September 25, 2026

Electricity Branch
Natural Resources Canada
electricity-electricite@rncan.gc.ca

RE: Electricity Supply Chain Roundtable Written Submission

Strengthening Canada's Electricity Equipment Supply Chains

Electro-Federation Canada's Response to the Supply Chain Discussion Questions

Introduction

Electro-Federation Canada (EFC) represents more than 230 member companies that manufacture, distribute, market, sell, and maintain a range of electrical and automation products. Members create and support $15.1 billion in GDP impact across Canada and sustain more than 109,000 jobs, helping advance the country's energy transition and electrified future.

This submission responds to the discussion guide's questions about supply chain risks, critical equipment, domestic manufacturing gaps, lessons from recent disruptions, research needs and federal policy.

Canada's National Electricity Strategy recognizes that expanding and modernizing the electricity system is essential to economic growth, industrial competitiveness, energy security and affordability. Its focus on domestic manufacturing, resilient supply chains, grid modernization and workforce development aligns with EFC's research, including *Decarbonizing Canada via Electrification*, developed with the Pembina Institute, and *Building Canada's Future Electricity Grid: A Supply Chain and Policy Roadmap*, developed with Dunsky Energy + Climate Advisors.

Many of the technologies Canada needs are commercially available. The challenge is creating the manufacturing, supply chain, investment and regulatory conditions to deploy them at the required pace and scale. EFC believes the National Electricity Strategy establishes the right direction; implementation now requires an industrial ecosystem capable of delivering it.

Dunsky's *Building Canada's Future Electricity Grid* identifies five priorities for action:

1. Scale and secure domestic manufacturing and supply chains for critical grid equipment and components, using demand aggregation, strategic financing, and targeted incentives.

2. Modernize utility regulatory frameworks to enable cost recovery for digital systems, non-wires alternatives, and demand flexibility.

3. Align grid technology codes and standards to improve interoperability, reduce vendor lock-in, and accelerate deployment.

4. Demonstrate and scale emerging grid solutions under Canadian operating conditions to reduce risk and support replication and scaling.

5. Provide long-term, predictable policy signals and accelerate grid build-out through streamlined approvals and federal support for priority transmission and grid modernization projects.

Together, these measures address barriers to deploying grid technologies at the pace Canada needs. This submission focuses on Pillar 1, securing the equipment and components required to build and modernize the grid, and Pillar 4, generating Canadian performance evidence and moving promising technologies from demonstration to broader deployment. Action in both areas can reduce project delays, support manufacturing investment and help utilities meet growing electricity demand.

Discussion Topics

Most Significant Supply Chain Risk Facing Canada

EFC's *Building Canada's Future Electricity Grid* report found that the primary challenge facing Canada's electricity transition is not the availability of technology, but the ability to deploy available technologies at scale. Long lead times, equipment shortages, cost escalation, limited manufacturing capacity, and dependence on imported components have become significant barriers to grid expansion and modernization

The most immediate risk is that demand for grid infrastructure is growing faster than the supply of some indispensable equipment and components. Dunsky found supply chain constraints to be the dominant deployment barrier for critical grid hardware. Canada imports approximately 60 per cent of the critical electrical equipment supply. The United States, Mexico and China together accounted for about 70 per cent of the relevant imports in 2024, while almost 90 per cent of Canada's grid equipment exports went to the United States. This concentration exposes Canadian projects and manufacturers to geopolitical shocks, trade restrictions, and competition for global production slots. [1, pp. 26–27]

Long and uncertain lead times create a second risk. Dunsky cited power transformer lead times of roughly 80 to more than 210 weeks, high-voltage breakers near 151 weeks, medium-voltage switchgear up to 80 weeks, and high-voltage cables of two to three years. These are indicative estimates across different product specifications and source dates. When an item is late, utilities may need to change designs, requalify products or resequence work, delaying connections for new generation, industrial facilities and other loads. Since 2020, the report also cited Canadian price increases of 74 per cent for transformers, 40 per cent for transmission equipment and 31 per cent for switchgear. [1, pp. 9, 23–24]

