SECURING CANADA'S GRID EQUIPMENT SUPPLY CHAINS

What Canada should build at home, what it should secure with allies, and how to use its purchasing power

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SECURING CANADA'S GRID EQUIPMENT SUPPLY CHAINS

What Canada should build at home, what it should secure with allies, and how to use its purchasing power

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About The Transition Accelerator

The energy transition is disrupting global power. The Transition Accelerator is here to help Canada win — **economically** and **geopolitically**.

Our Work

The Transition Accelerator drives projects, partnerships, and strategies to ensure Canada is competitive in a carbon-neutral world. We're harnessing the global shift towards clean growth to secure permanent jobs, abundant energy, and strong regional economies across the country.

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The listing of individuals above does not imply endorsement of the brief, and any errors or omissions are the responsibility of the authors.

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EXECUTIVE SUMMARY

Canada's nation-building agenda flows through the grid

Canada should act now to secure the grid equipment needed for its nation-building agenda. Meeting the federal government's *Powering Canada Strong* goal of doubling electricity supply by 2050 will require substantially more equipment to transform, control and carry electricity. Canada can work with other middle powers to pool demand and coordinate investment, expanding manufacturing at home and sustaining critical production abroad. Prime Minister Carney's vision for a Canada–EU Alliance for the Future offers one concrete opportunity to deepen this cooperation.

Canadian buyers are competing with countries around the world that are electrifying their economies and building data centres. Canadian producer prices for transformers, switchgear, and wire and cable each rose by more than 50 per cent between 2020 and 2025. Large power transformers can take two to four years to procure, high-voltage submarine cables approximately five years, and high-voltage direct-current (HVDC) converter stations up to a decade. Equipment supply planning must begin early enough to keep grid expansion on schedule.

Drawing on the Transition Accelerator's ongoing research, this brief identifies where Canada should expand production, improve procurement and work with partner countries to secure critical supplies. It synthesizes desk research, production and trade analysis, demand modelling, and interviews and surveys with manufacturers, buyers and other industry stakeholders.

Focus action on the most consequential supply constraints

Our modelling suggests that expanding Canada's grid and replacing aging equipment will require nearly twice as many transformers annually over 2026–2050 as were installed over the previous two decades. New transmission lines and replacement of aging conductors could require enough conductors for around 200,000 kilometres of transmission routes over the same period, exceeding the length of Canada's existing network of about 180,000 kilometres.

The assessment identifies where to build on Canadian manufacturing strengths, secure critical supplies with partners, improve procurement or monitor and reassess where intervention is not yet warranted. The strategic priorities differ by equipment type:

- **Transformers:** Canada has several large power transformer manufacturers and a broad base of small and medium transformer producers, but capability narrows for the largest units. The priority is to preserve and scale existing production, with new capability and broader sourcing to address gaps that remain after announced expansions.

- **Transformer inputs:** Expanding transformer production requires reliable access to cores, electrical steel, and specialized components. Preserve and scale Canadian core production, secure grain-oriented electrical steel (GOES) through partnerships that sustain allied production and broaden qualified sources for constrained components.

- **Switchgear:** Canada has a broad medium-voltage manufacturing and assembly base, but supply remains tight. Preserve and scale this capability while broadening qualified supply. At high voltage, clarify the gaps in Canadian production and assess where new capability would be viable.

- **Overhead conductors and transmission structures:** Existing conductor production provides a foundation to preserve and scale as demand grows. For transmission towers, monitor and reassess Canadian demand while verifying commercially available supply and investigating buyers' difficulty obtaining bids from Canadian producers.

- **Specialized transmission:** Canada relies on foreign suppliers for complete HVDC converter systems and high-voltage submarine cables. Secure this equipment through partnerships, reserving engineering, manufacturing and installation capacity early where projects require it. For advanced conductors, monitor demand and support utility testing and qualification before considering investment in Canadian production.

Use Canada's purchasing power to secure supply and manufacturing investment

Seven recommendations directed at the federal government translate these equipment-specific priorities into action. They combine support for purchasing and manufacturing investment with the intelligence and coordination needed to sustain secure supply.

1. **Pool Canadian grid purchases to secure supply and drive manufacturing investment.** Purchases spread across utilities and projects leave manufacturers without the firm demand commitments needed to justify expansion. Provide federal backing for pooled, long-term purchases, sharing the risk of orders being delayed or never placed. Support

utility-led alignment of specifications, joint testing and approval of additional suppliers. Assess shared spare equipment and strategic reserves where they would strengthen supply security.

2. **Make Canada a more competitive place to build grid equipment.** General-purpose grid equipment is excluded from the Clean Technology Manufacturing Investment Tax Credit, while some input tariffs disadvantage Canadian production relative to imported finished equipment. Extend the credit to grid equipment and selected upstream inputs where viable investment can address supply constraints. Review input tariffs, starting with the counter-tariff on U.S.-origin GOES.

3. **Make Canadian grid equipment manufacturing a priority in investment negotiations with allied governments and manufacturers.** Some capabilities Canada needs are held by multinational firms whose Canadian plants compete with facilities elsewhere for investment. Combine purchasing commitments and incentives to address gaps in large power transformers and high-voltage switchgear that remain after announced expansions. Tie support to production capacity, start dates and reliable access for Canadian buyers. Maintain U.S. market access and open allied procurement markets to production in Canada. Track the resulting Canadian economic benefits against a Canadian value-added baseline and target.

4. **Use Canadian purchasing commitments to secure critical production in allied countries, starting with GOES.** Canada does not produce grain-oriented electrical steel, an essential transformer input, and commercial pressure on established allied mills threatens reliable access. Bring together transformer and core manufacturers' long-term purchasing commitments, with federal backing, to sustain allied production. In return, secure dependable access to required grades and volumes, including during shortages.

5. **Integrate equipment supply planning into federal support for nation-building projects.** Waiting until project selection and design are complete can add years to delivery of HVDC systems and submarine cables. Through the Major Projects Office, engage provinces, developers and suppliers while projects and routes are being assessed. Identify when engineering, manufacturing and installation capacity must be reserved, and develop purchasing commitments as projects become more certain.

6. **Establish a sustained federal intelligence and coordination function for electricity supply chains.** Information gaps and changing supply conditions make it difficult to anticipate shortages and coordinate timely action. Assign a federal team to track equipment demand, commercially available Canadian production and critical imports. Convene governments and utilities in a standing forum to agree on priorities and coordinate action as project schedules and supply conditions change.

7. **Build capacity for joint industrial policy with European and Asian allies.** An international facility is required to track grid equipment internationally and work to create the quid pro quos that will allow all partners to benefit from securing grid equipment supply chains. To make such measures meaningful, European and Asian countries should also develop offtake mechanisms for grid equipment, much like the one being piloted by PSPC for critical minerals in Canada. The creation and alignment of such demand-side mechanisms will be necessary to underwrite the formation of a shared allied market for grid equipment supply chains.

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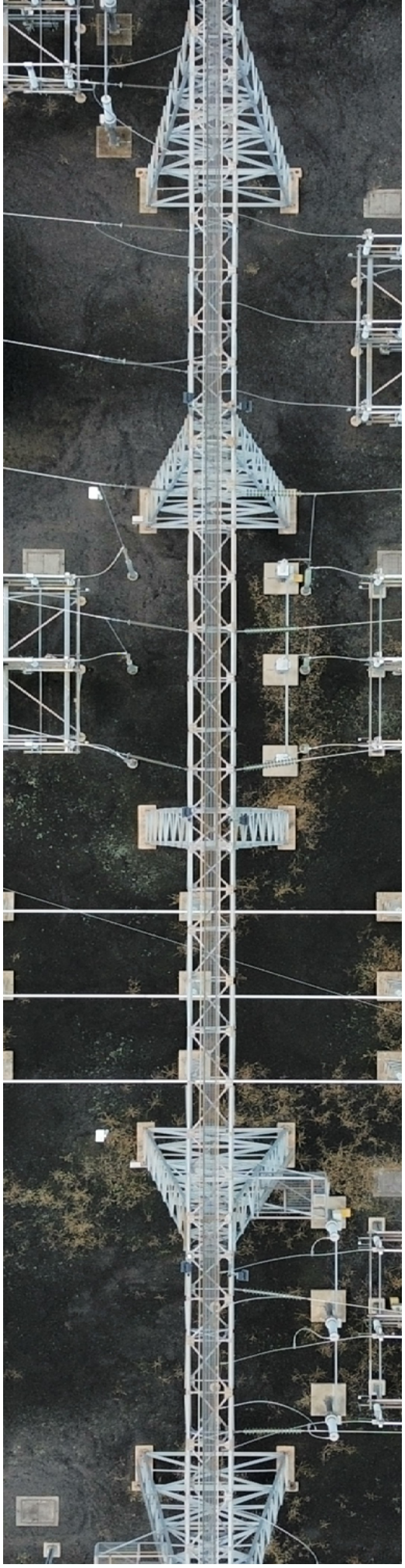
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1. CANADA'S NATION-BUILDING AGENDA FLOWS THROUGH THE GRID

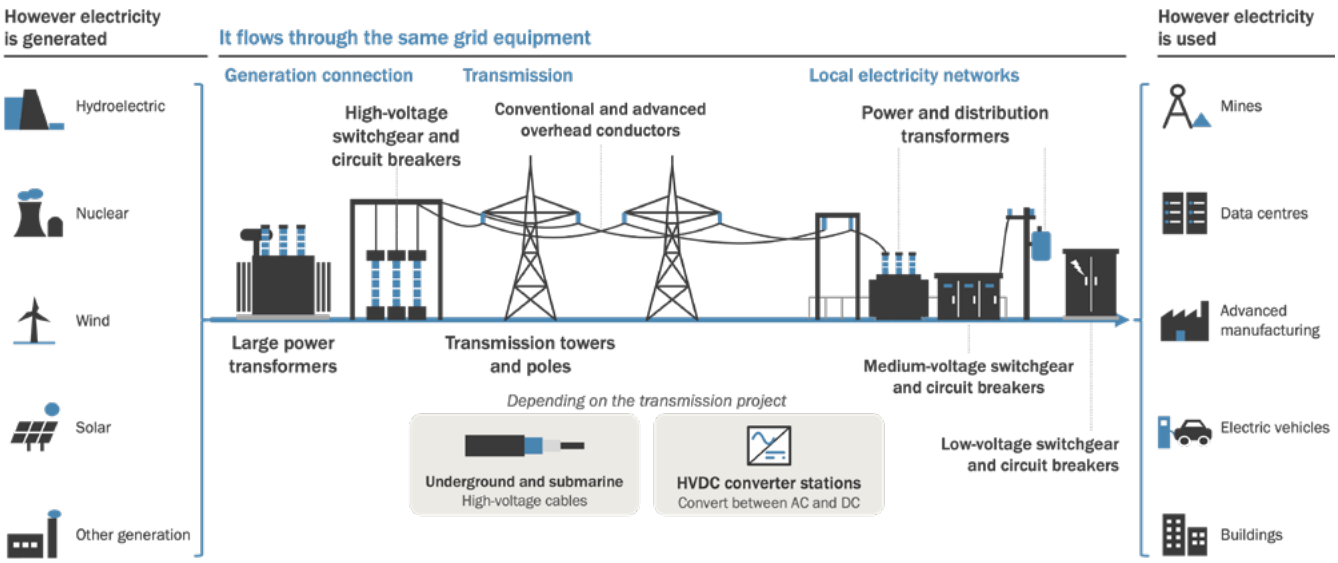
Canada's economic growth and competitiveness agenda depends on building at a scale not seen in decades. Prime Minister Mark Carney's government is seeking to secure $1 trillion in investment, including nearly $200 billion in designated national projects, ranging from mines and ports to major generation and transmission infrastructure.[1] Together, these investments are intended to develop Canada's resources, diversify trade and strengthen the nation's sovereign control over critical infrastructure.

