc.ca/dossiers/3211-16-020/3211-16-020-16.pdf>.
- . "Authier Lithium Project." Accessed December 12, 2023. <https://sayonamining.com.au/projects/authier-project/>.
- Community Data Program. "National Occupational Classification (NOC) 2021 (821A), Highest certificate, diploma or degree —."Sustainable development." Accessed December 12, 2023. <https://nemaskalithium.com/en/sustainable-development/>.
- Natural Resources Canada. *The Canadian Critical Minerals Strategy*. Ottawa: Government of Canada, 2022. <https://www.canada.ca/en/campaign/critical-minerals-in-canada/canadian-critical-minerals-strategy.html>.
- OCAS. "Machinist." Accessed December 11, 2023. <https://www.ontariocolleges.ca/en/programs/professions-and-trades/machinist>.
- Piedmont Lithium. "Carolina Lithium." Accessed December 12, 2023. <https://piedmontlithium.com/projects/carolina-lithium/>.
- . "Piedmont Completes Bankable Feasibility Study Of The Carolina Lithium Project With Positive Results." Piedmont Lithium press release, December 14, 2021. <https://piedmontlithium.com/piedmont-completes-bankable-feasibility-study-of-the-carolina-lithium-project-with-positive-results/>.
- Sayona. *Authier Lithium Project - Updated Definitive Feasibility Study*. La Motte: Sayona, 2019. <https://www.ree.environnement.gouv.qc.ca/dossiers/3211-16-020/3211-16-020-16.pdf>.
- . "Authier Lithium Project." Accessed December 12, 2023. <https://sayonamining.com.au/projects/authier-project/>.
- Statistics Canada. "21322 - Metallurgical and materials engineers." Last modified October 27, 2021. <https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=1322554&CVD=1322870&CPV=21322&CST=01052021&CLV=5&MLV=5>.
- . "22312 - Industrial instrument technicians and mechanics." Last modified October 27, 2021. <https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=1322554&CVD=1322870&CPV=22312&CST=01052021&CLV=5&MLV=5&adm=0&dis=0>.
- . "72106 - Welders and related machine operators." Last modified October 27, 2021. <https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=1322554&CVD=1322870&CPV=72106&CST=01052021&CLV=5&MLV=5>.
- . "72200 - Electricians (except industrial and power system)." October 27, 2021. <https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=1322554&CVD=1322870&CPV=72200&CST=01052021&CLV=5&MLV=5>.
- . "72301 - Steamfitters, pipefitters and sprinkler system installers." Last modified June 2, 2023. <https://noc.esdc.gc.ca/Structure/NocProfile?objectId=jGM6MkGNFdKbZf%2FE6kREnUCNYpsgVfLuzVakN5DepJM%3D>.
- . "72400 - Construction millwrights and industrial mechanics." October 27, 2021. <https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=1322554&CVD=1322870&CPV=72400&CST=01052021&CLV=5&MLV=5>.
- . "73201 - General building maintenance workers and building superintendents." June 2, 2023. <https://noc.esdc.gc.ca/Structure/NocProfile?objectId=%2BdTTGdx2P2emt6ZQjZDfK7fkqmJcQBeutEutZzQUQY%3D>.

—."92010 - Supervisors, mineral and metal processing." October 27, 2021. <https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=1322554&CVD=1322870&CPV=92010&CST=01052021&MLV=5&CLV=5>.

—."93100 - Central control and process operators, mineral and metal processing. October 27, 2021. <https://www23.statcan.gc.ca/imdb/p3VD.pl?Function=getVD&TVD=1322554&CVD=1322870&CPV=93100&CST=01052021&MLV=5&CLV=5>.

—."94100 – Machine operators, mineral and metal processing." June 2. <https://noc.esdc.gc.ca/Structure/NocProfile?objectId=CXQQMjgGg6UVt189%2BBKp0gQHfImEHvd%2BEid334bU1as%3D>.

Tinaqi Lithium Energy Australia. "Products." Accessed December 12, 2023. <https://www.tianqilithium.com.au/site/products>.



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