An additional risk sits upstream of final assembly. Grain-oriented electrical steel (GOES), amorphous transformer cores, copper, insulation, high-voltage bushings, tap changers, semiconductors, printed circuit boards and communications components can be difficult to obtain or qualify. For digital and customer-side technologies, risks are concentrated in PCBs, semiconductors, and communication components, reflecting broader global electronics volatility. One missing component can delay an otherwise available transformer, breaker or control system. Specialized technical labour and testing capacity can also limit how quickly manufacturers expand output. [1, pp. 23–24 and Appendix B] Government should assess gaps in testing, validation and certification capacity and support targeted investments where those gaps constrain manufacturing expansion, commercialization or utility qualification.

EFC recommends that NRCan establish an ongoing supply chain monitoring and intelligence framework, developed with utilities, manufacturers and distributors. It should combine long-term equipment demand forecasts with information on manufacturing capacity, utilization, lead times, critical production gaps and dependencies on specialized components and inputs. This would help guide procurement, targeted manufacturing investment and contingency planning.

Equipment with the Greatest Procurement Exposure

Power and distribution transformers, medium- and high-voltage switchgear and circuit breakers, and specialized conductors and cables warrant immediate attention. In Dunsky's 2025 EFC member survey, 67 per cent of respondents reported "major concern" about transformer supply chains and 40 per cent about switchgear and breakers; approximately nine in ten reported at least moderate concern for each. Respondents identified longer timelines and higher costs as the most common effects. [1, pp. 23–24]

Supply chain planning should also account for growing demand for distribution and digital grid equipment, including advanced metering, sensors, protection and control systems, communications equipment, and the hardware and software supporting ADMS and DERMS.

Domestic Gaps and Opportunities

Canada has established manufacturing clusters (notably in Ontario and Québec) and access to key materials (steel, aluminum, copper), creating a credible case for expanding domestic production and reducing import dependence. Cultivate internationally competitive clusters in strategic grid technologies, focusing on areas where domestic capability and supply chains provide security benefits, and where Canada has a credible pathway to global competitiveness. Canada has an opportunity to ensure sufficient domestic manufacturing capacity for critical technologies, particularly those contributing most to supply chain risk, cost inflation, security and resilience. Canada already has manufacturing capability in transformers, conventional wire and cable, and parts of the switchgear market, along with engineering, grid automation expertise and access to important critical minerals and raw materials. Dunsky identifies meaningful scope to expand transformer manufacturing and selected upstream inputs. It reports limited to no domestic manufacturing for some high-voltage breaker systems and limited domestic manufacturing of advanced conductors, while conventional overhead conductors are produced in Canada. These findings point to priorities for verification, not a claim that every related product must be made domestically. [Appendix A-5]

EFC's 2026 Competitiveness Survey suggests that future investment is contestable. EFC evaluated which drivers influence our member organizations decisions to locate in Canada. Availability of skilled labour, cost of land, market access along with proximity to customers topped the list. Market access is particularly important for electrical manufacturers. Seventy-one per cent of respondents manufacturing in Canada export to the United States. Maintaining predictable access to the U.S. market is therefore central to investment confidence, plant utilization and the competitiveness of Canadian supply chains. [2]

EFC members viewed Canada and the United States as broadly comparable on several important fundamentals, including market access, transportation infrastructure and proximity to integrated supply chains.

Canada's challenges are concentrated in the economics of investment, including land and building costs, capital investment incentives and corporate tax rates. The United States is viewed

as particularly strong in these areas, while Mexico and parts of Asia compete primarily on labour costs.