Electricity infrastructure is the foundation of this nation-building agenda. Mines, ports and industrial facilities consume large amounts of power, while projected increases in housing, electric vehicles and the rapid expansion of AI and data centres will add demand across the economy. Meeting these needs will require a larger grid that can deliver more power locally and carry it over long distances. The federal government's *Powering Canada Strong* strategy recognizes the scale of the task with its goal of doubling Canada's electricity supply by 2050. Modelling for the Canadian Chamber of Commerce and New Economy Canada estimates that an electrified economy could generate $3.1 trillion in additional cumulative economic output over 2026–2050 and support 1.6 million new jobs in 2050.[2]

1 Prime Minister of Canada. 2026. "Prime Minister Carney Announces First-Ever Canada Investment Summit." News release, April 17, 2026.
2 New Economy Canada and Canadian Chamber of Commerce, 2026. Powering Canada's Growth. Economic modelling by the Open Insights initiative, University of Victoria.

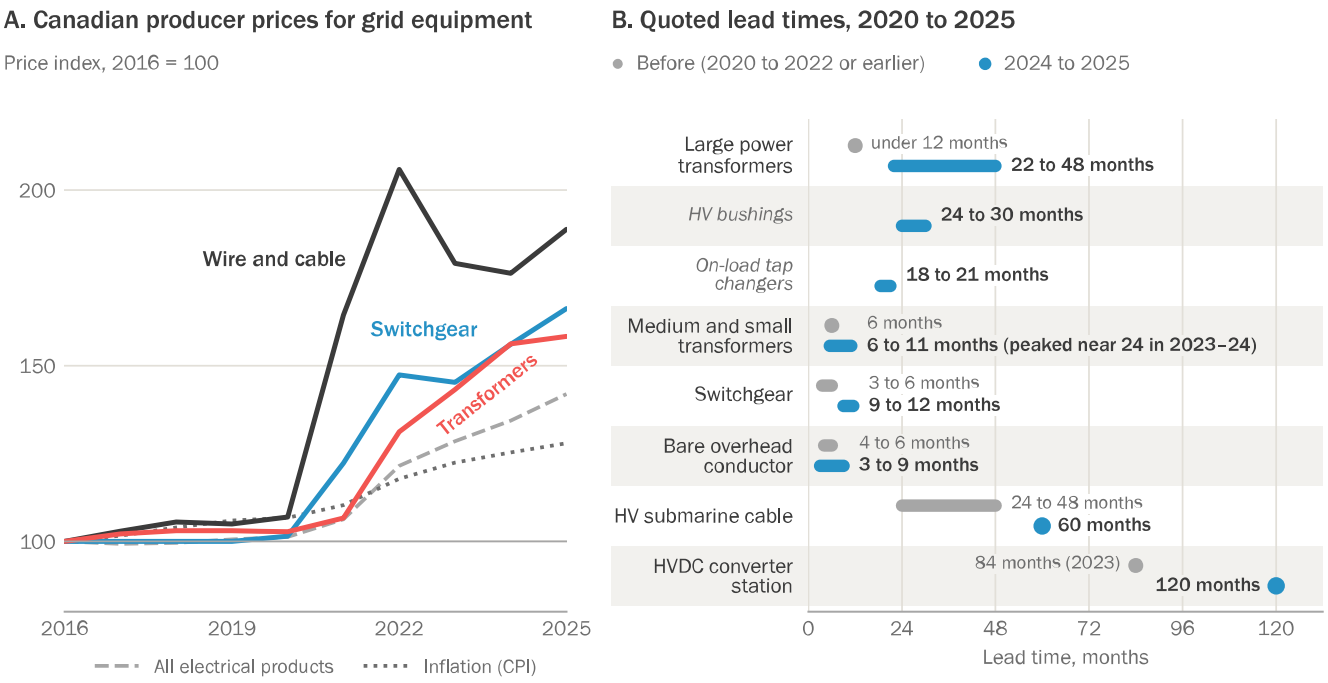
New generation and new loads connect to the grid through equipment that transforms, controls and transmits electricity. A kilowatt-hour consumed in Canada travels through a chain of grid equipment before reaching its final destination. Along the way, it may cross thousands of kilometres of transmission lines and pass through several substations, multiple transformers that raise and lower the voltage, and switchgear that controls and protects the flow of power. Canada must add this equipment at scale while replacing aging assets.

Canadian utilities and large industrial customers will be competing with buyers around the world for the same manufacturing capacity. Global electrification and the buildout of data centres are stretching demand for grid equipment. Tight supply is reflected in prices and lead times, which have risen sharply in recent years (Figure 2). Large power transformers can take two to four years to obtain, while delivery timelines for HVDC converter stations can reach a decade.



New sources of electricity and major new loads depend on a common backbone of equipment that transforms, controls and carries electricity.

Figure 1. The grid equipment behind Canada's nation-building agenda



Panel A: *Canadian producer prices for transformers, switchgear, and wire and cable each rose by more than 50 per cent between 2020 and 2025, outpacing both electrical products overall and general inflation.*

Panel B: *Large power transformers can take two to four years to obtain, high-voltage submarine cables approximately five years, and HVDC converter stations up to ten years. Estimates vary by product, supplier, market and observation date.*

Sources: *Panel A: Statistics Canada, Industrial Product Price Index, Table 18-10-0266-01; annual averages of monthly data, with calculations by the Transition Accelerator. Panel B: Transition Accelerator compilation of lead-time estimates from industry reports and interviews with manufacturers.*

Figure 2. Grid equipment prices have risen and delivery times have lengthened



Canada enters this period of rising demand with an established but uneven grid equipment manufacturing base (Table 1). Domestic manufacturing strengths include finished transformers, switchgear, overhead transmission conductors and lattice towers, while gaps remain in the production of critical transformer inputs and specialized transmission equipment. Production spans both Canadian-owned firms and foreign manufacturers operating in Canada. Scaling up grid equipment production to the level needed to meet electricity buildout goals will depend on coordinating domestic manufacturing capacity with imported materials and equipment.

Table 1. Summary of Canadian production capability for selected grid equipment and inputs

EQUIPMENT OR INPUT		CANADIAN PRODUCTION			OWNERSHIP AND SUPPLY CHAIN CONTEXT
		STATUS	FIRMS	PRODUCTION LOCATIONS	
Critical Grid Equipment					
Transformers	Finished large power transformers	Present but limited	5	MB, QC	Canadian production relies on foreign suppliers for critical components. Two of the five identified firms are Canadian-owned.
	Finished small and medium transformers	Established	22	BC, MB, ON, QC, SK	Fourteen of the 22 identified firms are Canadian-owned.
Transformer inputs	High-voltage components	None identified	0	-	Available evidence indicates high reliance on imported components.
	Transformer cores	Present but limited	1	ON	JFE Shoji, a Japanese-owned company, is the only specialist transformer-core producer identified in Canada.[3]
	Grain-oriented electrical steel	None identified	0	-	Canada has no identified GOES production; Canadian manufacturers rely on imports.
	Other transformer input components	Present but limited	3	MB, ON, QC	Two of the three identified firms are foreign-owned.

3 The extent of core production within transformer manufacturers has not been established.

EQUIPMENT OR INPUT		CANADIAN PRODUCTION			OWNERSHIP AND SUPPLY CHAIN CONTEXT
		STATUS	FIRMS	PRODUCTION LOCATIONS	
Switchgear	High voltage	Present but limited	6	MB, ON, QC	Mix of Canadian and foreign-owned.
	Medium voltage	Present but limited	26	AB, BC, NB, ON, QC	Fourteen of the 26 identified firms are Canadian-owned.
Overhead transmission conductors		Present but limited	2	ON, QC, SK	Both identified manufacturers are foreign-owned: Prysmian (Italy) and Nexans (France).
Transmission lattice towers		Present but limited	5	ON, QC	Five firms report production capability, but their ability to supply Canadian projects at the required specifications, volumes and schedules has not been established. Four are Canadian-owned.
Specialized transmission equipment					
HVDC converter equipment		None identified	0	-	Import-dependent.
Submarine cables		None identified	0	-	Import-dependent.
Composite-core advanced conductors		None identified	0	-	Import-dependent.

Note: Firm counts are minimum estimates from the grid equipment firm census (Appendix B). Status is a qualitative assessment based on the census, interviews and public disclosures. 'Established' indicates a broad Canadian supplier base; 'present but limited' indicates a narrow or incomplete one; and 'none identified' means the census found no Canadian producer. These labels describe production capability, not self-sufficiency.

Having producers in Canada is not the same as having a secure supply: domestic firms may not be able to produce at the volumes or pace projects require or meet technical specifications that can vary across buyers. Manufacturing of finished equipment can also be limited by constrained supply for individual input parts. In many parts of the equipment supply chain, Canada will have to expand its reliance on allies to secure supply.

Canada is not alone in facing growing demand for grid equipment. European and Asian allies are also expanding their electricity systems, creating an opportunity to coordinate investment and purchasing rather than compete independently for constrained global supply. This offers a practical way to advance Prime Minister Carney's Canada–EU Alliance for the Future: through pooled procurement and co-investment, Canada and its partners can build resilient equipment supply chains that support grid expansion and enable, rather than constrain, economic competitiveness.

Secure access to grid equipment is essential to Canada's economic growth, national security and energy sovereignty. However, demand is increasing at a rate faster than current grid equipment supply can support.





2. STRATEGIC PRIORITIES FOR CANADA'S GRID EQUIPMENT SUPPLY CHAINS

Government action should focus on grid equipment that is critical to Canada's electricity buildout and exposed to significant supply risk. A shortage of even one critical component can delay an otherwise ready-to-build project. Identifying these bottlenecks early helps target intervention where it can secure supply and keep projects on schedule.

For each equipment type and critical input, we assess its importance to operating and expanding Canada's grid and the likelihood that Canada will face supply constraints. We then examine the source of those constraints and whether Canadian production, allied partnerships or improvements to procurement can address them within the timeframe projects require. Where intervention is not currently warranted, we identify what changes would trigger further action.

These assessments guide five strategic priorities:

- **Preserve and scale existing Canadian capability:** Where Canadian producers can address an identified supply constraint, support the retention or expansion of production at the specifications, volumes and timelines projects require.

- **Establish new Canadian capability:** Where a gap in domestic production creates a supply vulnerability, develop Canadian production if there is a credible path to commercial viability and delivery within the required timeframe. Related manufacturing capabilities and access to inputs can provide a foundation.

