Decentralised Energy Industry Standards Landscape Scan

Draft presented to DEC's Standards Steering Committee
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Contents

Executive Summary

1. Forty-five (45) Keywords were searched;
2. Ten (10) relevant standards in the Canadian landscape have been identified;
3. The Canadian Electrical Code (CEC) appears to be the most valuable Canadian document;
4. Section 64 of the 2021 CEC, namely 'Renewable Energy Systems', provides direction for the installation of specific equipment such as **inverters**, **stationary fuel cell systems**, **small and large wind systems**, **micro-hydro power systems**, **hydrokinetic power systems** and **storage batteries** and includes general requirements that would apply to each of the systems mentioned;
5. Two (2) ISO, Canadian adopted, standards relating to Sustainability have been identified;
6. Canada is an active Participant in eight (8) relevant IEC Technical Committees and two (2) IEC Sub-Committees;
7. Eleven (11) ISO technical committees that may be relevant to this project have been identified;
    a. Canada is Participating in nine (9) relevant ISO Technical Committees;
    b. acting as Secretariat to Hydrogen Technologies Technical Committee, and;
    c. absent from the Solar Energy and Natural Gas committees;
8. Two (2) IEEE Technical Committees that may be relevant to this project however Canada is Absent from both committees;
9. Relevant ITU work areas have been listed as this standards development organization is foundational to all global ICT and interoperability;
10. Ten (10) Industry Standards and other relevant bodies have been identified in this landscape scan;
11. The Committee may wish to consider the adoption of one or more International Standard.

Summary Statement

Industry-accepted standards (including guides and beneficial management practices) can facilitate commerce, international trade, and buyer acceptance. The result of our standardization work will be a "made in Canada" image to enhance credibility for domestic and international customers.

Specific advantages include:

- Increases transparency to supply chain stakeholders on product quality;
- Can facilitate methods to address product attributes (i.e., address building code);
- Can reduce product wastage or assist in re-targeting product to other uses early on;
- Helps provide a base for commerce/international trade or assist dispute mechanisms;
- Can enhance buyer confidence or credibility of a seller, and in some instances may deflect additional regulation, complement them or help address non-tariff trade barriers;
- Contributes to sustainability for the sector(s).

Benefits of Participating

Being a committee member provides you with a forum to:

- Exchange valuable technical and professional information with peers;
- Help set technical requirements as a subject specialist;
- Promote the views of the sponsoring organization;
- Make a difference in establishing the parameters that facilitate trade;
- Network with peers and make new and valuable contacts.

Successful Outcomes

- Adoption of projects;
- DEC unites and collaborates with SDO;
- DEC membership participates in more technical committees.

Decentralised Energy Standards Scan

"A standard is a repeatable, harmonised, agreed and documented way of doing something. Standards contain technical specifications or other precise criteria designed to be used consistently as a rule, guideline, or definition.

Standards are an important way of protecting consumers. While consumer protection is often visible through government policies or consumer protection organisations, standards create an extra protective environment that lies behind the perception of most consumers. This is particularly true where consumers have little or no choice in what they are offered. In rural communities in developing countries, consumers do not generally have the luxury of comparing features and selecting their suppliers or products from the Internet. An important aspect of this protection is to ensure the product or service delivers as claimed, performs as specified, and is reliable, durable and safe."

(Source: IRENA, https://www.irena.org/inspire/Standards/What-are-Standards)