While Canada cannot control the outcome of trade negotiations, governments can take steps to strengthen the domestic competitiveness and resilience of the manufacturing sector. EFC has advocated for manufacturing investment tax credits for critical grid and electrification products. If a technology is essential to delivering Canada's clean electricity and electrification objectives, EFC believes the manufacturing equipment used to produce it should be eligible for the same investment tax treatment as other clean-economy technologies. [2]

Lessons and Risks

Canada's domestic market alone cannot efficiently support every specialized product. Nearly 90 per cent of grid equipment exports described by Dunsky go to the United States, and 71 per cent of respondents manufacturing in Canada in EFC's separate competitiveness survey export there. Predictable CUSMA access and the movement of raw materials, components and finished equipment are central to utilization and investment. Canada should prioritize negotiated solutions and avoid escalation that raises the cost of inputs required by Canadian factories or equipment needed for infrastructure.

Recent disruptions show that resilient supply is built across the entire production chain. Utilities and governments need visibility into key inputs and qualified alternative sources. Long-term procurement signals can help manufacturers reserve capacity and justify expansion; common specifications, where technically appropriate, can increase the number of viable suppliers. Strategic emergency stocks are useful for transformers and switchgear and other equipment with high failure consequences, but require joint decisions about ownership, storage, maintenance and how inventory will be shared. [1, pp. 23–29]

Where trade measures are considered, the Government should assess Canadian and non-U.S. capacity, lead times, product specifications, supply security and downstream project costs before imposing duties. It should make exclusions or tariff relief timely and usable when viable alternatives do not exist or where there is insufficient capacity. Effective investigation and enforcement of substantiated unfair trade practices can protect Canadian manufacturers; inadequate enforcement can undermine the competitiveness of Canadian and North American Manufacturers.

New Technologies Under Development

Dunsky's technology assessment distinguishes mature equipment facing supply constraints from innovations that need further qualification or Canadian operating evidence. Conventional medium-voltage switchgear is mature, but some designs use sulphur hexafluoride (SF_6), a potent greenhouse gas. SF_6-free switchgear is commercially available and being piloted in British Columbia and Ontario; solid-state circuit breakers and digital switchgear are further emerging options. Higher upfront costs and uncertainty about regulatory treatment can slow deployment of SF_6-free switchgear and advanced conductors even where lifecycle benefits are promising.

Advanced high-temperature and composite-core conductors are also available but are not yet mainstream in Canada. Utilities in Alberta are exploring them, Hydro One has proposed a 56-kilometre reconductoring project, and BC Hydro is considering them for new lines. [1, Appendix A-5]

Solid-state transformers, which could support bidirectional flows and storage integration, remain at the pilot and demonstration stage globally; Dunsky identified no Canadian deployment at the time of its assessment. [1, pp. 19 and Appendix A-3]

Digital substations are established internationally but Canadian deployment remains limited. Dunsky reported that about one-quarter of Saskatchewan substations had been digitized and that BC Hydro planned 150 digital substations over ten years. [1, Appendix A-7]

Advanced distribution management systems (ADMS) and distributed energy resource management systems (DERMS) are commercially available and have been deployed or piloted in Canada. Integrated ADMS–DERMS platforms and AI-assisted grid optimization are emerging developments. These technologies depend on imported hardware, skilled protection and control workers, interoperable standards and a utility business case, as well as software innovation. [1, Appendix A-9]

Power control systems (PCS), including smart panels and energy management systems, range from mature applications to early Canadian adoption. Emerging innovations include, Integrated panel and EMS ecosystems; Advanced integrated suites (e.g., bidirectional-ready, automated islanding, whole-home coordination). [1, Appendix A-10]

Networked devices such as smart thermostats and EV chargers are already widely available, while vehicle-to-everything (V2X) applications remain in Canadian pilots. Although customer-side technologies were outside the roundtable's main industrial focus, their uptake affects grid planning and demand for electronics, controls and interconnection equipment. [1, Appendix A-11]

Policy Recommendations

Demonstrating and Scaling Emerging Technologies

PILLAR 4: Demonstrate and scale emerging technologies

Purpose: Reduce risk aversion by producing Canadian performance and cost evidence through structured pilots and evidence gathering/sharing.