- **Secure critical capability with partners:** Where reliable access depends on foreign production, work with producers and partner governments to preserve or expand that production and secure Canadian supply. This can complement domestic manufacturing, particularly where Canadian plants depend on imported inputs.

- **Strengthen procurement and supply resilience:** Where supply exists or could readily expand, improve access by helping buyers qualify and approve additional suppliers, diversify purchasing and secure supply through contracts. Maintain reserve equipment and replacement parts where these can reduce the impact of disruptions.

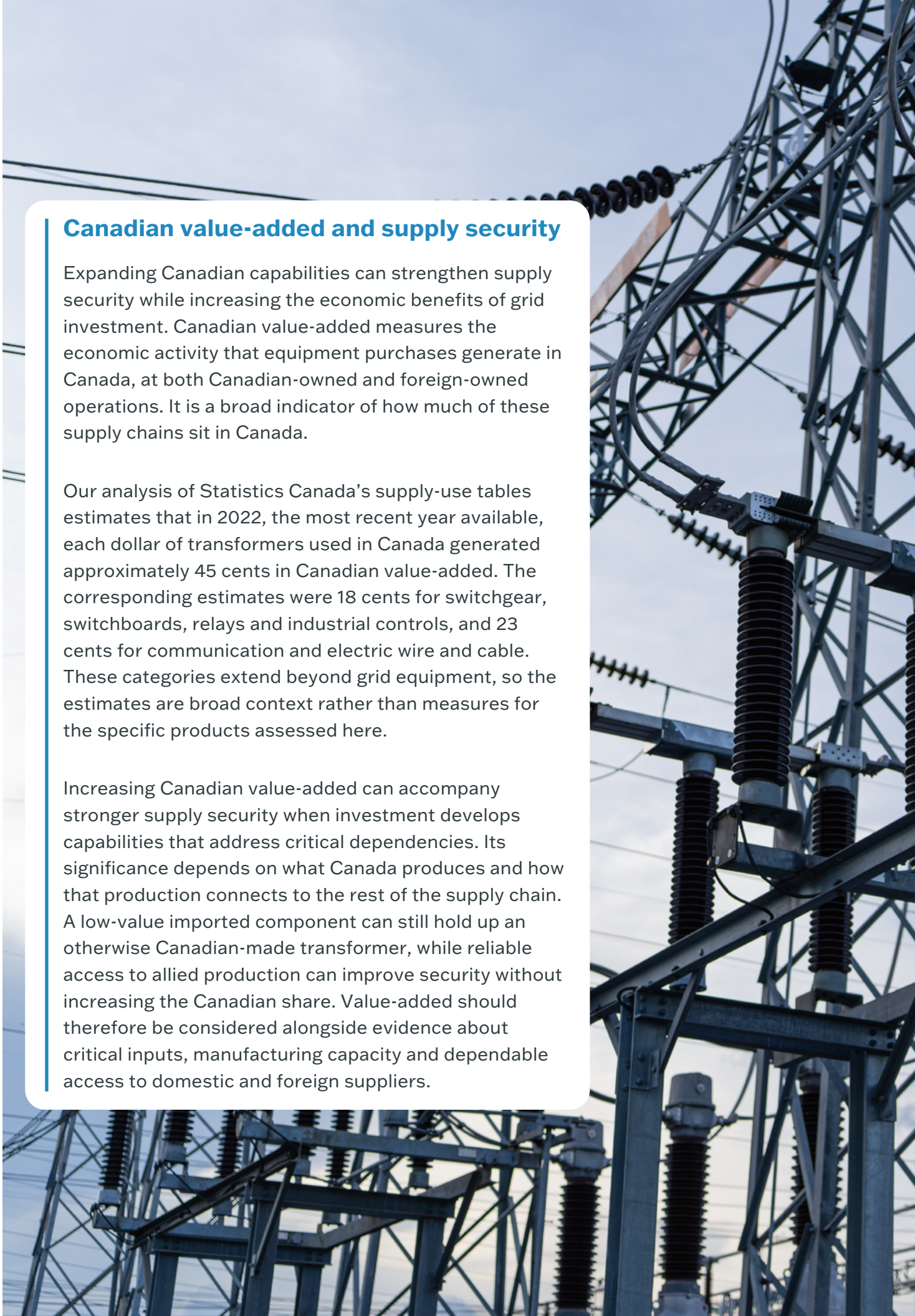
- **Monitor and reassess:** Where the evidence does not currently warrant intervention and there is enough time to respond if conditions change, track demand and supply, close evidence gaps and define triggers for action. These could include rising lead times, the loss of a supplier or confirmed demand from new projects.

Table 2 on the next page summarizes the strategic priorities for each equipment or input category. Some require a combination of approaches. Appendix A explains the framework in more detail, and Appendix B describes the general data and methods used in our assessments.



Table 2. Summary of strategic priorities

EQUIPMENT OR INPUT	STRATEGIC PRIORITY
Critical Grid Equipment	
Small and medium transformers	Preserve and scale existing Canadian capability.
Large power transformers	Preserve and scale existing Canadian capability; establish new Canadian capability where gaps warrant; strengthen procurement and supply resilience.
Transformer cores	Preserve and scale existing Canadian capability.
Grain-oriented electrical steel	Secure critical capability with partners.
Other transformer components and materials	Strengthen procurement and supply resilience; preserve and scale existing Canadian capability or establish new Canadian capability, depending on the component.
High- and medium-voltage switchgear	Preserve and scale existing Canadian capability; strengthen procurement and supply resilience; establish new Canadian capability where high-voltage gaps warrant.
Conventional overhead conductors	Preserve and scale existing Canadian capability.
Transmission lattice towers	Monitor and reassess.
Specialized transmission equipment	
HVDC converters	Secure critical capability with partners.
Submarine cables	Secure critical capability with partners.
Composite-core advanced conductors	Monitor and reassess.



Canadian value-added and supply security

Expanding Canadian capabilities can strengthen supply security while increasing the economic benefits of grid investment. Canadian value-added measures the economic activity that equipment purchases generate in Canada, at both Canadian-owned and foreign-owned operations. It is a broad indicator of how much of these supply chains sit in Canada.

Our analysis of Statistics Canada's supply-use tables estimates that in 2022, the most recent year available, each dollar of transformers used in Canada generated approximately 45 cents in Canadian value-added. The corresponding estimates were 18 cents for switchgear, switchboards, relays and industrial controls, and 23 cents for communication and electric wire and cable. These categories extend beyond grid equipment, so the estimates are broad context rather than measures for the specific products assessed here.

Increasing Canadian value-added can accompany stronger supply security when investment develops capabilities that address critical dependencies. Its significance depends on what Canada produces and how that production connects to the rest of the supply chain. A low-value imported component can still hold up an otherwise Canadian-made transformer, while reliable access to allied production can improve security without increasing the Canadian share. Value-added should therefore be considered alongside evidence about critical inputs, manufacturing capacity and dependable access to domestic and foreign suppliers.

2.1 Transformers and Their Supply Chain

Transformers allow electricity to travel efficiently over long distances and reach homes and businesses at usable voltages. Our modelling suggests that Canada's grid expansion and replacement needs will require nearly twice as many transformers annually over 2026–2050 as were installed over the previous two decades.[4] Canada has an established transformer manufacturing base, but securing finished units also requires reliable access to the cores, electrical steel, and specialized components used to build them. We assess finished transformers first, followed by their critical inputs.

2.1.1 Finished Transformers

Importance: Critical

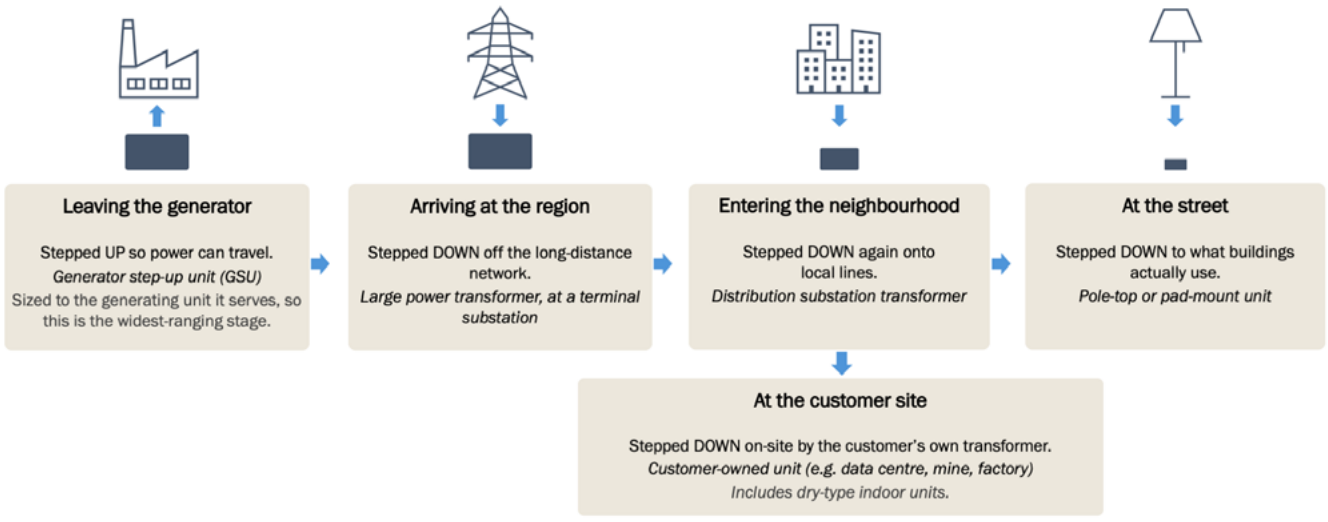
Every new generator and customer connection needs transformers, and a large portion of the existing fleet is approaching replacement. Much of Canada's grid was built between the 1950s and 1980s, and transformers are typically designed to last about 40 years. A shortage could cause significant delays for both expansion and replacement of aging infrastructure, especially in cases where custom-built units are required.

Supply risk: High for large power transformers; Manageable for small and medium transformers

Large power transformers present the greatest supply risk. They can take two to four years to procure, are built to order and leave buyers few alternatives if a manufacturer cannot meet their specifications or delivery schedule. Canadian production is particularly limited for the largest units: only one existing plant can produce them.

Canada nevertheless has a manufacturing foundation to build on. We identified more than 20 small and medium transformer manufacturers across five provinces and five large power transformer manufacturers. Two of the five large power transformer manufacturers are Canadian-owned; the others are subsidiaries of multinational

Transformers' place in the grid



Transformers change voltage so electricity can travel efficiently over long distances and reach customers at usable voltages. Power may pass through several transformers between a generator and its final use.