A. National Standard of Canada (NSC)

A.1 CSA Group (CSA)		
Standard/Code	**Title**	**Scope**
A.1.1 Canadian Electrical Code	(2021 Section 64)	Section 64 provides direction for the **installation** of specific equipment such as inverters, stationary fuel cell systems, small and large wind systems, micro-hydropower systems, hydrokinetic power systems and storage batteries and includes general requirements that would apply to each of the systems mentioned.
A.1.2 CAN/CSA-C61427-1:17	Secondary Cells and Batteries for Renewable Energy Storage — General Requirements and Methods of Test — Part 1: Photovoltaic Off-Grid Application	This part of the IEC 61427 series gives general information relating to the requirements for the secondary batteries used in photovoltaic energy systems (PVES) and to the typical methods of test used for the verification of battery performances. This part deals with cells and batteries used in photovoltaic off-grid applications.
A.1.3 CSA C22.3 No. 9:20	Interconnection of Distributed Energy Resources and Electricity Supply Systems	This Standard specifies the technical requirements for the interconnection of distributed energy resources (DER) and distribution systems up to 50 kV line to line at the point of common coupling (PCC).
A.1.4 CAN/CSA Z5000-18	Building Commissioning for Energy Using Systems	This Standard provides guidelines for the commissioning of buildings and all energy and domestic water related building systems. It applies to new construction only for Part 3 buildings, as specified in the National Building Code of Canada (NBC). It does not apply to equipment and systems installed by the owner or others after building completion.

A.1.5 CSA ISO/IEC 30145-3:21	Information Technology — Smart City ICT Reference Framework — Part 3: Smart City Engineering Framework	This document describes a framework, structured in layers of ICT technologies, essential for smart cities' operation. This framework also provides the mapping of the ICT techniques to various system entities in order to support the smart city's business, knowledge management, and operational systems from the engineering perspective.
A.1.6 CSA ISO/IEC 30182:19	Smart City Concept Model — Guidance for Establishing a Model for Data Interoperability	This International Standard describes, and gives guidance on, a smart city concept model (SCCM) that can provide the basis of interoperability between component systems of a smart city, by aligning the ontologies in use across different sectors.
A.1.7 CAN/CSA-ISO 37120:15	Sustainable Development of Communities — Indicators for City Services and Quality of Life	This International Standard defines and establishes methodologies for a set of indicators to steer and measure the performance of city services and quality of life. This International Standard is applicable to any city, municipality or local government that undertakes to measure its performance in a comparable and verifiable manner, irrespective of size and location.
A.1.8 CAN/CSA-ISO 26000:16	Guidance on Social Responsibility	This International Standard is intended to assist organizations in contributing to sustainable development.

A.2 Underwriter Laboratories (UL)		
Standard/Code	**Title**	**Scope**
A.2.1 ANSI/CAN/UL 9540:2020	Standard for Energy Storage Systems and Equipment	These requirements cover energy storage systems that are intended to receive and store energy in some form so that the energy storage system can provide electrical energy to loads or to the local/area electric power system (EPS) when needed. The types of energy storage covered under this standard include electrochemical, chemical, mechanical and thermal.
A.2.2 ANSI/CAN/UL 1974	Evaluation for Repurposing Batteries	This standard covers the sorting and grading process of battery packs, modules and cells and electrochemical capacitors that were originally configured and used for other purposes, such as electric vehicle propulsion, and that are intended for a repurposed use application, such as for use in energy storage systems and other applications for battery packs, modules, cells and electrochemical capacitors.

B. International Standard

B.1 International Electrotechnical Commission (IEC)			
Technical Committee	**Title**	**Scope**	**Participation (P/O/A)**
B.1.1 IEC TC 4	Hydraulic Turbines	To prepare international standards and reports for hydraulic rotating machinery and associated equipment allied with hydro-power development.	Participating-Full Member
B.1.2 IEC TC 8	System Aspects of Electrical Energy Supply	To prepare and coordinate, in co-operation with other TC/SCs, the development of international standards and other deliverables with emphasis on overall system aspects of electricity supply systems and acceptable balance	Participating-Full Member