Action	Details	Timeline	Actors			
			Federal	Provincial	Industry	Utility / Regulator
15. **Federal smart grid demonstration funding**	Re-open and/or sustain smart grid demonstration funding programs (e.g., SREPS; Energy Innovation Program – Smart Grids) with clearer multi-year horizons and replication requirements.	Near term	✓			
16. **Targeted pilots to address utility evidence gaps**	Support pilots for targeted technologies lacking clear Canadian operational benefit-case, including DLR, reconductoring with advanced, digital substations/IEC 61850.	Near term	✓	✓		✓
17. **Gather and share performance data from pilots**	Require performance data sharing and playbooks from publicly funded pilots (standard metrics, comparable reporting, lessons learned).	Mid term	✓	✓		✓

Scale and secure domestic manufacturing and supply chains for critical grid technologies

PILLAR 1: Scale and secure domestic manufacturing and supply chains for critical grid technologies

Purpose: Reduce strategic vulnerability (tariffs, export controls, long lead times) and crowd in private investment where Canada can compete

Action	Details	Timeline	Actors			
			Federal	Provincial	Industry	Utility / Regulator
1. **Expand Clean Technology Manufacturing Investment Tax Credit to include strategic grid technologies**	Amend CTM-ITC to include strategic grid technologies in the list of qualified zero-emission technology manufacturing activities: • Grid infrastructure: e.g., power/distribution transformers, MV/HV switchgear and breakers, advanced conductors • Key bottleneck subcomponents (e.g., transformer cores) • Smart grid and demand flexibility technologies identified in this report	Near term	✓			
2. **Launch "critical grid supply-chains" initiatives**	Work with industry to identify bottlenecks and co-invest in capacity (retooling, new lines, testing capacity, long-lead manufacturing equipment), using a short list of priority gaps (e.g., transformer subcomponents; HV breakers; electrical steel / core-related constraints; select electronics/PCBs where realistic).	Near term	✓	✓	✓	✓
3. **Provide strategic financing to support domestic manufacturing and supply chains**	Provide concessional financing (through CIB, BDC, or other financing agencies) and complementary support (e.g., loan guarantees, anchor offtake support) to de-risk expanded domestic supply tied to utility / customer procurement signals.	Near term	✓	✓		
4. **Coordinate joint procurement across utilities**	Aggregate demand and align specifications for key grid equipment to secure manufacturing capacity and reduce lead times.	Near term	✓	✓	✓	✓
5. **Introduce domestic-content incentives for grid technology**	Provide domestic content "bonuses" or incentives to encourage utilities and developers to source Canadian-made technologies where feasible (avoid "Buy Canada" mandates which could raise costs or limit options).	Mid term	✓	✓		
6. **Establish strategic reserves of critical equipment**	Maintain emergency stocks of transformers and switchgear; coordinate inventory sharing across utilities.	Long term			✓	✓

Conclusion

Canada's electricity ambitions depend on access to physical equipment. Long lead times for transformers, switchgear and specialized conductors, together with exposure to imported components and concentrated markets, can delay the connection of generation, storage and new industrial demand. At the same time, Canada has credible manufacturing strengths and a window to attract further investment. [1]

EFC recommends that Natural Resources Canada refer to *Building Canada's Future Electricity Grid: A Supply Chain & Policy Roadmap*, developed with Dunsky Energy + Climate Advisors on which this submission was based.

EFC and its members welcome the opportunity to assist with the Government's analysis, validate priority supply chain gaps and work toward practical solutions that strengthen both Canadian manufacturing and the timely delivery of electricity infrastructure.

Sincerely,

Cherith Sinasac
Director of Government Affairs
Electro-Federation Canada
www.electrofed.com

Sources

[1] Dunsky Energy + Climate Advisors, Building Canada's Future Electricity Grid: A Supply Chain and Policy Roadmap, prepared for Electro-Federation Canada, final report dated April 7, 2026. https://www.electrofed.com/wp-content/uploads/2026/04/EFC_Grid-Technology-Roadmap_Final-Report_2026-04-07-v2.pdf

[2] EFC, Competitiveness Survey Member Article, 2026, provided for this submission. Percentages reflect the respondents to each question and may involve multiple responses.