Figure 3. Transformers' place in the grid

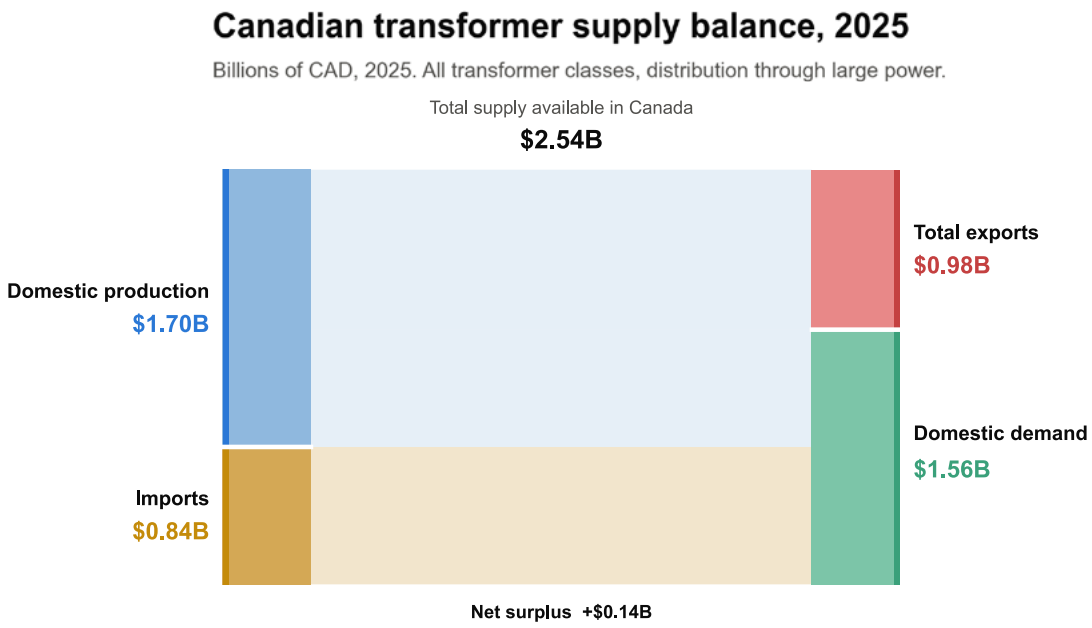
4 Demand modelling approach is described in Appendix B.

companies. Subsidiaries can draw on design expertise from their parent firm and benefit from their access to international markets, but their Canadian plants compete with facilities elsewhere for expansion investment.

Several manufacturers are expanding. CES Transformers, Rex Power Magnetics and PTI Transformers have recently added or announced capacity for small and medium units. Hitachi Energy is expanding in Varennes, and Northern Transformer is building a new large power transformer plant in Innisfil. These projects show that manufacturers are responding to market signals.

Canadian transformer manufacturing is strongly export-oriented. In 2025, exports totalled approximately $980 million, equivalent to roughly 58 per cent of estimated Canadian production by value, and nearly all went to the United States, leaving producers exposed to changes in U.S. trade policy.[5] Growing Canadian demand could offset some disruption to those sales, but the extent would depend on whether domestic orders match affected plants' products, volumes and delivery schedules.

Supply conditions have improved for some distribution transformers, with manufacturers reporting shorter lead times following capacity additions and an easing of purchasing. Announced facility expansions will also increase large power transformer capacity, but may leave gaps in the sizes, voltages and designs Canadian projects require. Assessing these gaps requires matching manufacturers' capabilities and expansion plans with buyers' specifications, order volumes and delivery schedules.



Canadian transformer production totalled an estimated $1.70 billion in 2025, alongside $0.84 billion in imports. Exports reached $0.98 billion, while apparent domestic demand was $1.56 billion.

Source: *Transition Accelerator calculations using Electro-Federation Canada's Statistics Program and Statistics Canada merchandise trade data. Apparent domestic demand is calculated as production plus imports minus exports. Figures cover all transformer classes and are expressed in current Canadian dollars. Totals may differ due to rounding.*

Figure 4. Canadian transformer production, imports and exports, 2025

5 *Own analysis, based on Statistics Canada's Canadian International Merchandise Trade Database and Electro-Federation Canada's Statistics Program.*

Essential inputs for transformers include imported electrical steel and specialized components, some of which remain difficult or costly to obtain. Tariffs on these inputs can put Canadian producers at a competitive disadvantage compared with imported transformers, which do not face the same charges. The following assessments examine the availability of these essential inputs and the options for securing them.

Strategic priority: Preserve and scale existing Canadian capability, with new capability and broader sourcing for large power transformers

Canada should sustain and expand its transformer manufacturing base by securing firm Canadian purchasing commitments, maintaining access for U.S. customers and developing new export markets. Clearer information on the quantities, sizes, voltages and delivery schedules required by Canadian buyers would give manufacturers the confidence they need to plan further investment.

For large power transformers, Canada should identify gaps in the sizes, voltages and designs that domestic manufacturers will be unable to produce, supporting new manufacturing capacity where commercially viable. In the meantime, approving additional domestic and foreign suppliers will help secure future equipment access.

2.1.2 Transformer Cores

Importance: Critical

Every conventional transformer needs a core built to its design and performance requirements, so core production must grow with transformer production.

Supply risk: Elevated, with concentrated domestic production

This assessment identified only one specialist Canadian transformer-core producer: JFE Shoji Power Canada's Burlington facility. It manufactures wound, amorphous and step-lap cores and processes electrical steel for power-transformer cores. The company has expanded its operations in recent years. Some transformer manufacturers may also produce cores in-house, but the extent of that capability is unclear.

Manufacturers that depend on Burlington are exposed to disruption at that facility. The key uncertainty is whether qualified alternatives could supply the required core designs and volumes if its production were interrupted.

Trade data and our analysis of domestic GOES requirements suggest that a substantial share of Canadian core production is exported to the United States, although the exact proportion is uncertain. Reduced access to that market could weaken the commercial foundation of production that also serves Canadian manufacturers. Retaining Canadian core production therefore depends on reliable access to imported steel and sufficient demand from domestic and export customers.

Strategic priority: Preserve and scale existing Canadian capability

The priority is to keep transformer core production in Canada. The export access that matters for transformer plants matters here too, and closer coordination with Canadian transformer manufacturers would support expansion as their orders grow. Because production is concentrated in one facility, manufacturers should also qualify alternative sources in case it cannot supply them.

2.1.3 Grain-Oriented Electrical Steel

Importance: Critical

Grain-oriented electrical steel (GOES) is a specialized steel used to make transformer cores. Only a few mills globally produce the higher-performing grades required for large and high-efficiency units. Disrupted access to these grades could constrain Canadian core and transformer production, delaying equipment needed for grid expansion and undermining manufacturers' ability to serve export customers.

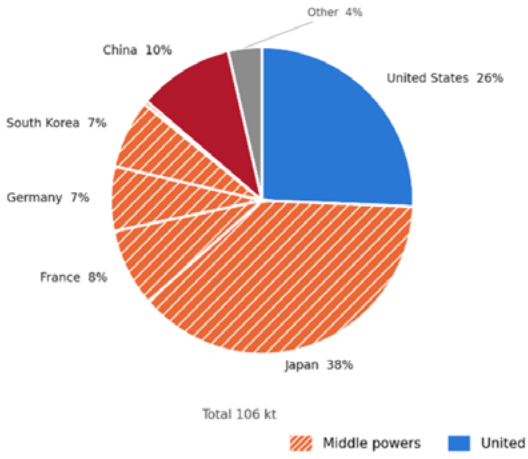
Supply risk: High and worsening

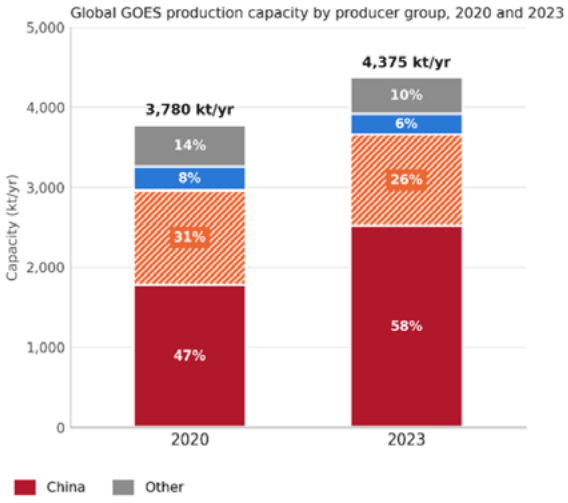
Canada has no domestic GOES production, making it entirely import-reliant. In 2025, 61 per cent of imports (worth roughly $520 million) came from Japan, South Korea and Europe.[6] Our analysis suggests that most of this steel leaves Canada again in cores or finished transformers, primarily for the U.S. market. Reliable imports therefore support both the grid buildout and an export-oriented manufacturing base.

About a quarter of 2025 imports came from the United States, the only North American producer. Since September 8, 2026, U.S.-origin GOES has been subject to a Canadian counter-tariff of 50 per cent, while imported finished transformers face no equivalent counter-tariff. This can put Canadian manufacturers at a cost disadvantage when they rely on U.S.-origin steel.

Commercial pressure on established GOES suppliers threatens the reliability of sources that Canadian manufacturers depend on. France and Germany supplied approximately 15 per cent of Canada's GOES imports by volume in 2025.[7] Plants in both countries curtailed production in late 2025 and 2026.[8] Further curtailments could narrow access to the grades and volumes Canadian manufacturers require.

Canadian GOES imports by source, 2025 (by volume)





Japan, South Korea and European producers supplied approximately 61 per cent of Canada's GOES imports in 2025. Their combined share of global production capacity fell from 31 to 26 per cent between 2020 and 2023, while China's rose from 47 to 58 per cent.

Figure 5. Canada's GOES import sources and the changing distribution of global production capacity

6 Own analysis, based on Statistics Canada's Canadian International Merchandise Trade Database.
7 Statistics Canada (2026). Canadian International Merchandise Trade Web Application.
8 thyssenkrupp Steel Europe AG (2026), Import crisis for grain-oriented electrical steel: thyssenkrupp Electrical Steel extends production cuts at its Isbergues site in France.

These pressures accompany a shift in global production capacity. China's share rose from 47 to 58 per cent between 2020 and 2023, and Chinese producers are moving into higher-performing grades.[9] Producers elsewhere face pressure from lower-priced imports. Purchasing from several countries offers limited protection when their producers face similar commercial pressures.

Growing Canadian demand could strengthen the case for domestic GOES production, but demand alone is unlikely to justify a new mill or address near-term supply needs.

Strategic priority: Secure critical capability with partners

Canada's objective is to secure dependable access to the grades and volumes of GOES Canadian manufacturers require. Canada should work with established producers and their governments to sustain allied GOES production that can grow with increased demand. Domestic production remains a longer-term option if a partnership can secure the technology, investment and customers needed for a viable mill.