		between cost and quality for the users of electrical energy. Electricity supply system encompasses transmission and distribution networks, generators and loads with their network interfaces.	
B.1.3 IEC SC 8A	Grid Integration of Renewable Energy Generation	To prepare and coordinate, in co-operation with other TC/SCs, the development of international standards and other deliverables for grid integration of variable power generation from renewables such as PV, wind energy with emphasis on overall system aspects of electricity supply systems (grids) as defined in TC 8 scope.	Participating-Full Member
B.1.4 IEC SC 8B	Decentralized Electrical Energy Systems	To develop IEC publications enabling the development of secure, reliable and cost-effective systems with decentralized management for electrical energy supply, which are alternative, complement or precursor to traditional large interconnected and highly centralized systems.	Participating-Full Member
B.1.5 IEC TC 21	Secondary Cells and Batteries	To provide standards for all secondary cells and batteries related to product (dimension and performance), safety (including marking and labelling), testing, and safe application (installation, maintenance, operation) irrespective of type or application or configuration (hybrid, stand alone, module).	Participating-Full Member
B.1.6 IEC TC 69	Electrical Power/Energy Transfer Systems for EVs	To prepare publications on electrical power/energy transfer systems for electrically propelled road vehicles and industrial trucks (hereafter EV) drawing current from a rechargeable energy storage system (RESS). Possibilities to transfer power/energy include conductive power/energy transfer, wireless	Participating-Full Member

		power/energy transfer and battery swap.	
B.1.7 IEC TC 82	Solar Photovoltaic Energy Systems	To prepare international standards for systems of photovoltaic conversion of solar energy into electrical energy and for all the elements in the entire photovoltaic energy system. In this context, the concept "photovoltaic energy system" includes the entire field from light input to a photovoltaic cell to and including the interface with the electrical system(s) to which energy is supplied.	Participating-Full Member
B.1.8 IEC TC 88	Wind Energy Generation Systems	Standardization in the field of wind energy generation systems including wind turbines, wind power plants onshore and offshore and interaction with the electrical system(s) to which energy is supplied.	Participating-Full Member
B.1.9 IEC TC 105	Full Cell Technologies	To prepare international standards regarding fuel cell (FC) technologies for all FC types and various associated applications such as stationary FC power systems for distributed power generators and combined heat and power systems.	Participating-Full Member
B.1.10 TC 120	Electrical Energy Storage (EES) Systems	Standardization in the field of grid integrated EES Systems.	Participating-Full Member

B.2 Institute of Electrical and Electronics Engineers (IEEE)			
Technical Committee	**Title**	**Scope**	**Participation (P/O/A)**
B.2.1 TC-37	Measurements and Networking	The purpose of the TC-37 is to increase awareness and interest in networking and to encourage I&M Society members to apply their skills and extend their knowledge of networking-related problems in I&M application field.	Absent

B.2.2 TC-39	Measurements in Power Systems	The aim of TC-39 is to gather people involved in the field of measurements in power systems in order to lead the research on specific topics.	Absent

B.3 International Organization for Standardization (ISO)			
Technical Committee	**Title**	**Scope**	**Participation (P/O/A)**
B.3.1 ISO/TC 85	Nuclear Energy, Nuclear Technologies, and Radiological Protection	Standardization in the field of peaceful applications of nuclear energy, nuclear technologies and in the field of the protection of individuals and the environment against all sources of ionising radiations.	Participating
B.3.2 ISO/TC 92	Fire Safety	Standardization of the methods of assessing ● fire hazards and fire risk to life and to property; ● the contribution of design, materials, building materials, products and components to fire safety	Participating
B.3.3 ISO/TC 180	Solar Energy	Standardization in the field of solar energy utilization in space and water heating, cooling, industrial process heating and air conditioning. This includes developing standards on the instrumentation and procedures used for measuring solar energy and solar measurement.	Absent
B.3.4 ISO/TC 192	Gas Turbines	Standardization in the field of all aspects of gas turbine design, application, installation, operation and maintenance, including simple turbine cycles, combined cycle systems, definitions, procurement, acceptance, performance, environment (on the gas turbine itself and the external environment) and methods of test.	Participating
B.3.5 ISO/TC 193	Natural Gas	Standardization of terminology, quality specifications, methods of measurement, sampling, analysis	Absent