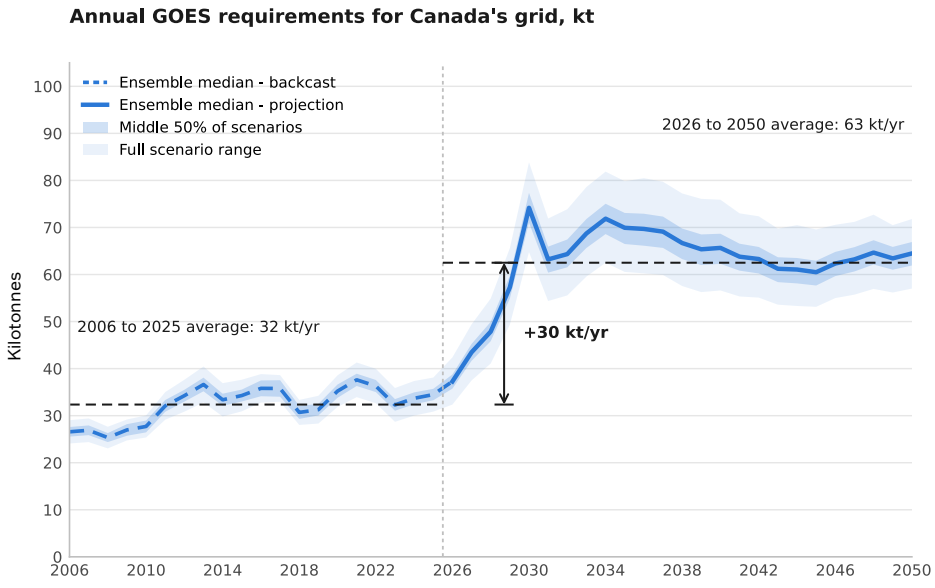
9 IEA (2023). Energy Technology Perspectives 2023. International Energy Agency, Table 5.1; Hilgers, M. (2025). Establishing green lead markets for CO2-reduced electrical steel in energy grids. thyssenkrupp Electrical Steel, presentation at CWIEME Berlin.

The case for Canadian GOES production

Modelled GOES embodied in transformers required by Canada's grid averages approximately 63 kt a year over 2026–2050, roughly double the indicative backcast average of 32 kt over 2006–2025. This estimate spans different grades of GOES and includes steel embodied in imported transformers, not just ones manufactured and used in Canada.

These estimates cover the GOES in transformers installed on Canada's grid, wherever they are manufactured. They are not comparable with Canada's 106 kt of GOES imports in 2025, much of which leaves Canada again in cores and transformers for export.

A new mill could replace some existing imports and serve export customers as well as contributing to growing Canadian demand. Canadian imports for GOES are already well above the yearly production of some international facilities: 50 kt/year for JSW-JFE in Nashik, India; 75 kt/year each for thyssenkrupp plants in Gelsenkirchen, Germany and Isbergues, France; and 100 kt/year proposed for JSW-JFE in Vijayanagar, India. The commercial case for production in Canada would depend on the grades customers require, the volumes they would commit to buying and the cost and scale of production. Canada's steelmaking expertise and competitively priced electricity in some regions are a foundation to build on.



Sources: *Demand series: Transition Accelerator transformer demand modelling (see Appendix B). Facility benchmarks: JFE Steel Corporation (2025), Regarding the Expansion of Electrical Steel Manufacturing Capacity in India, news release; Hilgers, M. (2024), Steel: Collaborative Approaches for a Resilient and Sustainable Supply Chain for Transformers, thyssenkrupp Electrical Steel.*

Figure 6. Annual GOES requirements for Canada's grid are projected to rise by about 30,000 tonnes above historical levels

2.1.4 Other Transformer Components and Materials

Importance: Critical

Beyond cores and GOES, transformer production depends on several other specialized components and materials, including bushings, tap changers, insulation, winding conductor and insulating fluids. Each part must adhere to technical specifications set by the transformer buyer. Since a transformer cannot be built without each of these components, a shortage of any can delay completion of the finished product, even when that input accounts for only a small share of its value.

Supply risk: Elevated, with acute bottlenecks in selected components

The most serious vulnerabilities in transformer supply chains are in components for large power transformers, as lower-voltage products can draw on broader supply bases (Table 3). Industry feedback indicates that high-voltage bushings are the most immediate risk, and on-load tap changers are also constrained. This research did not identify domestic production of either at the highest voltages, and global capacity is limited, especially at the very highest voltages. For both, lead times can be in the range of two years or more.

Utility specifications can further restrict access by limiting manufacturers to one or two approved suppliers. Additional production will improve supply only if buyers qualify and approve the products for their required applications.

Strategic priority: Strengthen procurement and supply resilience, with selective development of Canadian capability

Priorities for securing supply differ by component. In general, transformer buyers should work to broaden qualified supplier lists where sourcing is constrained. In some cases, such as for bushings, there is already Canadian production, just not at the voltage levels that are most constrained. Manufacturers should sustain existing production while also assessing commercial viability for high-voltage product classes.

Table 3. Canadian position and principal risk of selected transformer components

COMPONENT	CANADIAN POSITION AND PRINCIPAL RISK
Critical Grid Equipment	
High-voltage bushings	**No verified Canadian production at the highest voltage classes;** few qualified suppliers and lead times exceeding two years.
On-load tap changers	**No identified Canadian production;** narrow global supply base, long lead times and few approved alternatives.
Electrical insulation paper and pressboard	**No identified Canadian production;** supply concentrated among specialized foreign producers, but no immediate shortage established.
Continuously transposed conductor copper wire	**Canadian production exists;** a recent capacity constraint was addressed through expansion.
Specialized insulating fluids	**Some Canadian capability;** changing suppliers and limited interchangeability create exposure.

For components Canada does not currently produce, transformer manufacturers are a natural route to new capability: they buy these inputs, understand the specifications and already work with utilities. Industry interviews indicate that some are already exploring or investing in component production. Early testing and qualification with utilities would help new sources serve Canadian projects.

2.2 Medium- and High-Voltage Switchgear

Switchgear is a collection of equipment including circuit breakers, switches, and fuses, housed in enclosed assemblies and used to control, isolate and protect electrical circuits. Medium-voltage equipment is installed throughout distribution systems and at large commercial and industrial facilities; high-voltage equipment does the same job on the transmission system. Because switchgear is installed alongside transformers and other substation equipment, demand will rise broadly with transformer procurement, new substations and major electricity connections.

Importance: Critical

A substation, generating facility or large customer connection cannot be energized without equipment to control power and interrupt faults, so a switchgear shortage can delay an otherwise completed project. Data centres and other large industrial loads are competing for the same equipment and manufacturing capacity.

Supply risk: Elevated for medium voltage; High for high voltage

Canada has a broad medium-voltage manufacturing and assembly base. We identified 26 producers across five provinces (23 manufacturers and three assemblers), and at least seven have recently expanded or announced additional capacity. Their capacity and product range vary, but together they are a foundation for meeting higher demand.

Capacity is still tight. One major supplier reports that medium-voltage lead times have increased from approximately 15–25 weeks to more than 40 weeks. Canadian producers also depend on imported circuit breakers, protective relays and other components, and a shortage of any one can stop a completed assembly from being delivered.

Canadian manufacturing capability is more limited for high-voltage switchgear. We verified six manufacturers of finished high-voltage equipment, though we have not yet established their full range of products and voltages or their output capacity. Switching to other international suppliers can require equipment redesign, testing and utility qualification, so buyers cannot respond quickly to a disruption. The move away from equipment containing sulfur hexafluoride (SF_6), a potent greenhouse gas used for insulation, will make access to qualified alternative technologies even more important.

Strategic priority: Preserve and scale existing Canadian capability while broadening qualified supply

Canada should retain its existing medium-voltage manufacturing capability and support expansion as demand grows, while securing access to the imported components on which production depends.

At high voltage, the available evidence does not yet establish the full range of equipment, voltage classes or production capacity that Canadian plants can supply. It is also unclear which gaps will remain after announced expansions. Without that information, the scope for commercially viable Canadian production is difficult to assess.

2.3 Conventional Overhead Conductors and Structures

Conventional overhead transmission lines use aluminum-based conductors suspended from steel towers or poles. Conductors carry the electricity, while the structures maintain the clearances and mechanical support needed to operate the line safely at different transmission voltages.

Importance: Critical

Canada's existing transmission network consists of about 180,000 route-kilometres of lines.[10] Our modelling suggests that new lines and replacement of aging conductors will require conductor for around 200,000 route-kilometres over 2026–2050, although the estimate varies widely with electricity system growth, the capacity of new lines and replacement assumptions. Underground and submarine cables and advanced conductors on existing lines will meet some of these needs, but conventional overhead conductors are expected to supply most of them.

Supply risk: Manageable, but concentrated

Canada has two major producers of conventional bare overhead conductors: Prysmian and Nexans, headquartered in Italy and France respectively. The standard design relies on two input materials: aluminum and steel. Canada is a major aluminum producer and conductor-grade aluminum is produced and processed into wires locally, reducing import exposure at the material level. The steel core is imported.

The evidence gathered to date does not establish a general shortage of conventional overhead conductors. Reported lead times are generally shorter than for transformers and specialized transmission equipment. However, available Canadian manufacturing capacity has not been comprehensively assessed. It remains unclear whether existing facilities could meet the requirements of several large transmission projects arriving together, or how quickly production could expand.

Canada has domestic manufacturing capability for steel lattice towers used for long-distance transmission. We identified at least five firms with reported capability, including two reporting capability for structures used at voltages of 765 kV. However, industry feedback indicates that some Canadian buyers have difficulty obtaining bids from domestic suppliers. The reasons remain unclear: reported technical capability does not necessarily mean a firm can offer the required products at commercially viable prices and within project schedules. We have not established the extent of this difficulty or how much domestic capacity is available for a sustained national buildout.

Strategic priority: Preserve and scale existing Canadian capability for conductors; monitor and reassess for towers and poles

For conventional overhead conductors, existing Canadian production provides a foundation for meeting growing demand. Longer-term purchasing commitments from utilities could help sustain that production and support expansion where project requirements warrant it. Their value would depend on how well Canadian facilities can meet the specifications, volumes and delivery schedules of prospective projects, particularly if several large transmission investments advance together. A clearer picture of these requirements and available capacity would

10 *Hendriks, R. M., Monroe, J., Cusi, T., Ahmed, A., Aldana, D., Griffiths, K., Dorman, T., Chhina, A., & McPherson, M. (2023). Canadian open-source database for energy research and systems-modelling (CODERS).*

help identify where purchasing commitments could retain essential capability or bring additional production into service before constraints emerge.

For towers, the immediate priority is to verify commercially available domestic supply and investigate the reported difficulty obtaining bids. This work should assess whether suppliers can meet the specifications, volumes and delivery schedules of prospective projects, including regional transportation requirements. The findings should determine whether the appropriate response is better procurement coordination, supplier qualification, support for production expansion or continued reliance on foreign supply.

2.4 Specialized Transmission Equipment

Canada's grid buildout may require more specialized transmission equipment to connect remote generation and offshore wind, move large volumes of power over long distances and increase capacity in constrained corridors. Most of today's grid uses alternating current (AC). HVDC requires more costly equipment, but its lower electricity losses during transmission can offset those costs over longer distances. According to BloombergNEF (BNEF), this occurs beyond approximately 50–70 kilometres for subsea connections and several hundred kilometres for overhead lines.[11] Each HVDC link requires converter stations at both ends to connect it to the AC grid.

Submarine cables enable connections across bodies of water, including links to offshore wind projects. Advanced conductors can increase the capacity of existing transmission corridors without requiring new rights-of-way. Demand for these technologies will depend on which Canadian projects proceed, their routes and the capacity they require.

2.4.1 HVDC Converter Equipment

Importance: Significant but pathway-dependent

Demand for HVDC converter equipment will depend on which generation resources Canada develops, where they are located and how they connect to the grid. Large remote generation projects, offshore wind and long-distance interregional links are the most likely to use HVDC; other buildout pathways may rely mainly on alternating current.

Supply risk: High and worsening

The global market is highly concentrated. Hitachi Energy, Siemens Energy and GE Vernova account for approximately two-thirds of commissioned HVDC converter capacity worldwide.[12] Reported order-to-delivery timelines have increased from roughly seven years in 2023 to as much as ten years as major buyers compete for production slots.[13]

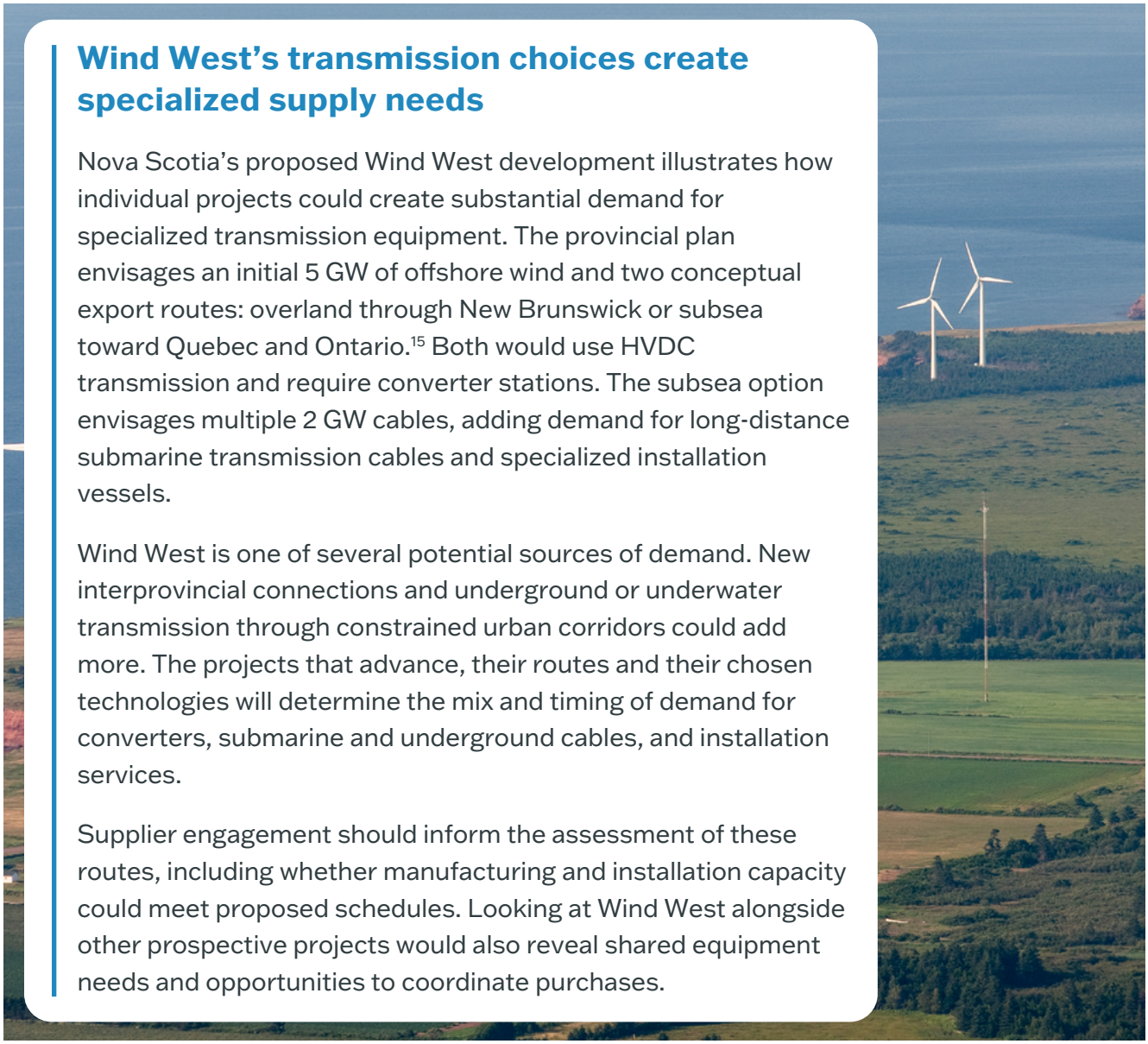
Converter stations also depend on specialized valve systems and power semiconductors. Only one of the three leading suppliers makes its own power semiconductors, which adds another concentrated dependency beneath the finished system.

11 *BNEF, 2024. Europe's High-Voltage Converters: Just Enough for 2030.*
12 *Ibid.*
13 *Energy Transitions Commission, 2025. Connecting the World: Long-Distance Transmission as a Key Enabler of a Zero-Carbon Economy.*

Canada does not manufacture complete HVDC converter systems. Its clearest emerging capability is in testing: a federally supported Hitachi Energy facility planned for Montréal is expected to begin testing HVDC equipment in 2027.[14] Canada also has relevant capabilities in engineering, construction, converter transformers and long-term service, but remains dependent on foreign suppliers for the central converter technology.

Strategic priority: Secure critical capability with partners

Establishing complete Canadian converter-system production is unlikely to meet the timelines of prospective projects. Canada should use its prospective project pipeline to engage leading suppliers and their home governments before formal procurement begins. The aim is to secure engineering and manufacturing capacity while building Canadian roles in testing, construction, maintenance and selected components.



Wind West's transmission choices create specialized supply needs

Nova Scotia's proposed Wind West development illustrates how individual projects could create substantial demand for specialized transmission equipment. The provincial plan envisages an initial 5 GW of offshore wind and two conceptual export routes: overland through New Brunswick or subsea toward Quebec and Ontario.[15] Both would use HVDC transmission and require converter stations. The subsea option envisages multiple 2 GW cables, adding demand for long-distance submarine transmission cables and specialized installation vessels.

Wind West is one of several potential sources of demand. New interprovincial connections and underground or underwater transmission through constrained urban corridors could add more. The projects that advance, their routes and their chosen technologies will determine the mix and timing of demand for converters, submarine and underground cables, and installation services.

Supplier engagement should inform the assessment of these routes, including whether manufacturing and installation capacity could meet proposed schedules. Looking at Wind West alongside other prospective projects would also reveal shared equipment needs and opportunities to coordinate purchases.

14 In September 2025, the federal government announced $40 million to support Hitachi Energy's Montréal HVDC simulation centre and transformer manufacturing and testing facilities in Varennes. The stated rationale was to secure critical grid-component supplies and strengthen domestic capabilities amid transformer lead times reaching five years.
15 Nova Scotia, 2025. Wind West: a Nation-Building Energy Project.

2.4.2 Submarine Cables and Installation

Importance: Significant but pathway-dependent

Submarine transmission plays a limited role in Canada's electrical grid today, but demand could grow with decisions on major projects, transmission routes, and offshore wind, especially in Canada's eastern provinces.

Supply risk: High, with separate manufacturing and installation constraints

High-voltage submarine cables require specialized factories, several manufacturing steps and extensive testing to ensure that the cable can withstand underwater conditions. Each cable must be designed for its voltage, as well as factors unique to its transmission route, including water depth and seabed conditions. Manufacturing lead times can reach approximately five years, and factory capacity can be committed well before construction begins.[16]

Installation creates a separate dependency. Submarine cables must be transported, laid and protected by purpose-built vessels with trained crews and route-specific equipment. The global fleet capable of installing high-voltage transmission cables is limited, and vessel schedules are often reserved years in advance. A project that secures a cable without securing installation capacity remains exposed.

Canada does not manufacture high-voltage submarine transmission cables and has no established cable-laying fleet. The Maritime Link, the longest subsea electricity cable in North America, relied on cables manufactured in Norway and Japan and on foreign installation capability. Prospective Canadian orders are likely to be large but irregular, making a complete domestic manufacturing operation difficult to sustain without a much clearer long-term project pipeline. Export demand is unlikely to close this gap in the near term: incumbent producers have already committed major capacity expansions against long-term framework agreements to supply upcoming projects in higher-demand regions.

Strategic priority: Secure critical capability with partners

Canada should treat cable manufacturing and installation as a single supply requirement and secure both early in project development. Governments and project developers should coordinate prospective equipment requirements and engage suppliers while projects and routes are being assessed. This work should also test whether combined Canadian and export demand over the longer term could support commercially viable production in Canada, including through investment by an established manufacturer. Securing supply for upcoming projects should proceed alongside that assessment. Canadian participation in engineering, testing, route preparation, port services, maintenance and installation should also be explored.

2.4.3 Advanced Conductors

Importance: Limited at present, but potentially significant on pathways that rely heavily on reconductoring

Advanced conductors use lightweight composite cores to increase power-carrying capacity. Replacing existing lines with advanced conductors can therefore increase the transmission capacity of existing corridors, making them particularly valuable where obtaining new rights-of-way would be costly or slow. Their role will depend on which lines utilities choose to reconductor and which technologies they approve.

16 IEA, 2025. *Building the Future Transmission Grid.*

Supply risk: Uncertain, with no immediate shortage established

We found no Canadian manufacturing of composite-core advanced conductors, so Canadian utilities that deploy these products depend on foreign suppliers. The evidence gathered to date does not show a general shortage. The more immediate constraint is adoption: utilities must determine where the technologies are suitable, test their performance and build them into planning, engineering and procurement. Until demand becomes clearer, the commercial case for Canadian production remains uncertain.

Strategic priority: Monitor and reassess while building the basis for adoption

Canada should develop a clearer view of where advanced conductors can materially increase transmission capacity and support utilities in testing and qualifying them. Investing in Canadian production should be considered if this work identifies sustained demand and a credible investment pathway. Until then, diversified sourcing and monitoring are more proportionate than direct support for new manufacturing.





> **"Where our strengths differ, they complement. Where they overlap, they create scale. We should build on each other's strengths — deliberately, systematically, and rapidly."**
>
> **– Prime Minister Mark Carney**



3. BUILDING CANADIAN AND ALLIED CAPACITY TO SECURE GRID EQUIPMENT

Canada's coming electricity buildout creates an opportunity to use equipment purchases to secure supply and attract manufacturing investment. Pooled orders, investment incentives and agreements with allied governments can support production in Canada while securing critical inputs and technologies from abroad. This puts Prime Minister Carney's vision of complementary strengths and collective scale into practice: Canada and its partners can build on their manufacturing strengths and coordinate demand and investment to expand the capabilities their grids require.

Expanding production in Canada can also support employment, economic growth, and manufacturing expertise. Decisions along the supply chain should weigh Canadian value-added against the urgency of supply-security objectives. Investment in Canada by both Canadian-owned and allied-owned firms can boost the Canadian economy while improving security.

Four interventions can help implement the equipment-specific priorities identified in Section 2: pooled purchasing, support for Canadian production, allied investment partnerships and agreements to secure critical production abroad. Section 4 sets out the specific federal actions needed to implement these approaches.