		and testing, including thermophysical property calculation and measurement, for: ● natural gas ● natural gas substitutes ● mixtures of natural gas with gaseous fuels (such as unconventional gases and renewable gases), and ● wet gas	
B.3.6 ISO/TC 197	Hydrogen Technologies	Standardization in the field of systems and devices for the production, storage, transport, measurement and use of hydrogen.	Participating-Secretariat
B.3.7 ISO/TC 205	Building Environment Design	Standardization in the design of new buildings and retrofit of existing buildings for acceptable indoor environment and practicable energy conservation and efficiency. Building environment design addresses the technical building systems and related architectural aspects, and includes the related design processes, design methods, design outcomes, and design-phase building commissioning. Indoor environment includes air quality, and thermal, acoustic, and visual factors.	Participating
B.3.8 ISO/TC 268	Sustainable Cities and Communities	Standardization in the field of Sustainable Cities and Communities will include the development of requirements, frameworks, guidance and supporting techniques and tools related to the achievement of sustainable development considering smartness and resilience, to help all Cities and Communities and their interested parties in both rural and urban areas become more sustainable. Note: TC 268 will contribute to the UN Sustainable Development	Participating

		Goals through its standardization work.	
B.3.9 ISO/TC 301	Energy Management and Energy Savings	Standardization in the field of energy management and energy savings	Participating
B.3.10 ISO/TC 323	Circular Economy	Standardization in the field of Circular Economy to develop frameworks, guidance, supporting tools and requirements for the implementation of activities of all involved organizations, to maximize the contribution to Sustainable Development.	Participating
B.3.11 ISO/TC 324	Sharing Economy	Standardization in the field of sharing economy.	Participating

B.4 International Telecommunication Union (ITU)	
Scope	The International Telecommunication Union (ITU) is the United Nations specialized agency for information and communication technologies – ICTs. ITU's global membership includes 193 Member States as well as some 900 companies, universities, and international and regional organizations leading the digital economy.
Areas of Interest	
Telecoms	Artificial Intelligence
Internet	Fin Tech
Broadcast	Utilities
Satellite	Automotive
Software	Smart Cities

C. Other Standards Organizations and Relevant Bodies

Organization	**Scope**
C.1 Arctic Council	The Arctic Council is the leading intergovernmental forum promoting cooperation, coordination and interaction among the Arctic States, Arctic Indigenous peoples and other Arctic inhabitants on common Arctic issues on issues of sustainable development and environmental protection in the Arctic.
C.2 Canadian Advisory Council on Electrical Safety (CACES)	CACES provides a forum for discussing the safety, technical, and regulatory aspects of developing, promoting, and implementing electrical standards for Canada. The Council monitors and reports on problems encountered in the field with respect to electrical safety and advises accredited organizations on those matters.
C.3 Canadian Advisory Council of Energy Efficiency (CACEE)	CACEE acts as the Advisory Body to participating Accredited Organizations (AOs) and provides a forum for discussing the technical, social, economic, and regulatory aspects of developing,