3.1 Pooling Demand and Using It Strategically

Canada will spend tens of billions of dollars on grid equipment over the coming decades. Pooled purchasing commitments could give Canadian buyers more influence over delivery schedules and investment decisions. Who supplies the equipment, and where they invest to produce it, should be part of Canada's discussions with allied governments and manufacturers, backed by credible purchasing commitments.

The federal government should work with provinces, utilities and project developers to turn combined equipment requirements into pooled purchasing commitments, starting with major projects prioritized for federal support. Federal financial backing should share the risk that anticipated orders are delayed or never placed. Federal support could also help utilities assess opportunities for shared spare equipment or strategic reserves, taking account of existing arrangements, equipment compatibility, storage and maintenance costs, and responsibilities for deployment. Utilities and developers should retain responsibility for equipment specifications, supplier selection and procurement.

Multi-year framework agreements are one way to structure these commitments. Buyers commit to purchases over several years or pay to reserve factory capacity, and suppliers commit to production and delivery. In return, manufacturers get a firmer basis for investing in expansion, and buyers get greater assurance that equipment will be available. European transmission operators have used this approach to secure equipment and support manufacturing investment, particularly for submarine cables.[17] Canada's purchases are spread across many utilities and projects. Pooling them could provide the scale and continuity needed to negotiate comparable commitments.

Pooling orders will also require utilities to align equipment specifications and supplier approval requirements where practical, while preserving differences needed for safe and reliable operation in particular systems and projects. The federal government should support utility-led joint testing, shared technical assessments and qualification of additional Canadian and foreign suppliers. Where adopting common specifications entails additional engineering, testing or transition costs, federal support could be used to offset those costs when justified by expected improvements in supply security or procurement efficiency.

17 European transmission operators including TenneT, National Grid and Terna have committed to multibillion-dollar purchases covering thousands of kilometres of submarine cables for offshore wind connections and grid interconnections. These long-term agreements have supported investment in cable manufacturing capacity. Similar procurement arrangements have been used for underground cables and power transformers.



From Submarines to Substations

The Canadian Patrol Submarine Project is seeking up to 12 modern submarines to maintain Canada's presence across the Atlantic, Pacific and Arctic oceans. With an estimated value of up to $60 billion, the procurement gives Canada substantial purchasing power to negotiate industrial investment, technology partnerships and skills development alongside an essential security requirement.

A prospective partnership with Germany and its submarine manufacturer, TKMS, could encompass design, construction and long-term fleet support, with opportunities for technology transfer, workforce development and cooperation with allied naval programs. The lasting benefits for Canada would depend on the commitments negotiated and delivered.

Pooled grid equipment purchases could similarly support negotiations for dependable supply and investment in Canadian manufacturing capabilities. Federal backing for pooled purchases would give utilities and developers greater scale and certainty in negotiations with allied governments and manufacturers. Dependable supply should come first, but the same negotiations should also seek investment in Canadian capabilities that strengthen supply security and deliver lasting economic benefits.

3.2 Lowering the Cost of Expanding Canadian Production

Dependable orders reduce the commercial risk of expansion, but manufacturers must still finance new production lines, specialized machinery and testing equipment before they generate revenue. Investment incentives can help attract that spending to Canada.

The federal government has already proposed tax measures that could make it more affordable for manufacturers to expand production in Canada. Available details for the Productivity Mega Deduction, proposed in September 2026 but not yet implemented, indicate that it would make immediate expensing permanent for a broad range of capital assets, including machinery used to manufacture grid equipment.[18] This allows businesses to deduct eligible investment costs from taxable income in the year an asset becomes available for use, bringing forward tax savings. A targeted credit could build on these broad measures by supporting the specific manufacturing capabilities needed to address grid equipment supply constraints.

18 The September 15, 2026 draft proposals indicate that eligible manufacturing machinery and equipment, including property in capital cost allowance Classes 8 and 43, would qualify for immediate expensing, subject to the applicable conditions.

The Clean Technology Manufacturing Investment Tax Credit provides a mechanism for that support. It offers a refundable credit of 30 per cent of eligible capital costs, with lower rates after 2031. Eligible activities include manufacturing renewable energy, nuclear and storage technologies. General-purpose grid equipment such as transformers, switchgear and conductors is excluded, although components purpose-built or designed exclusively as integral parts of eligible technologies can qualify.

The federal government should extend the credit to machinery and equipment for new or expanded grid equipment production in Canada, with priority for large power transformers, high-voltage switchgear and their key components. It should also cover production of selected upstream components and materials where commercially viable investment can address identified supply constraints. Supporting finished equipment alone would leave manufacturers exposed to bottlenecks further upstream.

The government should also review tariffs on essential manufacturing inputs. Working with manufacturers, it should identify where tariffs on imported materials and components put production in Canada at a disadvantage to imported finished equipment and adjust them where that would strengthen supply security. The review should consider both manufacturers' immediate input needs and opportunities to develop viable Canadian production of those inputs.

3.3 Securing Investment Through Allied Partnerships

Incentives improve the economics of investing in Canada, but filling particular production gaps will also require direct engagement with manufacturers and their home governments, especially in cases where the fragmentation and uncertainty of demand are holding back capacity investments. Some of the capabilities Canada needs are held by a small number of multinational firms, whose Canadian plants compete with their facilities elsewhere for investment.

Large power transformers and high-voltage switchgear should be priorities for this effort. The federal government should work with provinces and utilities to identify gaps in capability and capacity, taking account of existing production and announced expansions. It should then approach manufacturers and allied governments with proposals that combine purchasing commitments, investment incentives and, where needed, negotiated financial support. A deal might pair a multi-year order for large power transformers with a commitment to build a new production line for them in Canada.

These negotiations should also address the customer base these plants need. Where facilities depend on export sales, the federal government should use trade discussions to maintain U.S. market access and work with other allied governments and buyers to open their procurement to plants in Canada. Canadian purchasing commitments combined with a broader export customer base would sustain the facilities that Canadian buyers also depend on.

Any agreement should specify what equipment will be produced, how much capacity will be added, when production will begin and how Canadian buyers will obtain reliable access. Public support should be tied to delivery of those commitments.

3.4 Securing Critical Production Abroad

Canadian manufacturers and electricity projects will continue to depend on critical production abroad. For manufacturers, federal industrial partnerships should help secure essential inputs, with GOES an initial priority because of its importance to transformer production and the pressures facing established allied suppliers. For example, thyssenkrupp's German GOES facility is suffering under competition from lower-priced Chinese imports.[19] A pooled Canadian offtake for Canadian transformer manufacturing could be used to help the facility. This would establish allied supply for Canada while supporting an ally economically and geopolitically.

Working with Canadian transformer and core manufacturers, the federal government should help assemble long-term purchasing commitments and negotiate agreements with allied producers and their governments. Federal backing could share the risk of those commitments, as proposed for pooled equipment purchases, while partner governments support the investment needed to sustain and modernize their mills. In return, the agreements should secure dependable access to the grades and volumes Canadian manufacturers require, including during shortages. Reliable supply should be the primary objective, but the negotiations should also seek allied investment in transformer, core and component production in Canada.

For HVDC systems and submarine cables, the lead times identified in Section 2 mean that waiting until project selection and design are complete could add years to delivery.

Equipment supply planning should therefore proceed alongside the assessment of nation-building projects. Working with provinces and developers, the federal government should identify prospective equipment requirements, engage suppliers and their home governments while projects and routes are still being assessed, and establish when engineering, manufacturing and installation capacity would need to be reserved. As projects become more certain, their requirements can be brought into the pooled purchasing commitments described in Section 3.1. Otherwise, Canada risks approving nation-building projects it cannot equip in time.

19 *Steitz, Christoph, and Tom Käckenhoff. 2025. "Thyssenkrupp to Close Electrical Steel Sites as Asian Imports Put Additional 1,200 Jobs at Risk." Reuters, December 11, 2025.* https://www.reuters.com/business/world-at-work/thyssenkrupp-close-electrical-steel-sites-asian-imports-put-additional-1200-jobs-2025-12-11/



4. CORE RECOMMENDATIONS

Canada should act now to secure the equipment needed for its electricity buildout. The following seven recommendations translate the five strategic priorities in Section 2 and the interventions in Section 3 into specific federal actions. Actions 1–5 focus on procurement, manufacturing investment and critical supplies; Actions 6–7 establish the intelligence and coordination capacity needed to sustain these efforts. Responsible federal departments and agencies are identified in parentheses.[20]

1. **Pool Canadian grid purchases to secure supply and drive manufacturing investment (PSPC, ISED, NRCan)**. Canada's grid equipment purchases are spread across many utilities and projects, leaving manufacturers without the firm demand commitments needed to invest in expansion. Provide federal backing for pooled, long-term purchases by utilities and major project developers to share the risk of orders being delayed or never placed. Use those commitments to negotiate reliable deliveries and additional production capacity. Because pooling depends on compatible equipment, support utilities in aligning specifications, testing equipment jointly and qualifying additional suppliers. Assess shared spares and strategic reserves where pooling them would strengthen supply security.

20 PSPC = Public Services and Procurement Canada, ISED = Innovation, Science and Economic Development Canada, NRCan = Natural Resources Canada, Finance = Department of Finance Canada, GAC = Global Affairs Canada, MPO = Major Projects Office

2. **Make Canada a more competitive place to build grid equipment (Finance, GAC).** The Clean Technology Manufacturing Investment Tax Credit currently excludes general-purpose grid equipment such as transformers, switchgear and conductors. Extend it to new and expanded production in Canada by Canadian-owned and allied-owned firms. Include selected components and materials where viable Canadian production can address identified supply constraints, so support also reaches the inputs needed to make finished equipment. Review tariffs on essential inputs that disadvantage production in Canada relative to imported finished equipment, starting with the 50 per cent counter-tariff on U.S.-origin grain-oriented electrical steel.

3. **Make Canadian grid equipment manufacturing a priority in investment negotiations with allied governments and manufacturers (ISED, GAC).** Some capabilities Canada needs are held by a few multinational firms whose Canadian plants compete with their facilities elsewhere for investment. Work with these manufacturers and their home governments to secure concrete agreements to expand manufacturing in Canada, beginning with identified gaps in large power transformers and high-voltage switchgear that remain after announced expansions. Tie public support to commitments on production capacity, timelines and access for Canadian buyers. Use trade discussions to maintain U.S. market access and open procurement markets in allied countries to production in Canada. Track the domestic economic benefits of this effort against a Canadian value-added baseline and target.

4. **Use Canadian purchasing commitments to secure critical production in allied countries, starting with GOES (ISED, GAC).** Canada produces no grain-oriented electrical steel, and the mills in allied countries that supply most Canadian imports are losing ground to Chinese producers. Make this steel an initial priority in industrial agreements with those producers and their governments. Bring together Canadian manufacturers' long-term purchasing commitments, with federal backing to share the risk, to help sustain and expand production abroad. In return, secure dependable access to the grades and volumes Canadian manufacturers need, including during shortages.