	promoting, and implementing Canadian standards in the field of Energy Efficiency.
C.4 Canadian Electrical Association (CEA)	CEA is governed by a Board of Directors comprised of senior executives from its Corporate Utility Members. CEA offers members a broad range of innovative programs and services in addition to delivering a coherent and convincing industry viewpoint to decision makers on critical policy and regulatory issues. CEA members generate, transmit, and distribute electrical energy to industrial, commercial, residential, and institutional customers across Canada. Members include integrated electric utilities, independent power producers, transmission and distribution companies, power marketers, manufacturers and suppliers of materials, technology, and services that keep the industry running smoothly.
C.5 Energy Council of Canada (ECC)	The Energy Council of Canada is a non-partisan, non-lobbying, resource and technology neutral organization. We bring together diverse members from energy industries, sectoral associations and governments from across Canada. As a neutral convener, we foster dialogue, strategic thinking, collaboration and action to support an affordable, stable and environmentally sound Canadian energy sector. We advocate Canadian energy with North American and international audiences.
C.6 Federal Energy Regulatory Commission (FERC)	FERC's Mission: Economically Efficient, Safe, Reliable, and Secure Energy for Consumers. Assist consumers in obtaining economically efficient, safe, reliable, and secure energy services at a reasonable cost through appropriate regulatory and market means, and collaborative efforts.
C.7 North American Electric Reliability Corporation (NERC)	The North American Electric Reliability Corporation (NERC) is a not-for-profit international regulatory authority whose mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel. NERC's area of responsibility spans the continental United States, Canada, and the northern portion of Baja California, Mexico. NERC is the Electric Reliability Organization (ERO) for North America, subject to oversight by the Federal Energy Regulatory Commission (FERC) and governmental authorities in Canada. NERC's jurisdiction includes users, owners, and operators of the bulk power system, which serves nearly 400 million people.
C.8 National Electric Manufacturers Association (NEMA)	NEMA is an ANSI-accredited Standards Developing Organization made up of business leaders, electrical experts, engineers, scientists, and technicians. NEMA convenes a neutral forum for Members to discuss industry-wide concerns and objectives under a legal umbrella by trained NEMA Staff.

C.9 National Fire Protection Association (NFPA)	One of the most notable features about NFPA's code development process is that it is open, and consensus based. That means anybody can participate in the development of these important documents. All NFPA codes and standards are periodically reviewed by more than 9,000 volunteer committee members with a wide range of professional expertise.
C.10 North American Energy Standards Board (NAESB)	NERC works with the North American Energy Standards Board (NAESB) to coordinate the development of business practices and reliability standards for the wholesale electric industry. The members and staff of NERC and NAESB actively participate in both organizations, and NERC is a member of the NAESB Wholesale Electric Quadrant. NAESB representatives participate in NERC technical committees and regularly attend meetings of the NERC Stakeholders Committee and Board of Trustees.

Appendix 1 – Keywords and Acronyms

National Standard of Canada (NSC) – A standard developed by a Standards Council of Canada (SCC) accredited standard development organization following SCC prescribed requirements and guidance, resulting in a full consensus document designated as a National Standard of Canada. Intended as the standard of choice for national use. Often identified as "CAN" descriptor in the title.

American National Standards Institute (ANSI) – The ANSI designation indicated the standard was developed or adopted in compliance with the USA's national standards development requirements. Often identified by the "ANSI" descriptor in the title.

International Standard – An international standard published by any international standardizing/standards organization and made available to the public (ISO, IEC, IEEE, ITU). These standards can be adopted by countries as national standards or used independently.

Industry Standard – A document, established by consensus and approved by a recognized body that provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context.

Keywords

Affordable Energy
Aggregation of Energy
Automation
Bioenergy
Circular Economy
Climate Action
Cogeneration
Combined Heat and Power (CHP)
Community Energy
Community Energy Planning (CEP)
Decentralised Energy/Decentralized Energy (DE)
Distributed Energy Resource Management System (DERMS)
Digitalization of Energy
Distributed Energy
Distributed Energy Interconnection
Distributed Energy Networks
Distributed Energy Resource
Distributed Energy Resource Management
Distributed Networks
District Energy
Earth Energy
Electric Vehicles (EV)
Electricity Measurement
Electricity Monitoring
Electrification
Energy Security
Energy Storage
Independent Electricity
Indigenous Energy
Integration of Energy
Microgrids
Modular Reactors
Nanogrids
Optimization of Energy
Power Controls
Pumped Storage
Responsible Consumption
Responsible Production
Small-Scale Power Generation
Small Modular Nuclear Reactors
Smart Grids
Solar Energy
Storage Batteries
Sustainable Cities
Virtual Power Plants (VPP)