5. **Integrate equipment supply planning into federal support for nation-building projects (NRCan, MPO)**. HVDC converters and submarine cables can take five to ten years to deliver, and manufacturing capacity is often committed well before construction begins. Working through the Major Projects Office, engage provinces, project developers, suppliers and suppliers' home governments while projects and routes are being assessed. Identify when critical capacity must be reserved, including HVDC engineering and manufacturing,

and submarine cable production and installation. Develop purchasing commitments as projects become more certain so equipment is available when projects need it. These actions should proceed while the federal government builds the analytical capacity and coordination needed to sustain them and adjust priorities as conditions change.

6. **Establish a sustained federal intelligence and coordination function for electricity supply chains (NRCan, ISED).** Effective industrial policy requires sustained analytical capacity within government and regular exchange with industry so decisions can be tested and revised as conditions change.[21] This assessment highlights gaps in the information needed to determine whether Canadian and foreign supply can meet future grid equipment needs. *Powering Canada Strong* acknowledges the need for supply-chain analysis, but production capacity, project schedules and foreign supply will keep changing after an analysis is published.

   Assign a federal team to maintain analysis of equipment demand, commercially available Canadian production and critical imports. Establish a standing table of federal, provincial and territorial governments and utilities to agree on priorities and assign next steps. The Electricity Working Group under the Energy and Mines Ministers' Conference could serve this role if given the mandate and resources; otherwise, establish a dedicated forum. Use the findings to guide supplier qualification, pooled purchases, manufacturing investment and foreign supply agreements. Utilities and developers should retain responsibility for procurement.

7. **Build capacity for joint industrial policy with European and Asian allies (GAC, ISED).** An international facility is required to track grid equipment internationally and work to create the quid pro quos that will allow all partners to benefit from securing grid equipment supply chains. To make such measures meaningful, European and Asian countries should also develop offtake mechanisms for grid equipment, much like the one being piloted by PSPC for critical minerals in Canada. The creation and alignment of such demand-side mechanisms will be necessary to underwrite the formation of a shared allied market for grid equipment supply chains.

21 Allan, Bentley. Canada at the Frontier: A Framework for Industrial Policy. (Centre for Industrial Policy, 2026).

APPENDIX A: A FRAMEWORK FOR GRID EQUIPMENT SUPPLY CHAIN DECISIONS

This appendix sets out the framework behind the assessments in Section 2.

Set the Objective

Industrial policy begins with a clear connection between the actions governments take, the results those actions are expected to produce and the broader goals they serve.[22] The objective should determine how the decision is scoped and what evidence is required.

For grid equipment, the overriding objective is security of supply. Canada must be able to obtain essential equipment and inputs in the quantities, specifications and timeframes needed to build and operate its electricity systems. Dependence becomes a sovereignty concern when it gives other countries or firms leverage over whether and when Canadian projects proceed.

Canadian production can improve access while supporting jobs, exports and regional development. These economic benefits are secondary in this assessment. Interventions are judged first by their contribution to supply security.

Scope the Decision

For security of supply, the analysis must identify the specific constraint that could prevent Canada from obtaining the equipment it needs. That means tracing each product upstream from the finished equipment to the components, materials and inputs used to make it.

Grid equipment is produced through networks of specialized suppliers. A bottleneck can arise in final equipment, components, processed materials or services such as testing and installation. Broad product categories can therefore conceal the source of a vulnerability and point toward the wrong response.

The brief groups related products where their constraints and strategic priorities are similar enough to discuss together and identifies within each group any differences that materially affect the assessment or recommended action.

Assess Importance and Supply Risk

Each assessment addresses two questions:

Importance: Would constrained access materially impair Canada's electricity buildout? Importance may be critical across the system or significant only where a particular project or development pathway is selected.

Supply risk: How likely is Canada to face constrained access, and how resilient would it be if supply tightened or was disrupted? This judgement brings together market vulnerability and Canadian exposure.

Assessments combine official statistics, facility research, corporate disclosures, technical studies and engagement with manufacturers and buyers. Findings are expressed as documented judgements using the following categories:

- Importance: Critical; Significant but pathway-dependent; or Limited.
- Supply risk: High; Elevated; Manageable; or Uncertain.

22 *Allan, Bentley.* Canada at the Frontier: A Framework for Industrial Policy. *(Centre for Industrial Policy, 2026).*

Table 4. Assessing importance and supply risk

ASSESSMENT	KEY QUESTION	EVIDENCE TO CONSIDER
Importance to supply security	What would constrained access prevent or delay?	Uses across the electricity system; availability of substitutes; consequences of disruption; scale and timing of demand; dependence of specific projects or development pathways.
Supply risk for Canada	How likely is Canada to face constrained access, and how resilient would it be?	Supplier concentration; capacity relative to demand and orders; lead times; Canadian production and upstream dependencies; reliability of foreign supply; qualified alternatives; inventories, repair and substitution options.

Ratings may be qualified to distinguish product classes or project-specific requirements

Choose the Strategic Priority

Select the response, or combination of responses, most likely to improve Canadian access within the required timeframe. First establish the constraint and whether intervention is warranted. Then assess whether it can be addressed through existing or new Canadian production, arrangements with foreign suppliers or improvements to sourcing and procurement.

Domestic and allied capabilities often need to develop together. Expanding Canadian equipment production may require securing foreign inputs, while qualifying additional suppliers can improve access before new manufacturing capacity becomes available. Where monitoring is sufficient, identify the conditions that would warrant further action.



Table 5. Choosing strategic priorities

RESPONSE	WHEN IT FITS	EVIDENCE NEEDED
Preserve and scale existing Canadian capability	Existing Canadian production can address the constraint, but retaining or expanding it may require action.	Capability at the required specifications; capacity and expansion plans; access to inputs, workers and testing; evidence that intervention would improve Canadian availability.
Establish new Canadian capability	New Canadian production could address the constraint within the required timeframe and operate commercially.	A credible investor and technology pathway; sufficient customer demand; competitive costs and viable scale; access to inputs and workers; construction and qualification timelines.

RESPONSE	WHEN IT FITS	EVIDENCE NEEDED
Secure critical capability with partners	Canadian access depends on foreign production that needs to be preserved, expanded or secured through a partner arrangement.	Capable suppliers and partner governments; access to required specifications and volumes; production and delivery timelines; credible purchasing or investment commitments; and arrangements to maintain Canadian access during shortages.
Strengthen procurement and supply resilience	Improve access to reliable supply and the ability to withstand disruptions through supplier qualification, diversified purchasing, contracting, strategic spares and inventories, or substitution.	Independent suppliers with available capacity; qualification and switching timelines; practical options for contracting, inventories, repair or substitution.
Monitor and reassess	Evidence does not warrant intervention now, and monitoring leaves enough time to respond if conditions change.	Indicators that would change the assessment; thresholds for action; investment and procurement lead times; responsibility for monitoring and a review date.

Act Under Uncertainty and Reassess

Incomplete evidence must be weighed against the cost of delay. Long investment, qualification and delivery timelines may justify early action to clarify demand, qualify alternatives or engage suppliers before a shortage becomes acute. Assessments should identify material uncertainties and the evidence that could change the recommended response.



APPENDIX B: DATA AND METHODS

This brief synthesizes desk research, industry engagement and quantitative analysis of Canada's grid equipment supply chains. The research reviewed industry reports and supply chain assessments, technical literature, utility plans, government statistics and company disclosures. Interviews and surveys with manufacturers, buyers and other industry stakeholders provided additional insight into production capabilities, procurement conditions and barriers to expansion.

Findings were compared across sources where possible, using industry engagement to clarify gaps and interpret the published evidence. The analysis draws on sources including Statistics Canada, the Canada Energy Regulator, Canadian industry associations, the International Energy Agency and U.S. Department of Energy studies.

Grid Equipment Firm Census

We compiled a census of firms and facilities involved in Canadian grid equipment production. Industry association membership lists, the Canadian Importers Database, public procurement records and commercial business-information platforms identified approximately 4,000 candidate firms.

An AI-assisted review screened candidates against defined criteria for Canadian production, then developed structured profiles of relevant firms. These profiles identify equipment categories, production activities, Canadian facilities, technical capabilities, ownership, export orientation and announced expansions. Each profile retains supporting public sources and confidence ratings; attributes unsupported by those sources were left unspecified.

Research analysts reviewed and corrected the profiles against primary sources and supplemented them through technical literature and direct industry engagement. The resulting census supports assessments of where production occurs, what facilities in Canada can supply and where capabilities are concentrated. It captures documented or directly confirmed activity but may not identify all Canadian production. The absence of an identified producer should therefore not be treated as proof that no production exists.

Grid Equipment Demand Estimates

To inform our assessments, we estimated Canadian transformer and transmission conductor requirements for 2026–2050. Our bottom-up approach combines electricity system buildout pathways from the Canada Energy Regulator's *Canada's Energy Future 2026* with equipment intensity factors drawn from published engineering studies. These factors translate system activity into equipment needs, such as the transformer capacity required per unit of new generation.

We include the Current Measures, Higher and Canada Net-zero scenarios, excluding the Lower scenario to focus on pathways involving stronger electricity system growth. Across the included scenarios, electricity demand increases by approximately 44 to 84 per cent between 2025 and 2050, while installed generation capacity increases by approximately 83 to 138 per cent.

Generation additions determine requirements for generator step-up transformers, while electricity demand growth determines distribution transformer needs. For transmission transformers and conductors, we estimate network expansion

from these same pathways, drawing on published studies of the relationship between electricity system growth and transmission requirements.

Transmission conductor requirements expressed in kilometres refer to route-kilometres of new lines and conductor replacement on existing lines. They measure the length of lines requiring conductors, rather than the combined length of individual wires. Estimates of material requirements account separately for the number of circuits and conductor configuration.

We estimate replacement needs separately. Existing transmission infrastructure is drawn from the Canadian Open-Source Database for Energy Research and Systems-Modelling (CODERS). In the absence of a comprehensive Canadian transformer inventory, we estimate the installed fleet using Canadian generation capacity, peak electricity demand and transmission network data, together with published equipment ratios and U.S. fleet estimates scaled to the Canadian system.

Assumed service lives establish a baseline rate of replacement. We then add a modest increase in transformer replacements in the earlier years, peaking in the early 2030s, to reflect reported aging of the existing fleet. This allowance approximates the effect of an older fleet; it is not based on individual asset retirement dates.

Where feasible, we also estimate demand for upstream inputs, including GOES, copper and aluminum, using published factors for the material content of equipment.

We do not estimate switchgear demand separately. The category covers diverse components, and sufficiently robust equipment intensity factors were not available. We expect demand to broadly follow transformer demand because transformer installations generally require associated switching and protection equipment, although the relationship is not a fixed ratio.

We use an ensemble approach to represent the range of possible outcomes. For each equipment category, we calculate demand across all combinations of the selected electricity pathways and technical assumptions. Depending on the category, these include transmission expansion levels, equipment intensity factors, estimates of the installed fleet, service lives, and standard or higher-capacity conductor configurations for new lines.

We report the median across these combinations as the central estimate, with ranges showing how results vary across the modelled pathways and assumptions. These ranges are not statistical confidence intervals.